Appendix G
Standard Operating Procedures

(Provided on CD Only)

SOP-B2

Soil Classification and Logging Procedures
Standard Operating Procedures for PG&E Topock Program

This standard operating procedure (SOP) provides guidance to obtain accurate and consistent descriptions of soil characteristics during soil-sampling operations. The characterization is based on visual examination and manual tests not on laboratory determinations.

REQUIRED DOCUMENTS

1) Event-specific sampling and analysis plan, work plan or event-specific field instructions. Planned borehole depth, proposed well construction/specifications, and field sampling summary table, if available.
2) Applicable project work plan or monitoring plan. Refer to Topock Program *Sampling, Analysis, and Field Procedures Manual* and *Quality Assurance Project* Plan (Procedures Manual), as required.
3) Topock Program Health and Safety Plan (HSP).
4) Previous sampling, drilling, or well construction logs from other boreholes or wells in the vicinity, if available.
5) Blank field notebook.
6) Blank CH2M HILL soil boring log Form D1586.

PREPARATION AND SETUP

1) Review event-specific work plan or event-specific field instructions, previous sampling logs, Procedures Manual, and HSP.
2) Initiate field logbook for sampling activity.
3) Review sampling procedures and equipment, and planned sample depths with drilling contractor and field crew.

EQUIPMENT LIST

- Indelible pens
- Tape measure or ruler
- Field logbook
- Spatula
- HCl, 10-percent solution
- Squirt bottle/Spray bottle with water

- Rock- or soil-color chart (e.g., Munsell)
- Grain-size chart
- Hand lens
- Unified Soil Classification System index charts and tables to help with soil classification

PROCEDURES

This section covers several aspects of the soil characterization: instructions for completing the CH2M HILL soil boring log (see Form D1586, Attachment A) and the field logging of soil using the "Unified Soil Classification System and Logging Criteria" (Attachment B).

Instructions for Completing Soil Boring Logs

- Soil boring logs will be completed on field boring log forms. Information collected will be consistent with that required for Form D1586 (attached), a standard CH2M HILL form, or an equivalent form that supplies the same information.
- The information collected in the field to perform the soil characterization is described below.
- Field personnel should review completed logs for accuracy, clarity, and thoroughness of detail. Samples also should be checked to see that information is correctly recorded on both jar lids and labels and on the log sheets.

Heading Information

1) **Boring/Well Number.** Enter the boring/well number. A numbering system should be chosen that does not conflict with information recorded for previous exploratory work done at the site. Number the sheets consecutively for each boring.
2) **Location.** If stationing, coordinates, mileposts, or similar project layout information is available, indicate the position of the boring to that system using modifiers such as "approximate" or "estimated," as appropriate.
3) **Elevation.** Elevation will be determined at the conclusion of field activities.
4) **Drilling Contractor.** Enter the name of the drilling company and the city and state where the company is based.
5) **Drilling Method and Equipment.** Identify the bit size and type, drilling fluid (if used), and method of drilling (e.g., rotary, hollow-stem auger, sonic). Information on the drilling equipment (e.g., CME 55, Mobile B61) should be noted.
6) **Water Level and Date.** Enter the depth below ground surface to the apparent water level in the borehole. The information should be recorded as a comment. If free water is not encountered during drilling or cannot be detected because of the drilling method, this information should be noted. Record date and time of day (for tides, river stage) of each water level measurement.

7) **Date of Start and Finish.** Enter the dates the boring was started and completed. Time of day should be added if several borings are performed on the same day.

8) **Logger.** Enter the first initial and full last name of the logger.

Technical Data

1) **Depth Below Surface.** Use a depth scale that is appropriate for the sample spacing and for the complexity of subsurface conditions.

2) **Sample Interval.** Note the depth at the top and bottom of the sample interval.

3) **Sample Type and Number.** Enter the sample type and number. SS-1 = split spoon, first sample. Number samples consecutively regardless of type. Enter a sample number even if no material was recovered in the sampler.

4) **Sample Recovery.** Enter the length to the nearest 0.1 foot of soil sample recovered from the sampler. Often, there will be some wash or caved material above the sample; do not include the wash material in the measurement. Record recovery in feet.

5) **Soil Description.** The soil classification should follow the format described in the "Field Classification of Soil" subsection below.

6) **Comments.** Include all pertinent observations (changes in drilling fluid color, rod drops, drilling chatter, rod bounce as in driving on a cobble, damaged Shelby tubes, and equipment malfunctions). In addition, note if casing was used, the sizes and depths installed, and if drilling fluid was added or changed. You should instruct the driller to alert you to any significant changes in drilling (changes in material, occurrence of boulders, and loss of drilling fluid). Such information should be attributed to the driller and recorded in this column. Specific information might include:

   - The date and the time drilling began and ended each day.
   - The depth and size of casing and the method of installation.
   - The date, time, and depth of water level measurements.
   - Depth of rod chatter.
   - Depth and percentage of drilling fluid loss.
   - Depth of hole caving or heaving.
   - Depth of change in material.
   - Health and safety monitoring data.
   - Drilling interval through a boulder.

Field Classification of Soil

This section presents the format for the field classification of soil. In general, the approach and format for classifying soils should conform to the "United Soils Classification System and Logging Criteria" (see charts and criteria, Attachment B).

- The Unified Soil Classification System (USCS) is based on numerical values of certain soil properties that are measured by laboratory tests (ASTM D 2487). It is possible, however, to estimate these values in the field with reasonable accuracy using visual-manual procedures (ASTM D 2488). In addition, some elements of a complete soil description, such as the presence of cobbles or boulders, changes in strata, and the relative proportions of soil types in a bedded deposit can be obtained only in the field.
- Soil descriptions should be precise and comprehensive without being verbose. The correct overall impression of the soil should not be distorted by excessive emphasis on insignificant details. In general, similarities rather than differences between consecutive samples should be stressed.

Soil Descriptions

Soil descriptions must be recorded for every soil sample collected. The format and order for soil descriptions should be:

1) Soil name (synonymous with ASTM D 2488 Group Name) with appropriate modifiers. Soil name should be in all capitals in the log, for example "POORLY-GRADED SAND."
2) Group symbol, in parentheses, for example, "(SP)."
3) Color, using Munsell color designation.
4) Particle size distribution (i.e., sand, silt, clay).
5) Moisture content.
6) Relative density or consistency.
7) Soil structure, mineralogy, or other descriptors.

This order follows, in general, the format described in ASTM D 2488.

(1) Soil Name

The basic name of a soil should be the ASTM D 2488 Group Name on the basis of visual estimates of gradation and plasticity. The soil name should be capitalized.

Examples of acceptable soil names are illustrated by the following descriptions:

- A soil sample is visually estimated to contain 15-percent gravel, 55-percent sand, and 30-percent fines (passing No. 200 sieve). The fines are estimated as either low- or highly-plastic silt. This visual classification is SILTY SAND WITH GRAVEL with a Group Symbol of (SM).
- Another soil sample has the following visual estimate: 10-percent gravel, 30-percent sand, and 60-percent fines (passing the No. 200 sieve). The fines are estimated as low-plastic silt. This visual classification is SANDY SILT. The gravel portion is not included in the soil name because the gravel portion was estimated as less than 15 percent. The Group Symbol is (ML).

The gradation of coarse-grained soil (more than 50 percent retained on No. 200 sieve) is included in the specific soil name in accordance with ASTM D 2488.

- There is no need to further document the gradation.
- However, the maximum size and angularity or roundness of gravel and sand-sized particles should be recorded.
- For fine-grained soil (50 percent or more passing the No. 200 sieve), the name is modified by the appropriate plasticity/elasticity term in accordance with ASTM D 2488.

Interlayered soil should each be described starting with the predominant type.

- An introductory name, such as "Interlayered Sand and Silt," should be used.
- In addition, the relative proportion of each soil type should be indicated (see Table 1 for example).

Where helpful, the evaluation of plasticity/elasticity can be justified by describing results from any of the visual-manual procedures for identifying fine-grained soils, such as reaction to shaking, toughness of a soil thread, or dry strength as described in ASTM D 2488.

(2) Group Symbol

The appropriate group symbol from ASTM D 2488 must be given after each soil name.

1) The group symbol should be placed in parentheses to indicate that the classification has been estimated.
2) In accordance with ASTM D 2488, dual symbols (e.g., GP-GM or SW-SC) can be used to indicate that a soil is estimated to have about 10-percent fines.
3) Borderline symbols (e.g., GM/SM or SW/SP) can be used to indicate that a soil sample has been identified as having properties that do not distinctly place the soil into a specific group. Generally, the group name assigned to a soil with a borderline symbol should be the group name for the first symbol. The use of a borderline symbol should not be used indiscriminately. Every effort should be made to first place the soil into a single group.

(3) Color

Soil color is described by comparing the sample with the Munsell Soil Color Charts. The Munsell colors should be used unless directed otherwise by project sampling plans. Instructions for their proper use are in the color charts. The color name shall precede the Munsell color notation (e.g., "yellowish brown, 10 YR 5/4"), with color hue and chroma number parenthetically entered in the borelog description. If no color chip is available, the color should be simply described as primary color (i.e., green, brown, gray, yellow, tan, etc.).

(4) Particle Size Distribution

Within the gravel sizes and the sand sizes, there are further divisions based on particle sizes. Gravel is divided into fine and coarse gravel. Fine-gravel particles (pebbles) are those that would pass through 3/4-inch opening but not a 1/4-inch opening. The fine gravel ranges from pea- to marble-sized. Coarse-gravel particles are those that would pass through a 3-inch opening but not a 3/4-in opening. Common objects of this size are grapes and tennis balls. Cobbles range from 3 inches to 12 inches in size; boulders are larger than 12 inches.

Sand is divided into three sizes: fine, medium, and coarse. Sand passes a No. 4 sieve (approximately 1/4 inch) and is retained in a No. 200 sieve (0.003 inch). Fine-sand particles pass a No. 40 sieve (approximately 1/64 inch) and are retained in the No. 200 (0.003 inch) sieve. These particles are sugar- or table salt-sized. Medium sand passes the No. 10 sieve (approximately 1/2 inch) and retained on the No. 40 sieve. These particles are about the same size as the openings in window screening. Coarse-sand particles would pass a No. 4 sieve (approximately 1/4 inch) and be retained on a No. 10 sieve. Rock salt granules fall in this size range. Sand and gravel particle sizes are illustrated in ASTM D2488 along with percentage estimating charts. The percentages of different grain size fractions are important in the soil type determination.

(5) Moisture Content

Soil moisture content shall be estimated using only the terminology described below:

- Dry - Absence of moisture, dusty, dry to the touch
- Moist - Damp but no visible water
- Wet - Visibly free water, usually sampled from below the water table

(6) Relative Density or Consistency

An estimate of the consistency shall accompany descriptions of all fine-grained soil (silt and clay where more than 50 percent of the material would pass the No. 200 sieve). A pocket penetrometer is the most accurate method for estimating the consistency of fine-grained soils. The table below lists characteristics for soil consistency identification.

Consistency	Unconfined Compressive Strength (tons/ft)[a]	Blows/foot (SPT) [b]	Manual Procedure
Very soft	<0.25	0 – 4	Thumb will penetrate soil more than 1 inch (25 mm).
Soft	0.25 - 0.50	4 – 8	Thumb will penetrate soil about 1 inch (25 mm).
Firm (formerly stiff)	-1.50	8 – 15	Thumb will indent soil about 1/4 inch (6 mm).
Hard	-2.00	15 – 30	Thumb will not indent soil but readily indented with thumbnail.
Very hard	>4.0	> 30	Thumbnail will not indent soil.

Notes:

[a] Pocket penetrometer

[b] Blows/foot is defined as the total number of blows required to drive the second and third 6 inches of penetration (blow counts for the first 6 inches are also noted) while driving an 18-inch SPT sampler with a 140-pound hammer falling a free height of 30 inches. Conversion factors may be applied when the field log information is transferred to the final log when using a sampler other than an SPT (Standard penetrometer) (e.g., S&H or Modified California), or when using different hammer weights and drop. The conversion factor is approximately 0.5 for an S&H sampler with a hammer weight of 140 pounds falling 30 inches.

Descriptions of all coarse-grained soil (sand and gravel where less than 50 percent of the material would pass the No. 200 sieve and 100 percent would pass the 3-inch sieve) shall be accompanied by an estimate of the density based upon standard penetrometer (SPT) blow counts. The following terminology should be used:

Density	Blows/foot (SPT)
Very loose	< 4
Loose	4-10
Medium dense	10-30
Dense	30-50
Very dense	> 50

(7) Soil Structure, Mineralogy, and Other Descriptors

Discontinuities and inclusions are important and should be described. Such features include joints or fissures, slickensides, bedding or laminations, veins, root holes, and wood debris.

Significant mineralogical information such as cementation, abundant mica, or unusual mineralogy should be described.

Other descriptors may include particle angularity or shape, maximum particle size, hardness of large particles, plasticity of fines, dry strength, dilatancy, toughness, reaction to HCl, and staining, as well as other information such as organic debris, odor, or presence of free product. Criteria for the use of these other descriptions include:

- Structure:
  - Stratified - Alternating layers of varying material or color with layers at least 1/4-inch thick; note thickness.
  - Laminated - Alternating layers of varying material or color with the layers less than 1/4-inch thick; note thickness.
  - Fissured - Breaks along definite planes of fracture with little resistance.
  - Slickensides - Fracture planes appear polished or glossy, often striated.
  - Blocky - Cohesive soil that can be broken down into small angular lumps that resist further breakdown.
  - Lensed - Inclusion of small pockets of different soils, such as lenses of sand within clay; note thickness.
  - Homogeneous - Same color and appearance throughout.
  - Grading - Whether the particles increase or decrease in size toward the top of logged interval.
- Particle Shape:
  - Flat - Particles with width/thickness ratio > 3.
  - Elongated - Particles with length/width ratio > 3.

- Elongated and flat - Particles meet criteria for both flat and elongated.

- Particle Angularity:
  - Angular - Particles have sharp edges and relatively planar sides with unpolished surfaces.
  - Subangular - Particles are similar to angular description but have rounded edges.
  - Subrounded - Particles have nearly planar sides but have well-rounded corners and edges.
  - Rounded - Particles have smoothly-curved sides and no edges.

- Cementation:
  - Weak - rumbles or breaks with handling or little finger pressure.
  - Moderate - Crumbles or breaks with considerable finger pressure.
  - Strong - Will not crumble or break with finger pressure.

- Reaction with HCl:
  - None - No visible reaction.
  - Weak - Some reaction, bubbles forming slowly.
  - Strong - Vigorous reaction, bubbles forming immediately.

Comments

This section should be reserved for information not pertaining to lithologic description. Sample information including sample identifier, analysis, matrix, and depth interval should be included in the boring log comments. Information related to drilling, such as drilling rate, chatter, and equipment malfunctions should also be well documented in the comments section of the boring log. Additionally interpretations of the lithologic data may also be presented in the comments section. Examples of this include "transition between Older Alluvium and Fanglomerate," "paleosol horizon B," or "conductive zone."

Recovery

Recovery data are entered along the left side of the boring log. Enter the length of retrieved core to the nearest 0.1 foot of sample recovered and record the value in feet. Do not count slough or caved material as part of the total recovered length of core. Record total length and percent of sample recovered. If using a 5-foot sample barrel, multiply the total length by 2 and 100 to get a percentage number. Similarly, if using a 2.5-foot sampler, multiply by 4 and 100 to get the percent recovery.

Backfilling

When a boring is completed and the water level measured, the boring shall be backfilled to ground surface according to applicable regulations. The destruction of the hole shall be noted on the log. Borehole destruction should follow SOP 28 *Soil Boring Abandonment*

Attachments

- Soil Boring Log, CH2M HILL Form D1586, and a completed example
- Unified Soil Classification System and Logging Criteria

Key Checks and Preventive Maintenance

Check entries to the soil boring log and field logbook in the field; because the samples will be disposed of, confirmation and corrections cannot be made later. Check that sample numbers and intervals are properly specified. Check that drilling and sampling equipment is decontaminated using the procedures defined in SOP *Decontamination of Drilling Rigs and Equipment*.

ATTACHMENT A

Examples of Soil Bore Logs

CH2MHILL

PROJECT NUMBER	BORING NUMBER SHEET OF

SOIL BORING LOG

PROJECT ______________________ LOCATION ______________________

ELEVATION ______________ DRILLING CONTRACTOR ______________________

DRILLING METHOD AND EQUIPMENT ______________________

WATER LEVELS ______________ START ________ FINISH ________ LOGGER ________

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS	SOIL DESCRIPTION	COMMENTS
	INTERVAL	NUMBER AND TYPE	RECOVERY (FT)	6"-6"-6" (N)	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION

REV 9/96 FORM D1586

PROJECT NUMBER: 326128.01.16.EN

BORING NUMBER: *MW-47*

SOIL BORING LOG - DRAFT FOR DISCUSSION

PROJECT NAME: IMPM Drill Program		**HOLE DEPTH (ft):** 288.0	**DRILLING CONTRACTOR:** Prosonic Corp. Phoenix, AZ	
SURFACE ELEVATION: 482.6 ft. MSL	**NORTHING (CCS NAD 27 Z 5):** 2,103,450.05	**EASTING (CCS NAD 27 Z 5):** 7,615,629.49	**DATE STARTED:** 02/27/2006	**DATE COMPLETED:** 03/13/2006
DRILLING METHOD: Rotosonic			**DRILLING EQUIPMENT:** Sonic AT (track mounted)	
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California			**LOGGED BY:** B. Moayyad, K. Ebel	

DEPTH BGS (feet)	SAMPLE INTERVAL	SAMPLE TYPE/ NUMBER	SAMPLE RECOVERY (ft)	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.	COMMENTS: DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.
0–15	0–6		6	SP	**POORLY GRADED SAND (SP)** - very lt brn (10YR7/3), =2% fines, 98% f to m lithic quartz sand, subang to subrnd, dry - fine roots, iron staining, some iron oxide coating on grains - slightly moist - dry	Hand augured to 5' bgs
	6–17		10			Rapid drill rate, no chatter
15–25	17–34		16	SW	**WELL GRADED SAND w/ GRAVEL (SW)** - lt yellowish brn (10YR6/4), 45% gravel up to 7cm, 50% f to m sand, 5% fines, loose, met subang gravel, dry(moist@ 17') - cobble present in slough - one subrnd chert gravel - Possible Fluvially Reworked Alluvium - lt grey (10YR7/2), subang to rnd met gravel up to 9cm, 2% to 5% fines - dk yellowish brn (10YR4/4), mostly c sand subang to ang, met, some Miocene conglomerate gravel - 65% sand, 30% gravel up to 4cm, 5% fines	
25–30				SW	**WELL GRADED SAND w/ GRAVEL (SW)** - dk yellowish brn (10YR3/6), 35% gravel up to 4cm, 55% m to c sand, 10% silty fines, met clasts are grain supported some mm siltstone - some oxide staining	
30–34				SW	**WELL GRADED SAND w/ GRAVEL AND CLAY (SW)** - dk yellowish brn (10YR3/6), 30% subang met gravel up to 7 cm, 55% subrnd to subang m to c sand, 15% clayey fines, m density, moist	Drill rate slowed to clean out 8" pipe
35						

CH2MHILL

PROJECT NUMBER: 326128.01.16.EN

BORING NUMBER: *MW-47*

SOIL BORING LOG - DRAFT FOR DISCUSSION

PROJECT NAME: IMPM Drill Program		**HOLE DEPTH (ft):** 288.0	**DRILLING CONTRACTOR:** Prosonic Corp. Phoenix, AZ	
SURFACE ELEVATION: 482.6 ft. MSL	**NORTHING (CCS NAD 27 Z 5):** 2,103,450.05	**EASTING (CCS NAD 27 Z 5):** 7,615,629.49	**DATE STARTED:** 02/27/2006	**DATE COMPLETED:** 03/13/2006
DRILLING METHOD: Rotosonic			**DRILLING EQUIPMENT:** Sonic AT (track mounted)	
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California			**LOGGED BY:** B. Moayyad, K. Ebel	

DEPTH BGS (feet)	SAMPLE INTERVAL	SAMPLE TYPE/NUMBER	SAMPLE RECOVERY (ft)	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.	COMMENTS: DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.
			2.5	SW	**WELL GRADED SAND w/ GRAVEL (SW)** - dr yellowish brn (10YR3/6), 30% gravel, 60% sand, 10% silty fines	Drilling smooth but preceeds less rapidly
40			10	SW	**WELL GRADED SAND w/ GRAVEL (SW)** - 40% subang met gravel up to 6cm, 55% subrnd to ang sand, 5% fines - more gravel below 38' - gravel is mostly fine	
45						
50			10	SW	**WELL GRADED SAND w/ GRAVEL (SW)** - Pale brn (10YR6/3), 30% subang met gravel up to 5cm, 60% subrnd to subang m to c met sand, 10% silty fines, wet	Soil sample collected
				SP	**POORLY GRADED SAND w/ GRAVEL (SP)** - pale brn (10TR6/3), 30% f subang gravel up to 2 cm, 65% mostly c sand, =2% fines	
55				SW	**WELL GRADED SAND w/ GRAVEL (SW)** - yellowish brn (10YR5/4), 40% subang met gravel up to 9cm, 55% f to c met sand, 5% silty fines, clast supported, m density, wet	
60			9.5	GW	**WELL GRADED GRAVEL w/ SILT AND SAND (GW)** - brn (7.5YR5/4), 55% subang to ang met gravel up to 4cm, 25% f to c sand, 20% silty fines, dense, moist to dry - soil dries out - lt grey (10YR7/2) and powder dry - moist sandy zone, 55% gravel, 35% sand, 10% fines - dry silty lt grey GW below 65'	Collected Isoflow sample Drill rate slows to 2' / min
65						
70				SW	**WELL GRADED SAND w/ GRAVEL (SW)** - yellowish brn (10YR5/4), 35% subang met gravel up to 4cm, 60% subrnd sand, 5% silty fines, loose, moist to wet	Moderate Drill Rate

SHEET 5 of 9	PROJECT NUMBER: 326128.01.16.EN	BORING NUMBER: *MW-47*

SOIL BORING LOG - DRAFT FOR DISCUSSION

PROJECT NAME: IMPM Drill Program		**HOLE DEPTH (ft):** 288.0	**DRILLING CONTRACTOR:** Prosonic Corp. Phoenix, AZ	
SURFACE ELEVATION: 482.6 ft. MSL	**NORTHING (CCS NAD 27 Z 5):** 2,103,450.05	**EASTING (CCS NAD 27 Z 5):** 7,615,629.49	**DATE STARTED:** 02/27/2006	**DATE COMPLETED:** 03/13/2006
DRILLING METHOD: Rotosonic			**DRILLING EQUIPMENT:** Sonic AT (track mounted)	
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California			**LOGGED BY:** B. Moayyad, K. Ebel	

DEPTH BGS (feet)	SAMPLE INTERVAL	SAMPLE TYPE/ NUMBER	SAMPLE RECOVERY (ft)	USCS CODE	SOIL DESCRIPTION SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.	COMMENTS DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.
			6	SP	**POORLY GRADED SAND w/ SILT (SP)** - brn (7.5YR4/4), 5% subrnd to subang met gravel up to 4cm, 85% f to c sand, 10% fines, poorly graded, wet, no odor	
145			3	SM	**SILTY SAND W/ GRAVEL (SM)** - brn (7.5YR4/4), 20% subang to subrnd gravel up to 6cm, 60% f to c sand, 20% silty fines, well graded, m consolidated, met, wet, no odor	
150			5	SM	**SILTY SAND w/ GRAVEL (SM)** - dk yellowish brn (10YR4/4), 25% subang to subrnd up to 4cm met gravel, 60% well graded f to c sand, 15% fines, wet, no odor	
155			4	SW	**WELL GRADED SAND w/ SILT AND SAND (SW)** - dr yellowish brn (10YR4/4), 10% subang to subrnd up to 3cm met gravel, 75%well graded f to c sand, 15% fines, moist to wet	
			2	SW	**SILTY SAND (SM)** - brn (7.5YR4/4), 5% ang to subrnd met gravel up to 1.5cm increasing with depth, 85% poorly graded m to c sand, 10% fines, loose, wet	
			2	SM	**SILTY SAND w/ GRAVEL (SM)** - dk yellowish brn (10YR4/4), 15% subang to subrnd up to 2.5cm met gravel, 75% well graded f to c sand, 10% fines, mostly met, trace chert, loose, wet, no odor	Collected Isoflow sample
160			4	SM	**SILTY SAND W/ GRAVEL (SM)** - brn (7.5YR4/4), 25% subang to subrnd gravel up to 6.5cm, 60% m to c sand, 15% silty fines, well graded, m consolidated, met, wet, no odor	Drill rate = 0.75' to 1.5' / min
165			4	SW	**SILTY SAND (SW)** - mottled dk reddish brn (5YR3/4), 10% subang to subrnd gravel up to 2.5cm, 50% well graded f to m sand, 40% silt, metamorphic, dry to damp, no odor, interbedded sandy silt laminations	
170			5.5	SW	**SAND w/ GRAVEL (SW)** - dk reddish brn (5YR3/4), 20% subang to subrnd gravel up to 5cm, 75% f to c sand, 5% fines, well graded, loose, met, wet	
175			2.5	SM	**SILTY SAND w/ GRAVEL (SM)** - brn (7.5YR4/4), 15% subang to subrnd gravel, 70% f to m sand, 15% fines, poorly graded, met,increasingly consolidated, slightly to moderately calcareous, moist to wet	

CH2MHILL

SHEET 9 of 9	PROJECT NUMBER: 326128.01.16.EN	BORING NUMBER: *MW-47*

SOIL BORING LOG - DRAFT FOR DISCUSSION

PROJECT NAME: IMPM Drill Program		HOLE DEPTH (ft): 288.0	DRILLING CONTRACTOR: Prosonic Corp. Phoenix, AZ	
SURFACE ELEVATION: 482.6 ft. MSL	NORTHING (CCS NAD 27 Z 5): 2,103,450.05	EASTING (CCS NAD 27 Z 5): 7,615,629.49	DATE STARTED: 02/27/2006	DATE COMPLETED: 03/13/2006
DRILLING METHOD: Rotosonic			DRILLING EQUIPMENT: Sonic AT (track mounted)	
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California			LOGGED BY: B. Moayyad, K. Ebel	

DEPTH BGS (feet)	SAMPLE INTERVAL	SAMPLE TYPE/ NUMBER	SAMPLE RECOVERY (ft)	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.	COMMENTS: DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.
285			0	BR	**MIOCENE CONGLOMERATE BEDROCK (BR)** - 60% well graded subang to rnd gravel up to 10cm, 30% well graded sand, 10% fines, very calcareous, well consolidated to mostly hard, mod to very altered locally, mostly met, dry to moist	

Boring Terminated at 288 ft

ABBREVIATIONS

cc = continuous core run
brn = brown
lt = light
dk = dark
vf = very fine-grained
f = fine-grained
m = medium-grained
c = coarse-grained
vc = very coarse-grained
ang = angular
subang = subangular
subrnd = subrounded
rnd = rounded
br = bedrock formation
ss = sandstone
conglom = conglomerate
comptd = compacted
qtz = quartz

CH2MHILL

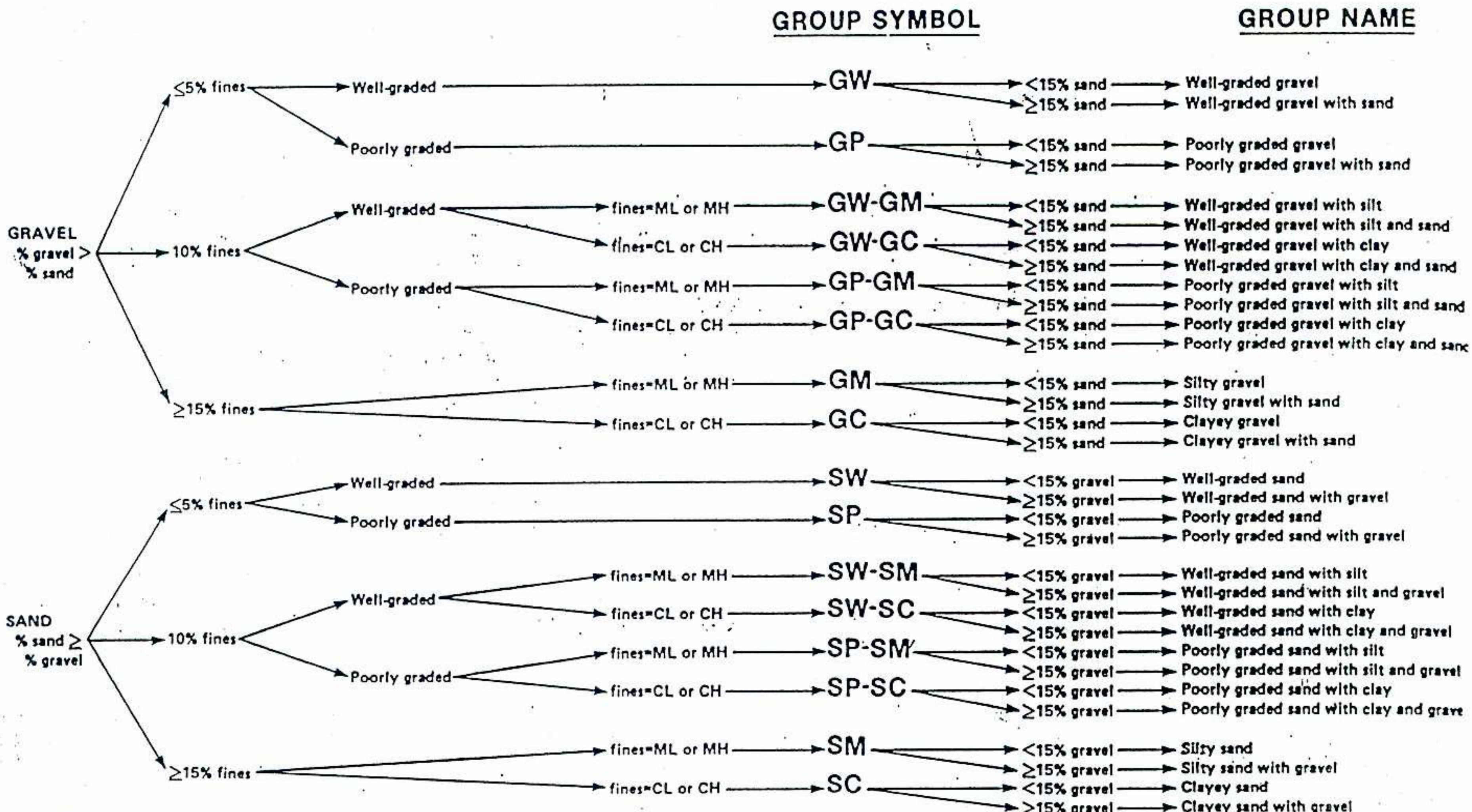
ATTACHMENT B

Unified Soil Classification System and Logging Criteria

GENERAL SOIL CATEGORIES			SYMBOLS	TYPICAL SOIL TYPES
COARSE GRAINED SOILS More than half is larger than No. 200 sieve	GRAVEL More than half coarse fraction is larger than No. 4 sieve size	Clean Gravel with little or no fines	GW	Well Graded Gravel, Gravel-Sand Mixtures
			GP	Poorly Graded Gravel, Gravel-Sand Mixtures
		Gravel with more than 12% fines	GM	Silty Gravel, Poorly Graded Gravel-Sand-Silt Mixtures
			GC	Clayey Gravel, Poorly Graded Gravel-Sand-Clay Mixtures
	SAND More than half coarse fraction is smaller than No. 4 sieve size	Clean sand with little or no fines	SW	Well Graded Sand, Gravelly Sand
			SP	Poorly Graded Sand, Gravelly Sand
		Sand with more than 12% fines	SM	Silty Sand, Poorly Graded Sand-Silt Mixtures
			SC	Clayey Sand, Poorly Graded Sand-Clay Mixtures
FINE GRAINED SOILS More than half is smaller than No. 200 sieve	SILT AND CLAY Liquid Limit Less than 50%		ML	Inorganic Silt and Very Fine Sand, Rock Flour, Silty or Clayey Fine Sand, or Clayey Silt with Slight Plasticity
			CL	Inorganic Clay of Low to Medium Plasticity, Gravelly Clay, Sandy Clay, Silty Clay, Lean Clay
			OL	Organic Clay and Organic Silty Clay of Low Plasticity
	SILT AND CLAY Liquid Limit Greater than 50%		MH	Inorganic Silt, Micaceous or Diatomaceous Fine Sandy or Silty Soils, Elastic Silt
			CH	Inorganic Clay of High Plasticity, Fat Clay
			OH	Organic Clay of Medium to High Plasticity, Organic Silt
HIGHLY ORGANIC SOILS			PT	Peat and Other Highly Organic Soils

UNIFIED SOIL CLASSIFICATION SYSTEM

JOB NUMBER	DATE	APPROVED	PLATE



NOTE:
Percentages are based on estimating amounts of fines, sand, and gravel to the nearest 5%
(After ASTM Designation D2488 Standard Test Method for Classification of Soils for Engineering Purposes)

Flow Chart for Classifying Coarse-grained Soil
(50% or more retained on No. 200 sieve)
Field Guide for Soil Classification and Logging Procedures

GROUP SYMBOL				GROUP NAME
CL	<30% plus No. 200	<15% plus No. 200		Lean clay
		15-25% plus No. 200	% sand ≥% gravel	Lean clay with sand
			% sand <% gravel	Lean clay with gravel
	≥30% plus No. 200	% sand ≥% of gravel	<15% gravel	Sandy lean clay
			≥15% gravel	Sandy lean clay with gravel
		% sand <% gravel	<15% sand	Gravelly lean clay
			≥15% sand	Gravelly lean clay with sand
ML	<30% plus No. 200	<15% plus No. 200		Silt
		15-25% plus No. 200	% sand ≥% gravel	Silt with sand
			% sand <% gravel	Silt with gravel
	≥30% plus No. 200	% sand ≥% of gravel	<15% gravel	Sandy silt
			≥15% gravel	Sandy silt with gravel
		% sand <% gravel	<15% sand	Gravelly silt
			≥15% sand	Gravelly silt with sand
CH	<30% plus No. 200	<15% plus No. 200		Fat clay
		15-25% plus No. 200	% sand ≥% gravel	Fat clay with sand
			% sand <% gravel	Fat clay with gravel
	≥30% plus No. 200	% sand ≥% of gravel	<15% gravel	Sandy fat clay
			≥15% gravel	Sandy fat clay with gravel
		% sand <% gravel	<15% sand	Gravelly fat clay
			≥15% sand	Gravelly fat clay with sand
MH	<30% plus No. 200	<15% plus No. 200		Elastic silt
		15-25% plus No. 200	% sand ≥% gravel	Elastic silt with sand
			% sand <% gravel	Elastic silt with gravel
	≥30% plus No. 200	% sand ≥% of gravel	<15% gravel	Sandy elastic silt
			≥15% gravel	Sandy elastic silt with gravel
		% sand <% gravel	<15% sand	Gravelly elastic silt
			≥15% sand	Gravelly elastic silt with sand

NOTE:
Percentages are based on estimating amounts of fines, sand, and gravel to the nearest 5%
(After ASTM Designation D2488 Standard Test Method for Classification of Soils for Engineering Purposes)

Flow Chart for Classifying Fine-grained Soil
(50% or more passing No. 200 sieve)
Field Guide for Soil Classification and Logging Procedures

similar, the material is classified as poorly graded or well sorted. If fines represent less than 5 percent of the total mass, the symbol SP is used for a poorly-graded sand and SW for a well graded sand. If silts and/or clays exceed 12 percent, the symbols GC, SC, GM, and SM are used, respectively.

If the silts and clays are between 5 to 12 percent of the total sample weight, a dual classification with two group symbols is used. The first symbol is GW, GP, SW, or, SP, and the second is GC, GM, SC, or SM. The group name corresponds to the first group symbol plus the modifying words "with clay" or "with silt" to indicate the plasticity characteristics. If the fines plot on the CL-ML range on the plasticity chart (Figure 2-2), possible dual classification group names are:

GW-GM	well graded gravel with silt
GW-GC	well graded gravel with clay
GP-GM	poorly graded gravel with silt
GP-GC	poorly graded gravel with clay
SW-SM	well graded sand with silt
SW-SC	well graded sand with clay
SP-SM	poorly graded sand with silt
SP-SC	poorly graded sand with clay

If silts and clays exceed 12 percent of the total weight of sample, the modifiers "M" and "C" are used, respectively. If a sand or gravel has more than 15 percent of the other coarse-grained constituent, the words "with gravel" or "with sand" are added to the group name. A flow chart for classifying coarse-grained soils is presented in Figure 2-3.

2.2 Fine-grained Soils

Particles passing the No. 200 sieve are silts (M) and clays (C). These soils must undergo testing in order to differentiate between them. Typical tests used are: dry strength, dilatancy, toughness, and plasticity. These terms are further discussed in Tables 2-2 through Table 2-6. Silts have little or no dry strength when dry, while clays have considerable dry strength. Dry strength, dilatancy, and toughness are also used to identify the fine-grained fraction of coarse-grained soils.

TABLE 2-2
Criteria for Describing Dry Strength

Description	Criteria
None	The dry specimen crumbles into powder with the mere pressure of handling.
Low	The dry specimen crumbles into powder with some finger pressure.
Medium	The dry specimen breaks into pieces or crumbles with considerable finger pressure.
High	The dry specimen cannot be broken with finger pressure. The specimen will break into pieces between the thumb and a hard surface.
Very high	The dry specimen cannot be broken between the thumb and a hard surface.

TABLE 2-3
Criteria for Describing Dilatancy

Description	Criteria
None	There is no visible change in the specimen.
Slow	Water appears slowly on the surface of the specimen during shaking, and does not disappear, or disappears slowly upon squeezing.
Rapid	Water appears quickly on the surface of the specimen during shaking, and disappears quickly upon squeezing.

TABLE 2-4
Criteria for Describing Toughness

Description	Criteria
Low	Only slight pressure is required to roll the thread near the plastic limit. The thread and the lump are weak and soft.
Medium	Medium pressure is required to roll the thread to near the plastic limit. The thread and the lump have medium stiffness.
High	Considerable pressure is required to roll the thread to near the plastic limit. The thread and the lump have very high stiffness.

TABLE 2-5
Identification of Inorganic Fine-grained Soils from Manual Tests

Soil Symbol	Dry Strength	Dilatancy	Toughness
ML	None to low	Slow to rapid	Low or thread cannot form
CL	Medium to high	None to slow	Medium
MH	Low to medium	None to slow	Low to medium
CH	High to very high	None	High

TABLE 2-6
Criteria for Describing Plasticity

Description	Criteria
Nonplastic	A 1/8-inch (3-mm) thread cannot be rolled at any water content.
Low	The thread can barely be rolled, and the lump cannot be formed when drier than the plastic limit.
Medium	The thread is easy to roll, and not much time is required to read the plastic limit. The thread cannot be re-rolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit.
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be re-rolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier that the plastic limit.

Fine-grained soils are accurately determined in the laboratory using the Atterberg Limits test. This test include liquid limit, plastic limit, and plasticity index measurements. The liquid limit is the water content of a soil at the point of transition from a plastic to a liquid state. The plastic limit is the water content of a soil at the point of transition from a semisolid to a plastic state. The plasticity index is the difference between the liquid limit and the plastic limit.

As shown in the Figure 2-2, five fields have been identified. These include:

- Silty Clays (CL), Organic Silts (OL) or Organic Silty Clays (OL) of low plasticity
- Fat Clays (CH) and Organic Clays (OH)
- Inorganic Silts (ML) and Organic Silty Clays (OL) of low plasticity
- Silts (MH) and Organic Clays (OH) of a high plasticity
- Silty Clays to Clayey Silt (CL-ML) of low plasticity

Fine-grained soils with a liquid limit > 50 are modified by the symbol H (MH or CH), and those with a liquid limit < 50 are modified by the symbol L (ML or CL). Fine-grained soils containing 30 percent or more coarse-grained fraction should be modified by descriptive terms, such as "gravelly" or "sandy." If the coarse fraction is between 15 and 30 percent, the words" with sand and/or gravel" should be added to the group name. A flow chart for classifying fine-grained soils is presented in Figure 2-4.

2.3 Organic Soils

To classify organic soils, the percentage organic material present in the soil as well as the non-organic fines must be estimated. When the organic content ranges from 18 to 36 percent, the material is an organic clay or an organic silt, depending on the nature of the fine-grained constituents. When the organic content is between 36 and 90 percent, the material is designated a muck or peaty muck (OL or OH). A flow chart for classifying organic soil is presented in Figure 2-4. The term "peaty" is added if the organic remains are

SOP-B3

Borehole Sampling and Logging of Soil Borings
Standard Operating Procedures for PG&E Topock Program

This standard operating procedure (SOP) provides guidance for sample collection from soil borings during the drilling process, and proper documentation necessary. Detailed guidance for sample collection, preservation and handling is provided in Section 4.0 of the site Quality Assurance Project Plan (QAPP) and in the Topock Program *Sampling, Analysis, and Field Procedures Manual* (Procedures Manual). SOP-B2 provides detailed guidance for soil characterization and logging.

REQUIRED DOCUMENTS

1) Event-specific sampling and analysis plan (SAP), work plan or event-specific field instructions. Planned borehole depth, proposed well construction/specifications, and field sampling summary table, if available.
2) Applicable project work plan or monitoring plan. Refer to the Procedures Manual and QAPP, as required.
3) Topock Program Health and Safety Plan (HSP).
4) Previous sampling, drilling, or well construction logs from other boreholes or wells in the vicinity, if available.
5) Blank sampling log and field notebook.

PREPARATION AND SETUP

1) Review event-specific work plan or event-specific field instructions, previous sampling logs, Procedures Manual, and HSP.
2) Initiate field logbook for sampling activity.
3) Review sampling procedures and equipment, and planned sample depths with drilling contractor and field crew.

Equipment List

- Field logbook
- Borehole log
- Blue or black waterproof or permanent ink pens
- Trash bags
- Plastic sandwich bags
- Paper towels

- Stainless steel sampling equipment (provided by driller)
- Decontamination equipment (Alconox® solution in spray bottle, brushes, buckets, rinse water spray bottle)
- Soil sample containers appropriate for sample analysis and preservation as called for in SAP and QAPP (glass jars, brass sleeves, Encore® containers, sandwich bags, etc.)
- Soil sampling equipment not provided by driller (spatula or putty knife, stainless steel compositing bowl, hand auger, etc.)
- Groundwater sample containers appropriate for sample analysis and preservation as called for in SAP and QAPP (glass jars, VOA vials, plastic jars, etc.)
- Groundwater sample equipment not provided by driller (pump, filters, tubing, power supply, etc.)
- Water quality meters
- Water level indicator
- Distilled water
- Coolers with ice
- Protective waterproof gloves (nitrile or latex)

GUIDELINES

Soil Boring Logs Documentation

Soil boring logs will be completed on the soil boring log forms during the drilling activities at the time of the logging and soil descriptions. Information collected will be consistent with the standard CH2M HILL form (See SOP-B2 attachment A). Sample data may also be documented in the comments section of the boring log.

Items documented on the borehole log include:

1) **Sample Interval:** The top and bottom depth of each sample run should be recorded on the borelog. Sampling includes samples collected for analysis as well as core retrieved for logging purposes.

2) **Sample Type and Number:** Enter the sample type and number consistent with the sampling and analysis plan at the correct depth intervals. An "x" should be placed across the vertical interval where the environmental soil, grab groundwater, or geotechnical sample was collected.

3) **Sample Recovery:** Enter the length of retrieved core to the nearest 0.1 foot of sample recovered, and record the value in feet. Do not count slough or caved material as part of the total recovered length of core. Record total length and percent of sample recovered. If using a 5-foot sample barrel, multiply the total length by 2 and 100 to get a percentage number. Similarly, if using a 2.5-foot sampler, multiply by 4 and 100 to get the percent recovery.

4) **Sampling:** Sampling difficulties shall be noted. Disturbed samples shall be noted on the log as well as the sample recovery. The top of the sample shall be marked on the container.

5) **Water Levels:** Water-level measurements, where groundwater is encountered, are required for each boring. Changes in soil moisture shall be noted and, if there is no water encountered, a note to that effect shall be included on the borehole log. The date and time of water-level measurements shall be documented.

At a minimum, sample identifiers (IDs) should be noted on boring logs at the depth collected. When time and space allows, a summary of analytical sample information can be included. When inclusion of these data prevents documentation of drilling information, sample data should be omitted in order to document drilling.

Borehole Sampling by Drilling—General Procedure

Split-spoon sampling procedures shall be executed in accordance with American Society for Testing and Materials (ASTM) D1586, "Standard Method for Penetration Test and Split-barrel Sampling of Soils" (ASTM 1984). California (2-inch) or Modified California (2.5-inch) split-barrel samplers may also be used.

1) The split-spoon or split-barrel sampler shall be advanced to the top of the sampling interval using a wire-line or sample rods such as A or AW. The larger-diameter samplers may be fitted with three 6-inch-long stainless-steel sleeves. The sampler shall be driven 18 inches or to refusal, with a 140-pound hammer dropping repeatedly 30 inches. Refusal shall be defined as requiring 50 blows with the hammer to advance the sampler less than 6 inches.

2) The number of blows required to drive the sampler each 6 inches shall be recorded on the borelog.

3) As the sample tubes are disassembled, an organic vapor monitor probe shall be inserted into the gap between two sample liners, and the liner exhibiting the highest reading shall be selected for analysis.

4) In general, the middle liner is collected for laboratory analysis, and 10 percent of the bottom liners are collected for quality assurance testing. A sample of the soil in the top liner typically is placed in a re-sealable plastic bag or 8-ounce clear glass jar and left in the sun for approximately 15 minutes to allow any volatile organic compounds (VOC) to volatilize.

5) After the 15 minute volatilization period, the soil vapor in the plastic bag is then measured for VOCs by taking a reading of the headspace. Background VOCs for the bag are determined by monitoring the air in an empty bag.

6) Results of the organic vapor monitoring are recorded on the boring log.

7) Small portions of soil at the ends of the sleeve are scraped off for classification.

Borehole Sampling by Drilling—Split Spoon Sampling

1) Samples collected for laboratory analysis using split spoon sampling device will be separated and transferred from the split-spoon halves into sample jars by clean stainless-steel utensils.

2) Samples for VOCs will be separated and collected first, followed by semivolatile organic compounds samples.

3) For VOC samples, avoid mixing the soil before sampling and sample directly from the split spoon. See SOPs for guidance on homogenizing soil samples and for VOC sampling using EnCore samplers, respectively.

Borehole Sampling by Drilling—Direct-push Sampling

1) Samples collected for laboratory analysis using a direct-push sampling drill rig will be handled by either opening the tube and placing the soil in sample jars or cutting the acetate tube and submitting it the laboratory directly.

2) For samples that will be removed from the acetate tube, the tube will be cut open longitudinally using a double-bladed razor knife.

   - Soil will be inspected and logged prior to removal of soil samples.
   - A short section of soil will be removed from the acetate sleeve using a stainless-steel utensil, homogenized in a clean stainless-steel bowl, and placed in sample jars.
   - Soil collected for VOC analysis will be sampled directly from the split acetate sleeve using EnCore samplers.

3) Alternatively, a short (6-inch) length of liner will be cut from the acetate sleeve and collected directly for laboratory analysis.

   - The section of acetate liner will be removed, capped with Teflon sheeting and plastic end caps at both ends, and taped with clear label or packing tape.
   - Labels shall be affixed to the liners with job designation, time, boring number, sample depth interval, sample number, date sampled, and the initials of the sampler clearly marked.
   - The samples shall then be enclosed in a plastic bag and stored in a cooler maintained at 4°C.
   - Sample information shall be placed on the chain-of-custody, the borelog, and the field logbook. All samples shall be handled in accordance with *Chain of Custody Procedures*.

Borehole Sampling by Drilling—Split-barrel Sampling

Soil samples can also be collected using a 3-foot-long or 5-foot-long split-barrel sampler. The split-barrel sampler is similar to the split-spoon sampler that is used to hold steel or brass sampling sleeves, but the split-barrel sampler typically is not used to hold sample sleeves.

1) The sampler is lowered to the base of the drill bit and is advanced slightly ahead of the drill bit and augers (or conductor casing). The weight of the drill string and sample barrel along with the drilling and cutting action of the drill bit advances the face of the split-barrel sampler into the formation.

2) Once the desired depth interval is reached, the split-barrel sampler is retrieved using a cable or tool steel sections.

3) The retrieved sampler is unscrewed, and one or both halves are laid on the sample table. The soil typically will form a continuous column of soil in one of the split-barrel halves.

4) The soil column is split longitudinally for soil descriptions using a putty knife or spatula.

5) Samples for VOC analysis are collected immediately directly from the soil column.

6) Other soil samples are collected after the core section has been described and logged. The soil is described following the procedures in the following sections.

Groundwater Sampling

1) Groundwater samples can be collected by hydropunch by bailer or by pumping from an isolated zone. Collection of groundwater by bailing is not an accurate method of collection depth discrete groundwater samples, as the zone sampled is poorly isolated.

2) Hydropunch samples are collected below the bit of the drill stem, in relatively undisturbed soil zone. This method of sample collection may be difficult in fine-textured soils and in very rocky soils. To collect these samples, a point is driven below the depth of the drill bit, then a screen zone is opened within this point and water allowed to flow in. The hydropunch tool must be decontaminated between samples.

Groundwater can also be collected from the open or cased borehole with a bailer. A disposable or decontaminated stainless-steel bailer is lowered into the boring, and water is collected. This method is preferable for collection of groundwater from the water table. Attempts can be made to collect discrete groundwater samples beneath the water table; however, the boring must be cased with watertight, stainless-steel pipe, and the boring must be evacuated prior to collection of samples.

Alternatively, discrete groundwater samples can be collected by isolating a zone with casing and packers. To collect these samples, the borehole is first advanced to the depth at which a sample is required. Then casing is advanced to within 20 feet of the sample zone. Next, a pump and packers are lowered into the hole. The zone from which samples are to be collected is isolated with a packer, and water is pumped directly from the target zone.

Sample Handling

Sample preservation and sampling procedures are detailed in Section 4.0 of the QAPP. Additional information is provided in the Procedures Manual and in the appropriate SAP.

KEY CHECKS AND ITEMS

- Check entries to the soil boring log and field logbook in the field during sampling activities because the samples will be disposed at the end of the fieldwork, confirmation and corrections cannot be made later.

- Check that the sample numbers and intervals are properly specified.
- Ensure that drilling equipment is decontaminated prior to the beginning of work and between each borehole.
- All materials generated during sampling (debris, PPE, decontamination liquids, etc.) will be placed in 55-gallon drums or roll-off bins for storage pending analysis and disposal off site, as outlined in SOP 39, Standard of Practice H-83, and Appendix D of the project *Soil and Groundwater Management Plan*.

ATTACHMENT A

Examples of Soil Bore Logs

CH2MHILL

PROJECT NUMBER	BORING NUMBER SHEET OF

SOIL BORING LOG

PROJECT ______ LOCATION ______

ELEVATION ______ DRILLING CONTRACTOR ______

DRILLING METHOD AND EQUIPMENT ______

WATER LEVELS ______ START ______ FINISH ______ LOGGER ______

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS	SOIL DESCRIPTION	COMMENTS
	INTERVAL	NUMBER AND TYPE	RECOVERY (FT)	6"-6"-6" (N)	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION

REV 9/96 FORM D1586

PROJECT NUMBER:	BORING NUMBER:
326128.01.16.EN	*MW-47*

SOIL BORING LOG - DRAFT FOR DISCUSSION

PROJECT NAME: IMPM Drill Program		**HOLE DEPTH (ft):** 288.0	**DRILLING CONTRACTOR:** Prosonic Corp. Phoenix, AZ
SURFACE ELEVATION: 482.6 ft. MSL	**NORTHING (CCS NAD 27 Z 5):** 2,103,450.05	**EASTING (CCS NAD 27 Z 5):** 7,615,629.49	**DATE STARTED:** 02/27/2006 — **DATE COMPLETED:** 03/13/2006
DRILLING METHOD: Rotosonic			**DRILLING EQUIPMENT:** Sonic AT (track mounted)
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California			**LOGGED BY:** B. Moayyad, K. Ebel

DEPTH BGS (feet)	SAMPLE INTERVAL	SAMPLE TYPE/NUMBER	SAMPLE RECOVERY (ft)	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.	COMMENTS: DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.
0					**POORLY GRADED SAND (SP)** - very lt brn (10YR7/3), =2% fines, 98% f to m lithic quartz sand, subang to subrnd, dry	Hand augured to 5' bgs
					- fine roots, iron staining, some iron oxide coating on grains	
			6			
5						
					- slightly moist	
				SP		
					- dry	
10						Rapid drill rate, no chatter
			10			
15					**WELL GRADED SAND w/ GRAVEL (SW)** - lt yellowish brn (10YR6/4), 45% gravel up to 7cm, 50% f to m sand, 5% fines, loose, met subang gravel, dry(moist@ 17')	
					- cobble present in slough	
					- one subrnd chert gravel	
					- Possible Fluvially Reworked Alluvium	
20				SW	- lt grey (10YR7/2), subang to rnd met gravel up to 9cm, 2% to 5% fines	
					- dk yellowish brn (10YR4/4), mostly c sand subang to ang, met, some Miocene conglomerate gravel	
					- 65% sand, 30% gravel up to 4cm, 5% fines	
25			16		**WELL GRADED SAND w/ GRAVEL (SW)** - dk yellowish brn (10YR3/6), 35% gravel up to 4cm, 55% m to c sand, 10% silty fines, met clasts are grain supported	
				SW	some mm siltstone	
					- some oxide staining	
30					**WELL GRADED SAND w/ GRAVEL AND CLAY (SW)** - dk yellowish brn (10YR3/6), 30% subang met gravel up to 7 cm, 55% subrnd to subang m to c sand, 15% clayey fines, m density, moist	
				SW		Drill rate slowed to clean out 8" pipe
35						

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
326128.01.16.EN	*MW-47*

SOIL BORING LOG - DRAFT FOR DISCUSSION

PROJECT NAME: IMPM Drill Program		**HOLE DEPTH (ft):** 288.0	**DRILLING CONTRACTOR:** Prosonic Corp. Phoenix, AZ	
SURFACE ELEVATION: 482.6 ft. MSL	**NORTHING (CCS NAD 27 Z 5):** 2,103,450.05	**EASTING (CCS NAD 27 Z 5):** 7,615,629.49	**DATE STARTED:** 02/27/2006	**DATE COMPLETED:** 03/13/2006
DRILLING METHOD: Rotosonic			**DRILLING EQUIPMENT:** Sonic AT (track mounted)	
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California			**LOGGED BY:** B. Moayyad, K. Ebel	

DEPTH BGS (feet)	SAMPLE INTERVAL	SAMPLE TYPE/ NUMBER	SAMPLE RECOVERY (ft)	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.	COMMENTS: DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.
			2.5	SW	**WELL GRADED SAND w/ GRAVEL (SW)** - dr yellowish brn (10YR3/6), 30% gravel, 60% sand, 10% silty fines	Drilling smooth but preceeds less rapidly
40			10	SW	**WELL GRADED SAND w/ GRAVEL (SW)** - 40% subang met gravel up to 6cm, 55% subrnd to ang sand, 5% fines - more gravel below 38' - gravel is mostly fine	
45						
50			10	SW	**WELL GRADED SAND w/ GRAVEL (SW)** - Pale brn (10YR6/3), 30% subang met gravel up to 5cm, 60% subrnd to subang m to c met sand, 10% silty fines, wet	Soil sample collected
				SP	**POORLY GRADED SAND w/ GRAVEL (SP)** - pale brn (10TR6/3), 30% f subang gravel up to 2 cm, 65% mostly c sand, =2% fines	
55				SW	**WELL GRADED SAND w/ GRAVEL (SW)** - yellowish brn (10YR5/4), 40% subang met gravel up to 9cm, 55% f to c met sand, 5% silty fines, clast supported, m density, wet	
60			9.5	GW	**WELL GRADED GRAVEL w/ SILT AND SAND (GW)** - brn (7.5YR5/4), 55% subang to ang met gravel up to 4cm, 25% f to c sand, 20% silty fines, dense, moist to dry - soil dries out - lt grey (10YR7/2) and powder dry - moist sandy zone, 55% gravel, 35% sand, 10% fines - dry silty lt grey GW below 65'	Collected Isoflow sample Drill rate slows to 2' / min
65						
70				SW	**WELL GRADED SAND w/ GRAVEL (SW)** - yellowish brn (10YR5/4), 35% subang met gravel up to 4cm, 60% subrnd sand, 5% silty fines, loose, moist to wet	Moderate Drill Rate

PROJECT NUMBER:	BORING NUMBER:
326128.01.16.EN	*MW-47*

SOIL BORING LOG - DRAFT FOR DISCUSSION

PROJECT NAME: IMPM Drill Program		**HOLE DEPTH (ft):** 288.0	**DRILLING CONTRACTOR:** Prosonic Corp. Phoenix, AZ	
SURFACE ELEVATION: 482.6 ft. MSL	**NORTHING (CCS NAD 27 Z 5):** 2,103,450.05	**EASTING (CCS NAD 27 Z 5):** 7,615,629.49	**DATE STARTED:** 02/27/2006	**DATE COMPLETED:** 03/13/2006
DRILLING METHOD: Rotosonic			**DRILLING EQUIPMENT:** Sonic AT (track mounted)	
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California			**LOGGED BY:** B. Moayyad, K. Ebel	

DEPTH BGS (feet)	SAMPLE INTERVAL	SAMPLE TYPE/ NUMBER	SAMPLE RECOVERY (ft)	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.	COMMENTS: DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.
			6	SP	**POORLY GRADED SAND w/ SILT (SP)** - brn (7.5YR4/4), 5% subrnd to subang met gravel up to 4cm, 85% f to c sand, 10% fines, poorly graded, wet, no odor	
145			3	SM	**SILTY SAND W/ GRAVEL (SM)** - brn (7.5YR4/4), 20% subang to subrnd gravel up to 6cm, 60% f to c sand, 20% silty fines, well graded, m consolidated, met, wet, no odor	
150			5	SM	**SILTY SAND w/ GRAVEL (SM)** - dk yellowish brn (10YR4/4), 25% subang to subrnd up to 4cm met gravel, 60% well graded f to c sand, 15% fines, wet, no odor	
155			4	SW	**WELL GRADED SAND w/ SILT AND SAND (SW)** - dr yellowish brn (10YR4/4), 10% subang to subrnd up to 3cm met gravel, 75%well graded f to c sand, 15% fines, moist to wet	
			2	SW	**SILTY SAND (SM)** - brn (7.5YR4/4), 5% ang to subrnd met gravel up to 1.5cm increasing with depth, 85% poorly graded m to c sand, 10% fines, loose, wet	
			2	SM	**SILTY SAND w/ GRAVEL (SM)** - dk yellowish brn (10YR4/4), 15% subang to subrnd up to 2.5cm met gravel, 75% well graded f to c sand, 10% fines, mostly met, trace chert, loose, wet, no odor	Collected Isoflow sample
160			4	SM	**SILTY SAND W/ GRAVEL (SM)** - brn (7.5YR4/4), 25% subang to subrnd gravel up to 6.5cm, 60% m to c sand, 15% silty fines, well graded, m consolidated, met, wet, no odor	Drill rate = 0.75' to 1.5' / min
165			4	SW	**SILTY SAND (SW)** - mottled dk reddish brn (5YR3/4), 10% subang to subrnd gravel up to 2.5cm, 50% well graded f to m sand, 40% silt, metamorphic, dry to damp, no odor, interbedded sandy silt laminations	
170			5.5	SW	**SAND w/ GRAVEL (SW)** - dk reddish brn (5YR3/4), 20% subang to subrnd gravel up to 5cm, 75% f to c sand, 5% fines, well graded, loose, met, wet	
175			2.5	SM	**SILTY SAND w/ GRAVEL (SM)** - brn (7.5YR4/4), 15% subang to subrnd gravel, 70% f to m sand, 15% fines, poorly graded, met,increasingly consolidated, slightly to moderately calcareous, moist to wet	

CH2MHILL

PROJECT NUMBER:	BORING NUMBER:
326128.01.16.EN	*MW-47*

SOIL BORING LOG - DRAFT FOR DISCUSSION

PROJECT NAME:	HOLE DEPTH (ft):	DRILLING CONTRACTOR:	
IMPM Drill Program	288.0	Prosonic Corp. Phoenix, AZ	

SURFACE ELEVATION:	NORTHING (CCS NAD 27 Z 5):	EASTING (CCS NAD 27 Z 5):	DATE STARTED:	DATE COMPLETED:
482.6 ft. MSL	2,103,450.05	7,615,629.49	02/27/2006	03/13/2006

DRILLING METHOD:	DRILLING EQUIPMENT:
Rotosonic	Sonic AT (track mounted)

LOCATION:	LOGGED BY:
PG&E Compressor Station - Flood Plain, Topock, California	B. Moayyad, K. Ebel

DEPTH BGS (feet)	SAMPLE INTERVAL	SAMPLE TYPE/ NUMBER	SAMPLE RECOVERY (ft)	USCS CODE	SOIL DESCRIPTION: SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.	COMMENTS: DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.
285			0	BR	**MIOCENE CONGLOMERATE BEDROCK (BR)** - 60% well graded subang to rnd gravel up to 10cm, 30% well graded sand, 10% fines, very calcareous, well consolidated to mostly hard, mod to very altered locally, mostly met, dry to moist	

Boring Terminated at 288 ft

ABBREVIATIONS

cc = continuous core run
brn = brown
lt = light
dk = dark
vf = very fine-grained
f = fine-grained
m = medium-grained
c = coarse-grained
vc = very coarse-grained
ang = angular
subang = subangular
subrnd = subrounded
rnd = rounded
br = bedrock formation
ss = sandstone
conglom = conglomerate
comptd = compacted
qtz = quartz

CH2MHILL

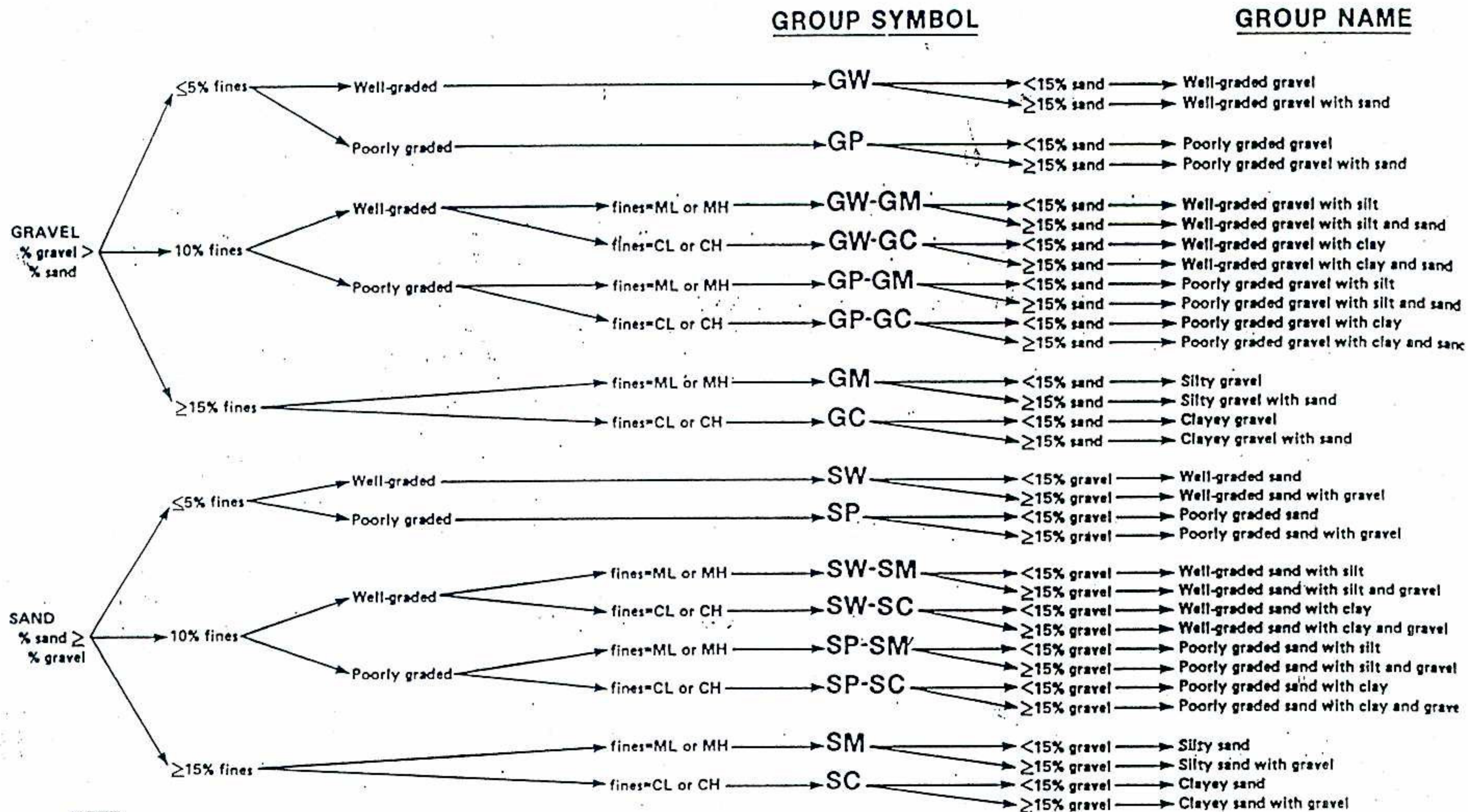
ATTACHMENT B

Unified Soil Classification System and Logging Criteria

GENERAL SOIL CATEGORIES			SYMBOLS	TYPICAL SOIL TYPES
COARSE GRAINED SOILS More than half is larger than No. 200 sieve	GRAVEL More than half coarse fraction is larger than No. 4 sieve size	Clean Gravel with little or no fines	GW	Well Graded Gravel, Gravel-Sand Mixtures
			GP	Poorly Graded Gravel, Gravel-Sand Mixtures
		Gravel with more than 12% fines	GM	Silty Gravel, Poorly Graded Gravel-Sand-Silt Mixtures
			GC	Clayey Gravel, Poorly Graded Gravel-Sand-Clay Mixtures
	SAND More than half coarse fraction is smaller than No. 4 sieve size	Clean sand with little or no fines	SW	Well Graded Sand, Gravelly Sand
			SP	Poorly Graded Sand, Gravelly Sand
		Sand with more than 12% fines	SM	Silty Sand, Poorly Graded Sand-Silt Mixtures
			SC	Clayey Sand, Poorly Graded Sand-Clay Mixtures
FINE GRAINED SOILS More than half is smaller than No. 200 sieve	SILT AND CLAY Liquid Limit Less than 50%		ML	Inorganic Silt and Very Fine Sand, Rock Flour, Silty or Clayey Fine Sand, or Clayey Silt with Slight Plasticity
			CL	Inorganic Clay of Low to Medium Plasticity, Gravelly Clay, Sandy Clay, Silty Clay, Lean Clay
			OL	Organic Clay and Organic Silty Clay of Low Plasticity
	SILT AND CLAY Liquid Limit Greater than 50%		MH	Inorganic Silt, Micaceous or Diatomaceous Fine Sandy or Silty Soils, Elastic Silt
			CH	Inorganic Clay of High Plasticity, Fat Clay
			OH	Organic Clay of Medium to High Plasticity, Organic Silt
HIGHLY ORGANIC SOILS			PT	Peat and Other Highly Organic Soils

UNIFIED SOIL CLASSIFICATION SYSTEM

JOB NUMBER	DATE	APPROVED	PLATE



NOTE:
Percentages are based on estimating amounts of fines, sand, and gravel to the nearest 5%
(After ASTM Designation D2488 Standard Test Method for Classification of Soils for Engineering Purposes)

Flow Chart for Classifying Coarse-grained Soil
(50% or more retained on No. 200 sieve)
Field Guide for Soil Classification and Logging Procedures

GROUP SYMBOL				GROUP NAME
CL	<30% plus No. 200	<15% plus No. 200		Lean clay
		15-25% plus No. 200	% sand ≥% gravel	Lean clay with sand
			% sand <% gravel	Lean clay with gravel
	≥30% plus No. 200	% sand ≥% of gravel	<15% gravel	Sandy lean clay
			≥15% gravel	Sandy lean clay with gravel
		% sand <% gravel	<15% sand	Gravelly lean clay
			≥15% sand	Gravelly lean clay with sand
ML	<30% plus No. 200	<15% plus No. 200		Silt
		15-25% plus No. 200	% sand ≥% gravel	Silt with sand
			% sand <% gravel	Silt with gravel
	≥30% plus No. 200	% sand ≥% of gravel	<15% gravel	Sandy silt
			≥15% gravel	Sandy silt with gravel
		% sand <% gravel	<15% sand	Gravelly silt
			≥15% sand	Gravelly silt with sand
CH	<30% plus No. 200	<15% plus No. 200		Fat clay
		15-25% plus No. 200	% sand ≥% gravel	Fat clay with sand
			% sand <% gravel	Fat clay with gravel
	≥30% plus No. 200	% sand ≥% of gravel	<15% gravel	Sandy fat clay
			≥15% gravel	Sandy fat clay with gravel
		% sand <% gravel	<15% sand	Gravelly fat clay
			≥15% sand	Gravelly fat clay with sand
MH	<30% plus No. 200	<15% plus No. 200		Elastic silt
		15-25% plus No. 200	% sand ≥% gravel	Elastic silt with sand
			% sand <% gravel	Elastic silt with gravel
	≥30% plus No. 200	% sand ≥% of gravel	<15% gravel	Sandy elastic silt
			≥15% gravel	Sandy elastic silt with gravel
		% sand <% gravel	<15% sand	Gravelly elastic silt
			≥15% sand	Gravelly elastic silt with sand

NOTE:
Percentages are based on estimating amounts of fines, sand, and gravel to the nearest 5%
(After ASTM Designation D2488 Standard Test Method for Classification of Soils for Engineering Purposes)

Flow Chart for Classifying Fine-grained Soil
(50% or more passing No. 200 sieve)
Field Guide for Soil Classification and Logging Procedures

similar, the material is classified as poorly graded or well sorted. If fines represent less than 5 percent of the total mass, the symbol SP is used for a poorly-graded sand and SW for a well graded sand. If silts and/or clays exceed 12 percent, the symbols GC, SC, GM, and SM are used, respectively.

If the silts and clays are between 5 to 12 percent of the total sample weight, a dual classification with two group symbols is used. The first symbol is GW, GP, SW, or, SP, and the second is GC, GM, SC, or SM. The group name corresponds to the first group symbol plus the modifying words "with clay" or "with silt" to indicate the plasticity characteristics. If the fines plot on the CL-ML range on the plasticity chart (Figure 2-2), possible dual classification group names are:

GW-GM	well graded gravel with silt
GW-GC	well graded gravel with clay
GP-GM	poorly graded gravel with silt
GP-GC	poorly graded gravel with clay
SW-SM	well graded sand with silt
SW-SC	well graded sand with clay
SP-SM	poorly graded sand with silt
SP-SC	poorly graded sand with clay

If silts and clays exceed 12 percent of the total weight of sample, the modifiers "M" and "C" are used, respectively. If a sand or gravel has more than 15 percent of the other coarse-grained constituent, the words "with gravel" or "with sand" are added to the group name. A flow chart for classifying coarse-grained soils is presented in Figure 2-3.

2.2 Fine-grained Soils

Particles passing the No. 200 sieve are silts (M) and clays (C). These soils must undergo testing in order to differentiate between them. Typical tests used are: dry strength, dilatancy, toughness, and plasticity. These terms are further discussed in Tables 2-2 through Table 2-6. Silts have little or no dry strength when dry, while clays have considerable dry strength. Dry strength, dilatancy, and toughness are also used to identify the fine-grained fraction of coarse-grained soils.

TABLE 2-2
Criteria for Describing Dry Strength

Description	Criteria
None	The dry specimen crumbles into powder with the mere pressure of handling.
Low	The dry specimen crumbles into powder with some finger pressure.
Medium	The dry specimen breaks into pieces or crumbles with considerable finger pressure.
High	The dry specimen cannot be broken with finger pressure. The specimen will break into pieces between the thumb and a hard surface.
Very high	The dry specimen cannot be broken between the thumb and a hard surface.

TABLE 2-3
Criteria for Describing Dilatancy

Description	Criteria
None	There is no visible change in the specimen.
Slow	Water appears slowly on the surface of the specimen during shaking, and does not disappear, or disappears slowly upon squeezing.
Rapid	Water appears quickly on the surface of the specimen during shaking, and disappears quickly upon squeezing.

TABLE 2-4
Criteria for Describing Toughness

Description	Criteria
Low	Only slight pressure is required to roll the thread near the plastic limit. The thread and the lump are weak and soft.
Medium	Medium pressure is required to roll the thread to near the plastic limit. The thread and the lump have medium stiffness.
High	Considerable pressure is required to roll the thread to near the plastic limit. The thread and the lump have very high stiffness.

TABLE 2-5
Identification of Inorganic Fine-grained Soils from Manual Tests

Soil Symbol	Dry Strength	Dilatancy	Toughness
ML	None to low	Slow to rapid	Low or thread cannot form
CL	Medium to high	None to slow	Medium
MH	Low to medium	None to slow	Low to medium
CH	High to very high	None	High

TABLE 2-6
Criteria for Describing Plasticity

Description	Criteria
Nonplastic	A 1/8-inch (3-mm) thread cannot be rolled at any water content.
Low	The thread can barely be rolled, and the lump cannot be formed when drier than the plastic limit.
Medium	The thread is easy to roll, and not much time is required to read the plastic limit. The thread cannot be re-rolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit.
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be re-rolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier that the plastic limit.

Fine-grained soils are accurately determined in the laboratory using the Atterberg Limits test. This test include liquid limit, plastic limit, and plasticity index measurements. The liquid limit is the water content of a soil at the point of transition from a plastic to a liquid state. The plastic limit is the water content of a soil at the point of transition from a semisolid to a plastic state. The plasticity index is the difference between the liquid limit and the plastic limit.

As shown in the Figure 2-2, five fields have been identified. These include:

- Silty Clays (CL), Organic Silts (OL) or Organic Silty Clays (OL) of low plasticity
- Fat Clays (CH) and Organic Clays (OH)
- Inorganic Silts (ML) and Organic Silty Clays (OL) of low plasticity
- Silts (MH) and Organic Clays (OH) of a high plasticity
- Silty Clays to Clayey Silt (CL-ML) of low plasticity

Fine-grained soils with a liquid limit > 50 are modified by the symbol H (MH or CH), and those with a liquid limit < 50 are modified by the symbol L (ML or CL). Fine-grained soils containing 30 percent or more coarse-grained fraction should be modified by descriptive terms, such as "gravelly" or "sandy." If the coarse fraction is between 15 and 30 percent, the words" with sand and/or gravel" should be added to the group name. A flow chart for classifying fine-grained soils is presented in Figure 2-4.

2.3 Organic Soils

To classify organic soils, the percentage organic material present in the soil as well as the non-organic fines must be estimated. When the organic content ranges from 18 to 36 percent, the material is an organic clay or an organic silt, depending on the nature of the fine-grained constituents. When the organic content is between 36 and 90 percent, the material is designated a muck or peaty muck (OL or OH). A flow chart for classifying organic soil is presented in Figure 2-4. The term "peaty" is added if the organic remains are

SOP-B4

Boring Abandonment
Standard Operating Procedures for PG&E Topock Program

The purpose of this standard operating procedure (SOP) is to describe methods to abandon drill borings to the surface. The guideline covers all drilling methods and includes borings through surface casings.

REQUIRED DOCUMENTS

1) Event-specific sampling and analysis plan, work plan or event-specific field instructions. Planned borehole depth, proposed well construction/specifications, and field sampling summary table, if available.
2) Applicable project work plan or monitoring plan. Refer to Topock Program *Sampling, Analysis, and Field Procedures Manual* and *Quality Assurance Project Plan* (Procedures Manual), as required.
3) San Bernardino County Department of Health well abandonment (destruction) permit.
4) Topock Program Health and Safety Plan (HSP).
5) Blank sampling log and field notebook.

PREPARATION AND SETUP

1) Review event-specific work plan or event-specific field instructions, previous sampling logs, Procedures Manual, and HSP.
2) Initiate field logbook for sampling activity.
3) Review sampling procedures and equipment, and planned sample depths with drilling contractor and field crew.
4) Inspect all required field equipment.

Equipment List

- Truck-mounted drilling rig, skid rig, or barge-mounted tripod rig
- Hollow-stem augers and associated equipment or either rotary-drilling or sonic- drilling equipment
- Steel or Schedule 40 PVC casing, of appropriate diameter for required installations (at least 6.25-inch inside diameter if surface casing is required)
- Approved water source
- Cement
- Bentonite

GUIDELINES

California Department of Water Resources, June 1991, Bulletin 74-90 (Supplement to Bulletin 74-81) *California Well Standards*.

PROCEDURES

Abandonment

1) The borehole will be grouted from total depth to the surface with bentonite-cement grout. The cement-bentonite grout will be installed continuously in one operation from the bottom of the space to be grouted to the ground surface.
2) The grout mixture will consist of 94 pounds of cement (1 bag) per 6 gallons of water and 2 to 3 pounds of powdered bentonite per bag of cement to reduce shrinkage.
3) The source of the water used in the grout mixture must be from a pre-approved source.
4) If there is any risk of borehole collapse upon removal of the drill casing, then the grout will be added prior to the removal of the drill casing. The grouting can be completed in stages, grouting 50 to 100 feet at a time, removing 50 to 100 feet of drill casing, and then repeating until the grout has reached the surface and the final casing removed.
5) When installing grout in soil borings, the grout will be installed through a tremie pipe that is placed inside the drill casing to the bottom of the borehole.
6) The production of grout will be completed to eliminate the preparation of excess/waste grout.

Waste Disposal

1) The soil cuttings are to be drummed and managed as described in SOP *Disposal of Waste Fluids and Soils* and the investigation-derived waste management plan.
2) Minimal quantities of grout may be included in the water or soil waste streams. The quantity of grout will be limited to that produced during cleaning of grouting equipment or decontamination of drill casing.

KEY CHECKS AND PREVENTATIVE MAINTENANCE

- Check that the drilling rig or soil-coring rig is in working order.
- Check that the borehole is grouted to the ground surface at the completion of drilling and sampling.

SOP-B5

Decontamination of Personnel and Equipment, Well Drilling, and Subsurface Sampling and Investigations
Standard Operating Procedures for PG&E Topock Program

This standard operating procedure provides general guidelines for the decontamination of personnel, sampling equipment, and monitoring equipment used in potentially-contaminated areas.

REQUIRED DOCUMENTS

1) Event-specific sampling and analysis plan (SAP).
2) Applicable project work plan or monitoring plan, which includes a health and safety plan. Refer to Topock Program *Sampling, Analysis, and Field Procedures Manual* and *Quality Assurance Project Plan*, as required.

PREPARATION AND SETUP

1) Initiate field log sampling book for activity.
2) Inspect all equipment necessary to carry out activities detailed in event-specific SAP.
3) Review decontamination guidelines for equipment necessary to carry out activities.

Equipment List

- Demonstrated analyte-free, deionized water (specifically, ASTM Type II water)
- Distilled water
- Potable water; must be from a municipal water supplier, otherwise an analysis must be run for appropriate volatile and semivolatile organic compounds and inorganic chemicals (e.g., Target Compound List and Target Analyte List chemicals)
- 2.5% (W/W) Liquinox® and water solution
- Large plastic pails or tubs for Liquinox® and water, scrub brushes, spray or squirt bottles for Liquinox® solution, and distilled or deionized water, plastic bags, and sheets
- Department of Transportation (DOT)-approved 55-gallon drum for disposal of waste
- Nitrile or latex gloves
- Decontamination pad and steam cleaner/high pressure cleaner for large equipment

GUIDELINES

Personnel Decontamination

Decontamination should be performed after completion of tasks whenever personnel come in contact with contaminated (or potentially-contaminated) soils or fluids. Full or emergency decontamination should be performed when contaminant concentrations are not known and when potentially-contaminated fluids come into contact with skin beneath clothing, eyes, nose, or ears.

Procedures for full/emergency decontamination are to:

1) Remove contaminated clothing.
2) Step into containment area (decontamination pad or large pail).
3) Rinse away fluids and soil.
4) Wash skin with Liquinox® solution in such a way as to not abrade skin. (Liquinox® solution should be made with potable water and sufficient detergent to create foamy suds.) Eyes and mucus membranes in contact with contaminants must be washed with eye wash or drinking water continuously for at least 15 minutes.
5) Rinse with potable water.
6) If no other clothes are available, wash affected clothes in Liquinox® solution prior to donning. If other clothes are available, contaminated clothes may be isolated for later wash or disposed of along with personal protective equipment (PPE).
7) Any PPE worn (including disposable latex booties, gloves, and disposable coveralls) should be discarded into DOT-approved 55-gallon drum located at the MW-20 bench.
8) Dispose of wash and rinseate water in an appropriate container with other chromium contaminated fluids. These fluids may be taken to the MW-20 bench for treatment or to a Baker® tank within the PG&E facility for containerization.
9) Replace all appropriate clothing and PPE before resuming work or departing site.

Moist soil or water containing known concentrations of hexavalent chromium less than 50 parts per billion that comes into contact with hands need not require full decontamination. Dry soil containing chromium that comes into contact with clothing can also be decontaminated in an abbreviated manner.

Daily decontamination and minor exposure contact decontamination procedures are to:

1) Wash hands and skin that comes in contact with soils or water that may contain small concentrations of chromium as soon as possible after contact. Wash with Liquinox® solution and rinse with potable water.
2) If contaminated soil or water contacts hands through hole or over lip of gloves, remove gloves and wash hands thoroughly before donning new gloves.
3) Discard gloves into DOT-approved 55-gallon drum located on the MW-20 bench at the end of the day or event.

4) Remove coveralls or dry soils from clothing before leaving site. Clothing contaminated by moist soil or water containing hexavalent chromium should be removed and promptly washed.

5) At the end of the work day, shower entire body, including hair, either at the work site or at hotel.

Sampling Equipment Decontamination—Groundwater Sampling Pumps

Sampling pumps are decontaminated after each use as follows:

1) Don waterproof (nitrile or latex) gloves.

2) Run pump and reusable tubing through with Liquinox® solution (made with potable water) so that the pump and all portions or the tubing have been flushed with the solution for at least 30 to 60 seconds. More time is required if water is present in the tubing. If unsure, run for 2.5 minutes. Outside of the tubing should also be submerged and washed in the solution.

3) Run pump and reusable tubing through first rinse (with potable or distilled water) so that the pump and all portions or the tubing have been flushed with the solution for at least 60 seconds. More time is required if any suds are present in the pump or tubing.

4) Run pump and reusable tubing through second rinse (with distilled water) so that the pump and all portions or the tubing have been flushed with the solution for at least 30 seconds. More time is required if water from first rinse is present in tubing.

5) Equipment blank samples may be taken at this point using ASTM Type II water or distilled water as required by laboratory.

Sampling Equipment Decontamination—Other Equipment

Reusable sampling equipment is decontaminated after each use as follows:

1) Don nitrile or latex gloves.

2) Wash all equipment surfaces that contacted the potentially contaminated soil/water with Liquinox® solution (made from potable water). Water quality meters that are not placed within wells should not be washed with detergent, as this will degrade sensors; these meters should be double-rinsed. Any portion of equipment that is placed inside wells (including cables and pipe) and that comes in contact with moisture should be washed with detergent.

3) Rinse equipment and supplies with potable water, if the equipment is not used to collect groundwater or soil samples. Equipment used to collect samples or take water quality parameters should be rinsed with distilled water.

4) Air dry or towel dry with paper towels.

5) Collect all rinseate and dispose of in Baker® tank within the PG&E facility or Denbeste® tank at the MW-20 bench.

6) Decontamination materials (e.g., plastic sheeting, tubing, etc.) that have come in contact with used decontamination fluids or sampling equipment will be disposed of in DOT-approved 55-gallon drums if highly contaminated. If not contaminated, equipment can be washed and disposed of in trash.

7) Preserved bottles may need to be washed before being packed or handed without gloves. The outsides of filled bottles should be rinsed and toweled dry to prevent contact with strong acids or based.

Heavy Equipment and Tools

Heavy equipment such as drilling rigs, drilling rods/tools, and the backhoe will be decontaminated upon arrival at the site and between locations as follows:

1) Set up a decontamination pad in designated area.

2) Steam clean heavy equipment until no visible signs of dirt are observed. This may require wire or stiff brushes to dislodge dirt from some areas.

KEY CHECKS AND ITEMS

- Clean with solutions of Liquinox® and potable water. Rinse with distilled or deionized water if equipment is used to collect samples or water readings; otherwise, rinse with potable water.
- Equipment placed within wells should be thoroughly decontaminated and before being placed in a well. All potions of this equipment that come into contact with moisture should be decontaminated.
- Decontaminate filled sample bottles before relinquishing them to anyone.

SOP-B7

Homogenization of Soil and Sediment Samples
Standard Operating Procedures for PG&E Topock Program

The homogenization of soil and sediment samples is performed to minimize any bias of sample representativeness introduced by the natural stratification of constituents within the sample. Standard techniques for soil and sediment homogenization and equipment are provided in this SOP. These procedures do not apply to aliquots collected for volatile organic compounds (VOCs) or field gas chromography screening; samples for these analyses should NOT be homogenized.

REQUIRED DOCUMENTS

1) Event-specific sampling and analysis plan (SAP).
2) Applicable project work plan or monitoring plan. Refer to Topock Program *Sampling, Analysis, and Field Procedures Manual* and *Quality Assurance Project Plan,* as required.
3) Topock Program Health and Safety Plan (HSP).
4) Previous sampling logs.
5) Blank sampling logs and field notebook.

PREPARATION AND SETUP

1) Review event-specific SAP or event-specific field instructions, previous sampling logs, Procedures Manual, and HSP.
2) Initiate field logbook for sampling activity.

EQUIPMENT LIST

- Sample containers
- Stainless-steel spoons or spatulas
- Stainless-steel pans
- Phthalate-free gloves

PROCEDURES

Sample Homogenization

1) Soil and sediment samples to be analyzed for semivolatiles, pesticides, polychlorinated biphenyls, metals, cyanide, or field x-ray fluorescence screening should be homogenized in the field.
2) After a sample is taken, a stainless-steel spatula should be used to remove the sample from the split spoon or other sampling device. The sampler should not use fingers to do this, as gloves may introduce organic interferences into the sample.

3) Samples for VOCs should be taken immediately upon opening the spoon and should not be homogenized.

4) Prior to homogenizing the soil or sediment sample, any rocks, twigs, leaves, or other debris should be removed from the sample.

5) The sample should be placed in a decontaminated stainless-steel pan and thoroughly mixed using a stainless-steel spoon. The soil or sediment material in the pan should be scraped from the sides, corners, and bottom, rolled into the middle of the pan, and initially mixed.

6) The sample should then be quartered and moved to the four corners of the pan. Each quarter of the sample should be mixed individually, then rolled to the center of the pan and mixed with the entire sample again.

Equipment Decontamination

1) All stainless-steel spoons, spatulas, and pans must be decontaminated following procedures specified in SOP *Decontamination of Personnel and Equipment* prior to homogenizing the sample.

2) A composite equipment rinse blank of homogenization equipment should be taken each day it is used.

SOP-B9

Drilling--Sonic Method
Standard Operating Procedures for PG&E Topock Program

REQUIRED DOCUMENTS

1) Event-specific sampling and analysis plan (SAP), Work Plan or event-specific field instructions. Planned borehole depth, proposed well construction/specifications, and field sampling summary table, if available.

2) Applicable project work plan or monitoring plan. Refer to Topock Program Sampling, Analysis, and Field Procedures Manual and QAPP (Procedures Manual), as required.

3) Topock Program Health and Safety Plan (HSP)

4) Previous sampling, drilling, or well construction logs from other boreholes or wells in the vicinity, if available

5) Blank sampling log and field notebook

Equipment List:

- Drilling rig (Sonic)
- Drill rods and core barrel

GUIDELINES

PRIOR TO INTRUSIVE ACTIVITIES AT ANY DRILLING LOCATION THE AREA WILL HAVE BEEN CLEARED OF ALL UTILITIES AND THE CLEARANCE RECORDED IN THE FIELD LOGBOOK. It is also the field team leader's responsibility to confirm that all required access permits are in place.

Prior to the start of drilling, the area of site activity will be identified and delineated using stakes and/or flagging. The extent of impact will be mineralized at all times and the delineated area of activity decreased when possible. All sensitive vegetation or habitats will be delineated with stakes and/or flagging and no impact will occur in these areas.

Sampling depths and total depths of holes shall be determined by temporary marking of drill equipment, by reference to standard equipment dimensions (for example, 5-foot hollow-stem auger flights), or by measurement using a fiberglass tape. Final total depth measurements will be confirmed using a weighted fiberglass tape. Observations by the field geologist or engineer shall be recorded directly in the borehole log.

The field borehole log is the standard form used to document subsurface geologic conditions. The borehole log is divided into two areas. One portion contains spaces for noting information on the drilling and sampling methods. The second portion contains space for noting lithologic descriptions. All sheets shall be filled out completely, legibly, and in ink. The borehole log will be filled out in the field at the time of the drilling and sampling. The original logs shall be permanent records, and information on the logs may not be erased. If corrections are needed, information shall be crossed out with a single line and the correction shall be initialed and dated.

The use of water and drilling fluid to assist in sonic drilling for monitoring well installation will be avoided, unless required for such conditions as running sands or drilling bedrock formations.

Temporary outer casing, drill rods, core barrels, and other downhole drilling tools will be properly decontaminated prior to the initiation of drilling activities and between each borehole location. Core barrels and other downhole soil sampling equipment will also be properly decontaminated before and after each use.

Sonic inner casing (sample tube) will have an inside diameter of at least 3.25 inches. Samples may be collected for chemical analysis. For sonic drilling, these samples are collected in a metal trough. A continuous core is collected and the sample interval is selected from the length of core run.

Surface casing may be installed where soil borings will penetrate a confining layer or when there is risk of eroding soil during the drilling process if water is used.

PROCEDURES

Instructions for Completing Soil Boring Logs

Soil boring logs will be completed in the field log books. Information collected will be consistent with that required for Form D1586 (attached), a standard CH2M HILL form or an equivalent form that supplies the same information. Procedures will follow the SOP "*Soil*

Non-Core Collection Drilling

At locations or depths from which core collection is not required, drilling may proceed without the recovery of soil cores. The drilling will include advancing the larger outer casing and the use of water to facilitate cuttings removal from the boring. The inner casing drill rods may or may not be used, depending on the cuttings recovery when drilling with the larger outer casing.

Continuous Core Drilling

At locations or depths when core collection is required, drilling will proceed using an outer casing and an inner core sample tube. The inner core sampling tube will be advanced first without the use of water. Before removal of the sampling tube, the outer casing will be advanced, using water only as needed for cuttings removal, to the same total depth as the inner casing. The outer casing will stabilize the boring when the sampling tube is removed. The process is repeated in 10 to 20 foot intervals, as the lithology of the boring permits.

The length of each drilling interval should be adjusted depending on the lithology and the quality and recovery percentage of the sample cores retrieved. At locations with very hard drilling (i.e. with large cobbles or hard materials) or when percent recovery decreases, the drilling interval should be decreased until such time that the conditions change.

After retrieval of the inner sampling core tube, the minimally disturbed sample cores will be collected into plastic liner sleeves in intervals of 2 to 3 feet. The plastic sleeves will be immediately sealed on both ends. The cores will be used for visual descriptions and may be used for analysis for geochemical and geotechnical parameters.

KEY CHECKS AND ITEMS

- Check entries to the soil boring log and field logbook in the field during sampling activities because the cores will be disposed at the end of the fieldwork, confirmation and corrections cannot be made later.
- Check that the sample numbers and intervals are properly specified.
- Ensure that drilling equipment is decontaminated prior to the beginning of work and between each borehole.
- All materials generated during sampling (debris, PPE, decontamination liquids, etc.) will be placed in approved IDW storage containers pending analysis and disposal off site as outlined in SOP-B6, *Disposal of Waste Fluids and Solids (IDW)*.

SOP-B11

Site Clearance and Permitting
Standard Operating Procedures for PG&E Topock Program

This standard operating procedure (SOP) addresses the procedures for site clearance and permitting at the Topock site. This SOP should be used to obtain proper site clearance and permits before any work is performed at a site.

REQUIRED DOCUMENTS

1) Applicable project work plan, event-specific sampling and analysis plan (SAP), and/or Procedures Manual, if applicable.
2) Topock Program Health and Safety Plan (HSP).
3) Site map with work locations identified.

PREPARATION AND SETUP

1) Review applicable project work plan, event-specific SAP, Procedures Manual, and HSP.
2) Identify locations where work will be performed, determine if any subsurface work will be needed.
3) Before the start of any work obtain approval by the appropriate land agencies (such as BLM, USFWS, County of San Bernardino). Activities located on PG&E property fall under the jurisdiction of the County; however, approval may also be required from BLM and/or USFWS for activities such as access, waste management, etc. Work in Topock, Arizona falls under the jurisdiction of the Arizona Department of Water Resources.
4) Before the start of any work obtain appropriate approval by the regulatory agencies. These include at a minimum the DTSC if in California, and ADEQ is in Arizona. Other regulatory approvals that may be required include, but are not limited to CDFG, USFWS, USACE and RWQCB. Approval from the Arizona Land Department may also be required for wells drilled in Arizona.

If subsurface work will be involved, follow the following steps:

1) Follow the guidelines of the Southern California Underground Service Alert (USA) agency to mark the edges of the work location as outlined on their web page (http://www.digalert.org). If in Arizona, the Arizona Blue Stake should be contacted for location of buried facilities (www.azbluestake.com). Make sure to:
   - Identify delineated areas with white markings with the requesters company name or logo within the pre-marked zones
   - Delineate the exact area of excavation with white paint through the use of dots or dashes, or a continuous solid line. Limit the size of each dash to approximately 6" in length and 1" width with interval spacing not less that approximately 4 feet. Dots of

approximately 1" diameter are typically used to define arcs or radii and may be placed at closer intervals in lieu of dashes. Limit width of lines to 1".

- For point locations (such as a soil boring or well) mark the exact location in the USA or Blue Stake box with a stake. Make sure the delineated area around the stake is of adequate radius (50 to 100 feet is appropriate for drilling).

2) Call USA at 1-800-227-2600 or Arizona Blue Stake at 1-800-782-5348 at least three working days before the start of work at the identified location and provide them with the information requested on the location request form. Be ready to give the location in terms of feet relative to I-40 and to Park Moabi Road when calling. You will be assigned a Dig Alert Number, file this number until work at the delineated area is complete. (The number does expire after two weeks and a new number may need to be obtained if work has been delayed.)

3) Mark the Dig Alert Number in the delineated area using white paint as soon as possible after calling USA or Arizona Blue Stake.

4) If the location is in a developed area, contact a private utility locator and have them perform a sweep of the delineated work area. Util-Locate at (866) 421-5325 is typically used for this service.

5) In some cases the utility companies may need to be contacted directly by CH2M HILL. If the following companies do not respond to the USA or Blue Stake ticket or if we are working in their easements, use the following contact information and procedures:

Southwest Gas: Main contact is Jim Default/702-365-2097 (The required minimum clearance distance from gas pipelines is 18-inches**.** Potholing may need to be performed in advance of design completion Southwest Gas should be called prior to construction activities). If Southwest Gas does not come to the site after the USA call, contact them at their Bullhead City office at (928) 763-7766

Southern California Gas Co.: Main contact is Frank Castro/818-701-4566; secondary contact is Martin Woodsworth/818-701-4543. If we need to work in their easement, we must provide a letter from BLM giving us permission to be on the property. Southern California Gas Co. also requires advance notification of construction activities. They may also require a copy of the design drawing, potholing activities, and the issuance of a "Non-Interference" letter, if applicable, before work can proceed. One of their representatives may need to be in the field when digging is occurring near their pipeline.

TransWestern Pipeline Co.: Main contacts are Ron Westbrook (ROW Department)/713-345-3067 and Mike Baxter (Operations)/928-757-3620. They may require potholing if proposed construction activities are near their pipelines. Crossing pipeline requires filling out a simple form.

Burlington Northern Santa Fe Railroad: Main contact is Greg Rousseau (BNSF)/909-386-4079. Prior to work in their easements submit the proper application with the $250 fee to the Staubach Company.

City of Needles Utility Dept: Main contact is Ron Myers/760-326-5700 (ext. 7 for the utilities department). Work activities may need to be a minimum of 10 to 15 feet from their utility poles.

6) Do not start subsurface work at the site until the delineated area has been marked or cleared by the appropriate utility agencies.

If the work includes a performing a well installation or abandonment, or drilling a boring in California:

1) Apply for a San Bernardino County well permit two to three weeks before the start of drilling (one permit per well; cost is /$212.00 per well). Obtain a permit application by calling the Environmental Health Services Department at 1-909-387-4666 (open Monday through Friday, 8:00 a.m. to 5:00 p.m. The fee schedule for permits is located at http://www.sbcounty.gov/ dehs/FEESCHEDULE/feeschedule.htm#wateranchor. Fill out the appropriate permit form and provide it to the California-licensed driller contracted to perform the well installation. The driller is expected to review and file the permit with the San Bernardino County Department of Environmental Health Services (Steve Sesler), address below.

   Environmental Health Services
   385 N. Arrowhead, 2nd Floor
   San Bernardino, CA 92415-0160

2) A well permit needs to be obtained from San Bernardino County for well abandonment by the same procedure described in #11. Check the 'destruction' box on the same permit form used for well installation.

3) A permit also needs to be obtained from San Bernardino County for any boring that reaches to or below the water table, even if a well is not actually installed. The permit process is the same as described in #11.

If the work includes a performing a well installation or abandonment, or drilling a boring in Arizona:

1) Apply for an Arizona Department of Water Resources (DWR) well permit two to three weeks before the start of drilling (one permit per well; cost is /$150.00 per well). Obtain a permit application by calling the DWR at 1-(602) 771-8500 (open Monday through Friday, 8:00 a.m. to 5:00 p.m. MST). All ADW permits and instructions can be found at http://www.azwater.gov/dwr/Content/Find_by_Category/Permits_Forms_Applications/default.htm
   Fill out the appropriate permit form (55-44A) and provide it to the Arizona-licensed driller contracted to perform the well installation. The driller is expected to review and file the permit with the Arizona Department of Water Resources address below.

   Arizona Department of Water Resources
   3550 N. Central Avenue
   Phoenix, AZ 85012

   Upon completion of the well, the driller must submit a Driller Report and Well Log (Form 55-55) to the DWR within 30 days. The form and instructions can be found on the DWR webpage.

2) A well abandonment permit needs to be obtained from the Arizona Department of Water Resources prior to well abandonment (form 55-38). Exploratory wells that are abandoned before the drill rig leaves the site are exempt from the well abandonment permit requirements. The well abandonment form and instructions are included as Attachment 4 and can be found at the ADW webpage . No fee is required for filing this form.

   Within 30 days of well abandonment a Well Abandonment Completion Report (Form 55-58) must be filed with the DWR.

SOP-B15

Volatile Organic Compound (VOC) Soil Sampling Standard Operating Procedures for PG&E Topock Program

This standard operating procedure (SOP) provides guidance for Volatile Organic Compound (VOC) sample collection from soil. Additional guidance for sample collection, preservation and handling is provided in Section 4.0 of the PG&E Quality Assurance Project Plan (QAPP). SOP-B2 and SOP-B3 *Sampling, Analysis, and Field Procedures Manual, PG&E Topock Program* (CH2M HILL, 2005) provides additional guidance for soil characterization and logging.

Required Documents

1) Event-specific planned sample table (PST).
2) Applicable project work plan or monitoring plan. Refer to the Procedures Manual and QAPP as required.
3) Topock Program Health and Safety Plan (HSP).
4) Previous sampling, drilling, or well construction logs from other boreholes or wells in the vicinity, if available.
5) Field notebook.
6) Database generated sampling logs.

Preparation and Setup

1) Review event-specific PST or event-specific field instructions, previous sampling logs, Procedures Manual, and HSP.
2) Coordinate with the Project Chemist for coolers, sample containers, and courier pickup of the samples.
3) Initiate field logbook for sampling activity.
4) Review sampling procedures and planned sample depths with field crew.
5) Field-check and set up equipment for sampling, decontamination, spill prevention, and health and safety.

Equipment List

- Pre-labeled soil sample containers appropriate for sample analysis and preservation as called for in PST and QAPP (Pre-weighed Vials, glass jars, auger sleeves, etc.)
- Soil sampling equipment (stainless steel trowel, spatula, EnCore™ Sampler, EasyDraw Syringe®, or a disposable plastic syringe with a barrel smaller than the neck of the soil vial with the cap removed from the plunger, etc.)
- Field notebook

- Sediment sampling logs generated from database
- Blue or black waterproof or permanent ink pens
- Trash bags
- Paper towels
- Decontamination equipment (Alconox® solution in spray bottle, brushes, buckets, rinse water spray bottle)
- Water level indicator
- Distilled water
- Coolers with ice
- Protective waterproof gloves (nitrile or latex)

SOIL SAMPLING LOGS DOCUMENTATION

Soil sampling logs or boring logs (SOP-B2 and SOP-B3 *Sampling, Analysis, and Field Procedures Manual, PG&E Topock Program* [CH2M HILL, 2005]) will be completed at the time of sample collection. Items to be documented on the sampling log include:

6) **Sample Interval:** The top and bottom depth of each sample run should be recorded on the log. Sampling includes samples collected for analysis as well as retrieved for logging purposes.
7) **Sample Type and Number:** Enter the sample type and number consistent with the sampling and analysis plan at the correct depth intervals. An "x" should be placed across the vertical interval where the environmental soil, grab groundwater, or geotechnical sample was collected.
8) **Sample Recovery:** Enter the length of retrieved sample to the nearest inch of sample recovered. Record total length and percent of sample recovered.
9) **Sampling:** Sampling difficulties shall be noted. The top of the sample shall be marked on the container.
10) **Water Levels:** Water-level measurements, where groundwater is encountered, are required for each boring. Changes in soil moisture shall be noted and, if there is no water encountered, a note to that effect shall be included on the sediment sampling log. The date and time of water-level measurements shall be documented.

At a minimum, sample identifiers (IDs) should be noted on sampling logs at the depth collected. When time and space allows, a summary of analytical sample information can be included.

VOLATILE ORGANIC COMPOUNDS (VOC) SOIL SAMPLING - COLLECTION OF SAMPLES FOR ANALYSIS

It is recommended (EPA Method 5035A) that VOC soil samples be collected in a coring device to minimize volatilization and soil disturbance to prevent constituent losses. After collection, the sample shall be immediately transferred to the sample vial (to be used for analysis) and stored for no longer than 48 hours at 4 C ± 2° C prior to analysis. Freezing the samples between -7 and -20° C within 48 hours and maintaining them frozen until analysis allows a 14 day holding time. Chemical preservation techniques are also available as options.

Use either a commercially available sampler (such as the EnCore™ Sampler or EasyDraw Syringe®) or a disposable plastic syringe to collect VOC soil samples. To use a syringe, cut the syringe end of the barrel off and removed the rubber 'cap' from the plunger, prior to sampling (barrel of the syringe needs to be smaller than the neck of the soil vial). One sampler is needed for each sample aliquot to be collected (typically the laboratory will supply the sampler along with the sample vials, but arrangements must be made prior to sampling).

11) Weigh 3 empty samplers and note the weight. Using the same 3 samplers collect several trial samples (try to collect 5.0 ± 0.2g). Weigh each trial sample (total weight – syringe weight = sample weight) and note the length of the soil column in the syringe. Use the data to determine the length of soil in the syringe that corresponds to 5.0 grams. The length of the soil column equal to 5 grams becomes the volume for the project location. Discard each trial sample.

12) The VOC sample collection process should be completed in the least amount of time as possible in order to minimize the loss of VOCs. Sample collection should be done with the least amount of disturbance/disruption as possible. Additional, exposure of the sampling location's surface layers should be considered if the material may have already lost VOCs or if it may have been contaminated by other means. Removal of surface layers can be accomplished by scraping the surface using a clean spatula, scoop, knife, or shovel.

13) Insert a clean coring tool into a freshly exposed surface; do not trap air between the sample and the plunger. For greater ease in pushing into the solid matrix, the front edge of these tools can be sharpened. The optimum diameter of the coring tool depends on the size of the opening of the collection vial (tool should fit inside mouth), the sample characteristics (e.g., particles size, cohesion), and volume of sample required for analysis. After an undisturbed sample has been obtained by pushing the barrel of the coring tool into a freshly exposed surface, quickly wipe the exterior of the barrel with a clean disposable towel. Transfer the sample into a pre-weighted vial by gently pushing the plunger, (use extreme care to ensure none of the preservative is lost if the sample is collected into a pre-preserved vial – water, methanol or NaHSO4), verify the sealing surfaces are clean, and secure the cap (the transfer should take less than 10 seconds). **Note: Samples are collected in pre-weighed and pre-labeled vials provided by the laboratory; no additional labels are to be added to the vials!** Complete the label attached by the laboratory (fill in sample ID-only). All vials from one sample location will be placed into a zip-lock bag and the sample information shall be recorded on a label attached to the bag.

14) As a last resort non-cohesive granular samples (sand, gravel, or a mixture of gravel and fines) that can not be easily obtained or transferred using coring tools, can be quickly sampled using a decontaminated stainless steel spatula or scoop. Decontamination is

covered in section 3.3 of the PG&E Program QAPP and in SOP-B5 *Sampling, Analysis, and Field Procedures Manual, PG&E Topock Program* (CH2M HILL, 2005).

15) As with the collection of aqueous samples for volatiles, collect at least 3 replicate samples. This will allow the laboratory an additional sample for reanalysis, if needed. The replicate samples should be taken from the same soil stratum or the same section of the solid waste being sampled, and within close proximity to the location from which the original sample was collected.

16) In addition, if a VOC sample is the only sample to be collected at a given location, collect at least one additional aliquot for the determination of percent moisture. Trip blanks and equipment blanks should be collected per the PG&E Program QAPP. However, trip blanks do not apply to samples that have been frozen upon collection.

17) Transport the sample at 4^{o} C, to the lab in less than 48 hours or freeze (reagent water preserved samples to between -7 and -20^{o} C) within 48 hours and transport frozen.

18) Complete Soil Sampling Logs and Chain of Custody Logs.

SOP-B16

Field-portable X-Ray Fluorescence Soil Sampling
Standard Operating Procedures for PG&E Topock Program

This Standard Operating Procedure (SOP) describes the analysis of in situ and ex situ soil and debris samples using a field portable x-ray fluorescence (XRF) instrument. SOP-B2 and SOP-B3 in the *Sampling, Analysis, and Field Procedures Manual, PG&E Topock Program* (SAFPM) (CH2M HILL, 2005) provides additional guidance for soil characterization and logging.

Required Documents

1. Event-specific planned sample table (PST).
2. Applicable project work plan or monitoring plan. Refer to the SAFPM and the *PG&E Program Quality Assurance Project Plan, Revision 2, Topock Compressor Station, Needles, California* (CH2M HILL, 2012) as required.

1. Topock Program Health and Safety Plan.

3. Field notebook.
4. Database generated chain-of-custody.
5. XRF Functional Check Log

Preparation and Setup

1. Review event-specific PST or event-specific field instructions, previous sampling logs, SAFPM, and health and safety plan.
2. Coordinate with the project chemist for coolers, sample containers, and courier pickup of the samples.
3. Initiate field logbook for sampling activity.
4. Initiate electronic file for XRF instrument download.
5. Review sampling procedures and planned sample depths with field crew.
6. Field-check and set up equipment for functional checks, sampling, decontamination, spill prevention, and health and safety.

Equipment List

- Niton XRF meter and stand
- Spare battery chargers
- Field notebook
- Trowel for smoothing soil surfaces

- Reusable plastic bags or stainless steel tray
- Disposable sample cups with x-ray film and lids
- X-ray window film (Mylar, Kapton, Spectrolene, polypropylene, or equivalent; 2.5 to 6.0 micrometers thick)
- Disposable scoops, stainless-steel spoons, or other appropriate mixing tools
- Appropriate quality assurance/quality control (QA/QC) standards and blank sand
- Chemwipes
- Decontamination equipment (Alconox solution [or equivalent] in spray bottle, brushes, buckets, rinse water spray bottle) for mixing tools and trowels
- Protective waterproof gloves (nitrile or latex)

XRF Analysis Documentation

The XRF sample results will be recorded by the associated software in an Excel format. The files will be downloaded at the end of each day and emailed to the project chemist for review. Any additional sample logging and sample collection should follow the protocol and procedures found in the appropriate SOP. Detailed notes should be recorded in the sampler's field notebook or in a log generated from the field database. Items to be documented on the sampling log include (include as much of the following information in the XRF software as possible):

1. Record type of boring or excavation equipment and the total boring or excavation depth.
2. If multiple samples are being collected at one location at a variety of depths, record all sample depths.
3. Record date and time of sample collection in addition to the full sample ID that is listed in the PST.
4. Sampling difficulties shall be noted (that is, difficult slope or abnormal debris in sample location).
5. Analysis start time and the source count time (that is, 60, 90, or 120 seconds, etc.) will be documented on sample collection sheet. Analysis and count time are automatically recorded in the XRF software.

Field-portable XRF Soil Sampling, Collection of Samples for Analysis

In Situ Sample Preparation

When the soil moisture is less than 20 percent, the error associated with moisture may be minimal. If areas are encountered where the moisture content is greater than 20 percent (moisture is visible), consult with the project chemist for options available for proceeding with field analysis.

For in situ analysis of soil:

1. Remove large or nonrepresentative debris from the selected location. This debris includes rocks, gravel, vegetation, and concrete.
2. Homogenize the location chosen for analysis by mixing in place an area approximately 4 inches by 4 inches by 3 inches deep using a clean (or decontaminated) stainless-steel or disposable spoon. Smooth and firmly tamp the location to provide as flat and smooth an area as possible.
3. Stretch a section of x-ray window film over the area to be tested to maintain a dust-free environment for the nose of the instrument. (Use in situ analysis for metals-only samples.)
4. To initiate a reading, position the nose of the XRF against the x-ray film, squeeze the shutter release, and firmly press the instrument flat against the surface. Source count times for in situ analysis usually range from 3 to 5 minutes, varying among instruments and depending on requirement detection limits.
5. After the in situ field screening is performed, inspect the nose of the instrument for contamination, which may affect future analysis. If necessary, clean it with a soft cloth or tissue.

For confirmation samples, or where samples for organic analysis are to be collected, the soil samples should be treated as ex situ samples, below.

For in situ analysis of debris:

1. In some cases, the large or nonrepresentative debris removed in Step 1 above may need analysis. The debris for analysis can include rocks, wood, concrete, etc.
2. Analyze debris that is too large or difficult to homogenize by locating multiple locations on the surface of the debris that are as flat and smooth as possible. Scan a minimum of three locations or approximately 10 percent of the surface area (whichever is greater).
3. Stretch a section of x-ray window film over the area to be tested to maintain a dust-free environment for the nose of the instrument. (Use in situ analysis for metals only samples.)
4. To initiate a reading, position the nose of the XRF against the x-ray film, squeeze the shutter release, and firmly press the instrument flat against the surface. Source count times for in situ analysis usually range from 3 to 5 minutes, varying among instruments and depending on requirement detection limits.

After the in situ field screening is performed, inspect the nose of the instrument for contamination, which may affect future analysis. If necessary, clean it with a soft cloth or tissue.

Ex Situ Sample Preparation

For ex situ analysis:

There are several possible correct methods for the ex situ analysis of samples. The area that previously would have been homogenized for the in situ analysis should be scooped out and placed into a clean (or decontaminated) stainless-steel or disposable pan (do not use plastic if organic analysis will be performed on any of this homogenized sample) using a stainless-steel or disposable spoon or spatula (do not use plastic if organic analysis are associated with the homogenized sample). The sample should then be thoroughly mixed (homogenized) using the same spoon or spatula.

1. The preferred method is to setup the portable field stand in an area where the XRF can be stationed and left in place for the day. Use the Niton software and a laptop computer to setup the method criteria and control the XRF instrument during the soil analysis.
   a. Starting with the previously homogenized sample, use the supplied soil sieves, bowl, and mortar to generate a finely ground well homogenized sample. (Note: This step is not required if the soil sample was passed through a sieve during the homogenization step.)
   b. Transfer the prepared sample into a new sample cup (order replacement supplies from Niton), place the X-ray film over the cup, and snap the lid in place. Place the sample cup in the portable field test stand. The XRF points upward, the sample rests on top of the XRF with the X-ray film directly in contact with the nose of the XRF cup lid facing down.
   c. Using the computer, start the analysis. The source count time should be at least 2 minutes for chromium. Consult previous analysis to determine if multiple scan frequencies are required (or contact the project chemist).
   d. Prepare the next sample while the XRF is analyzing the current sample.
2. An alternative method to using the portable field stand is to identify the sample for XRF analysis and homogenize the sample (as described above).
   a. Transfer the sample to a re-sealable plastic bag and firmly molded into a flat smooth surface.
   b. Use the Niton software and a laptop computer or the included PDA to setup the method criteria.
   c. To start the analysis, position the nose of the XRF against the flat smooth surface of the sample and squeeze the shutter release (or press the start button on the laptop or PDA). Be sure to maintain constant pressure against the sample. If contact is broken, the analysis will need to be restarted. The source count time for ex situ analysis usually range from one to two minutes, depending on the required detection limits (see 1c above for count times).
   d. After the ex situ field screening is performed, inspect the nose of the instrument for contamination, which may affect future analysis. If necessary, clean it with a soft cloth or tissue.
3. Transfer the sample to a labeled glass jar for shipment to the confirmation laboratory (if applicable).

Sample Analysis

In today’s modern XRF models:

1. An X-ray source is used for detection. Expose the sample to the X-ray source for a minimum of 1 minute. Longer exposure times may be needed depending on the media that is being analyzed and the required detection levels. The time needed for analysis will be determined in the field by analyzing standards that have concentrations of the metals of concern near the required detection levels. Better detection limits can usually be obtained by homogenizing the sample, increasing the exposure time, and using two or more scan frequencies. Use a minimum of a 2-minute exposure for chromium analysis.

2. When the XRF instrument displays the results they include the analyte, the result, and a percent confidence (displayed as a ± value). The result is displayed as nondetect for analytes that do not meet the percent confidence established in the instrument. The lower the required detection levels, the longer the analysis time required to meet the percent confidence.

3. Download saved data from XRF instrument daily (if data are collected in PDA). Foreword the data files to the project chemist daily.

4. All samples collected for offsite confirmation will also be analyzed using the XRF and will be treated as ex situ samples.

Using older models:

1. Expose the sample to the energy source for a minimum of 1 minute. Longer exposure times may be needed depending on the media that is being analyzed as well as the age of the detector (non X-ray detectors). The time needed for analysis will be determined in the field by analyzing standards that have concentrations of the metals of concern near the required detection levels. Better detection limits can usually be obtained by homogenizing the sample, increasing the exposure time. Use a minimum of a 2-minute exposure for chromium).

2. When the XRF instrument indicates the results for the suite of analyzed elements and their concentrations, it includes a standard deviation for the reported concentrations. An analyte concentration is considered **not detected** if the result value is **less than two times the standard deviation**. The lower the required detection levels, the longer the analysis time required to reduce the result's standard deviation.

3. Record the readings (electronically or documented on the sampling log). Review the standard deviations for the elements of interest and determine if a longer analysis time is needed to reduce the standard deviations, thereby allowing the desired accuracy and precision for the concentrations. The standards will be analyzed using increasingly longer times until the required detection level is achieved.

4. Record values in field notebooks.

5. Download saved data from XRF instrument daily.

6. Samples collected for offsite confirmation will also be analyzed using the XRF and will be treated as ex situ samples.

Calibration

Two forms of calibration are important with XRF testing: an energy calibration and a sample matrix calibration.

Energy Calibration

The Niton XLi 702 automatically re-calibrates the energy scale when powered on. The energy scale can also be re-calibrated by pressing "Reset" on the instrument. The energy calibration should be performed every two hours.

Sample Matrix Calibration

Modern XRF instruments, such as the Niton Xli 702, do not require site specific calibrations to account for sample matrix effects. United States Environmental Protection Agency Method 6200 allows both fundamental parameters and Compton normalization as two techniques to eliminate site specific calibrations. Niton uses the Compton normalization method to automatically correct for sample specific matrix effects. The XRF is calibrated internally at the factory on NIST standard reference soil samples. Ensure the annual factory calibration certification is on file. This internal calibration is used for subsequent field work, without need for adjustment or recalibration at other sites.

Quality Assurance and Quality Control (Functional Checks)

Even though no onsite calibration will be performed, the method does require QA/QC functional check-testing protocols. The QA/QC that will be used to document that the XRF is operating properly will have the following steps:

- A startup operations check
- Analysis of a blank sample (clean sand)
- Analysis of standard sample(s)
- Analysis of duplicate samples
- QA/QC procedures will be compliant with manufacturer's instructions.

1. At the beginning of each day perform QA/QC functional check procedure or when the instrument is turned on after more than 2 hours of down time or if the operating environment changes, such as a temperature change of more than 20 degrees Fahrenheit.

2. Two types of blanks should be analyzed, an instrument blank and a method blank. An instrument blank sample (silicon dioxide, provided by Niton) will be analyzed at the start and end of each day and once every 20 samples, to confirm proper zero calibration of the XRF. The blank will be analyzed following the procedure for the ex situ sample analysis. A method blank is used to monitor for any field induced contamination. The method blank should follow any preparation procedures performed on the samples, such as mixing or ex situ analysis. **A method blank will be analyzed each day**.

3. A set of three to ten QC samples will be collected from the site during the initial field activities. These samples will be well homogenized, and a portion sent to the offsite laboratory for characterization. The remaining sample will be collected in re-sealable bags, labeled, and stored with the XRF for use as standards. Three to five of the on-site standards will be analyzed at the start of each day. The results of the standards will be plotted against the original XRF results and a correlation value will be calculated. A

correlation coefficient of 0.90 or greater must be achieved to meet the project objectives. A running log of all onsite standards analyzed will be maintained. One of the standards will be analyzed after every 20 samples. The readout from the XRF **must be within 20 percent relative percent difference of the known QC sample concentration**.

4. The last QA/QC step will be to analyze duplicate samples (two separate aliquots) at a rate of 1 in 10. These duplicate measurements must be within 35 percent of each other for the analysis to continue. If the sample results are not in agreement, then the reason for this discrepancy must be determined.

5. The Niton XL3t 600 displays both concentration and precision for each sample analyte measurement. The precision displayed by the Niton's 95 percent (2-sigma level) confidence intervals; whereas the precision calculated in EPA method 6200 is at a 68 percent (1-sigma) level. The Niton also calculates and displays detection limits for analytes if the concentration is below three standard deviations. This bypasses the need for replicate measurements on low-level standards.

Note: Volatile organic compounds, semivolatile organic compounds, and other organic samples cannot be collected from the homogenized soil if plastic is used for homogenizing or after XRF analysis, if contacted by plastic.

SOP-B17

Standard Operating Procedure for the Installation of Permanent Soil Gas Sampling Implants

This procedure is recommended as a practical approach for installation of permanent soil gas implants using a hand auger or hydrovac where the intent is to collect shallow soil vapor samples, and continuing with hydrovac and/or hollow-stem auger to collect deeper soil vapor samples. This SOP should be used where its application is consistent with the project's data quality objectives and in conjunction with SOP B18 *Standard Operating Procedure for the Collection of Soil Gas Samples from Soil Gas Probes Using Summa™ Canisters.* Only persons trained in the collection of soil gas samples should attempt this procedure.

1. Implant/Probe System Set-up

1.1 Obtain all necessary equipment for hand auguring or hydrovac to 5 feet below ground surface (BGS), and for hydrovac or hollow stem augering to depth greater than 5 feet BGS.

1.2 This technique can only be used in the vadose zone, not below the water table.

1.3 Several screen lengths are available (3", 6", 14", 21") but for discrete intervals required in Vapor Intrusion investigations, a 6" screen is recommended.

1.4 It is necessary to coordinate the hardware (i.e. size of tubing, fittings, sampling interface assembly, etc.) that mates the soil gas probe sampling line to the sampling system (i.e. Tedlar bags, Summa canisters, etc.). This step is critical to achieve a leak free system. All connections should be inert gas tight compression fittings (i.e. Swagelok® or equal) and all sample transfer lines should be made of Teflon® tubing.

1.5 Prior to installation of implants at a given location a utility survey must be completed, the necessary permits acquired, and in the case of private property - permission granted.

1.6 The drilling system must be decontaminated prior to use. Steam cleaning is the preferred method of decontamination. Once decontaminated, the auger/drill rod must be shown to be free of contaminates. As a minimum, a suitably sensitive organic vapor meter should be used for this purpose. Any probe that does not pass decontamination should not be used.

1.7 Handle and store decontaminated hand augers and drill rods in a manner that prevents contamination.

2. Implant Installation

2.1 Assemble the hand auger and/or other coring device. Auger/hydrovac/drill to the desired depth. Be sure that the final depth of the hole includes extra depth to include length of the screen. (i.e. for 5′ BGS with a 6" screen, push the probe to 5′6", for 15′ BGS with a 6" screen, push the probe to 15′6").

2.2 Attach the ¼" Teflon tubing to the implant. Use sufficient tubing so that at least 2′ will be left above ground. Plug the exposed end of the tubing with a cap.

2.3 Remove the auger/drill rod and put a section of PVC pipe down the hole. The PVC pipe is helpful to help center the implant in the middle of the hole and to be sure that the filter pack material makes it to the bottom of the hole. Thread the implant and tubing down the inside of the PVC pipe until it reaches the bottom.

2.4 Determine the volume of glass beads or sand (#2/12 or #2/16) needed to fill the space around the implant plus an additional 6″ space above the implant. Pour the sand/beads into the hole as the PVC pipe is slowly removed. Do not pull on the tubing. Remove the PVC pipe from the hole completely once the filter pack material has been set in place.

2.5 Determine the volume of dry bentonite needed to fill the next 1 foot of hole. Pour dry bentonite into the hole until it measures 1 foot above the sand pack.

2.6 Determine the volume of hydrated bentonite needed to fill the hole to 6″ below the upper nested probe. Place hydrated bentonite to the point 6″ below the upper nested probe. Measure the depth to make sure the upper probe will be installed at 5′6″ BGS.

2.7 Follow steps 2.2 through 2.4 for the installation of the upper nested probe.

2.8 Determine the volume of dry bentonite needed to fill the next 1 foot of hole. Pour dry bentonite into the hole until it measures 1 foot above the upper sand pack.

2.9 Determine the amount of hydrated bentonite needed to complete the hole. Pour in granular bentonite and hydrate. Repeat the procedure in 6″ increments to ground level.

2.10 Optional: Enlarge the hole and install the flushmount so that it is flush with the ground surface. Label probe tubing with location and depth. Coil the extra tubing inside the enclosure and cover.

2.11 Wait at least 48 hours before sampling.

2.12 When calculating dead volume, use the internal volume of the Teflon tubing, the internal volume of the implant, and the volume of the glass bead pack (assume 30% porosity).

2.13 The ground surface shall be replaced and repaired to original condition.

SOP-B18

Collection of Soil Gas Samples from Temporary and Permanent Soil Gas Probes using SUMMA Canisters and a Helium Leak Check

---

1. Scope and Application

This procedure offers a practical approach for the collection of soil gas samples from soil gas probes from permanently installed vapor points into SUMMA canisters. Soil gas sample integrity is verified by using a real time helium leak checking procedure before taking each sample. This must be done after probe installation and before sampling as well as before each subsequent sample for permanent probes. This standard operating procedure (SOP) should be used in conjunction with CH2M HILL's SOPs: "Soil Gas Probe Installation SOP" or "Soil Gas Implant Installation SOP," and when its application is consistent with the project's data quality objectives. Only persons trained in the collection of soil gas samples should attempt this procedure.

2. Site-Specific Considerations

2.1. Prior to attempting soil gas sampling there should be an understanding of subsurface conditions at the site.

2.1.1. Depth to Groundwater – soil gas samples should be collected in the vadose zone (and above the capillary fringe). Generally, soil gas samples should not be collected at a depth above 5 feet below ground surface (bgs). Sampling at multiple depths should be considered.

2.1.2. Soil permeability **-** It may not be feasible to collect soil gas from tighter grain soils with little pore volume, such as clays; if there are clay layers present in the subsurface, these intervals should be avoided. For sampling in these soils, it is recommended to uses soil gas implants with a wider bore hole. Care should be taken during purging and sampling so that the vacuum in the sampling system never exceeds 7 "Hg (100 "water).

3. Other Considerations

3.1. A utility clearance should be performed prior to mobilization, as with all intrusive site work.

3.2. Soil gas sampling should not be performed until 48 hours after a significant rain event (>1 inch of rainfall).

4. Apparatus and Materials

4.1. The soil gas probes should be installed by a licensed driller.

4.2. Teflon tubing, ¼-inch outer diameter sample tubing.

4.3. Swagelok® ¼-inch nut and ferrule sets for connecting the probe tubing to the sampling manifold.

4.4. The helium leak check equipment, including the enclosure, helium cylinder (high purity helium), and helium detector (Dialectric MGD is preferred). The enclosure may be provided by the driller or can be constructed from polyvinyl chloride (PVC) pipe. The helium detector can be rented from an equipment rental company.

4.5. MultiRae five gas meter. (Optional if onsite atmospheric gas analysis is required)

4.6. Air pump for purging and electric supply for the pump (either generator or power inverter with adapter for car battery). Must be capable of a flow of 200 mls/min and a vacuum of 20 "Hg.

4.7. Sampling manifold consisting of Swagelok® gas tight fittings with three valves and one pressure gauge to attach the probe to the air pump and the sample canister. This manifold must be clean, free of oils, and flushed free of volatile organic compounds (VOCs) prior to use.

4.8. Canister, SUMMA polished, certified clean and evacuated. (Canisters are typically provided by the laboratory.)

4.9. Flow controller or critical orifice, certified clean and set at desired sampling rate. These are typically provided and set by the laboratory.

4.10. Negative pressure gauge, oil-free and clean, to check canister pressure. The pressure gauges are typically provided by the laboratory. The laboratory may either provide one pressure gauge to be used with all of the canisters, or a pressure gauge for each canister to be left on during sample collection. Sometimes the canisters are fitted with built-in pressure gauges that are not removable.

4.11. Shipping container, suitable for protection of canister during shipping. Typically, strong cardboard boxes are used for canister shipment. The canisters should be shipped back to the laboratory in the same shipping container in which they were received.

4.12. Wrenches and screw driver (clean and free of contaminants), various sizes as needed for connecting fittings and making adjustment to the flow controller A 9/16-inch wrench fits the ¼-inch Swagelok® fittings, which most canisters and flow controllers have.

5. System Set-up

5.1. Acquire all the necessary hardware and sampling equipment shown in Figure 1. Be sure to use ¼-inch outside diameter Teflon sample tubing. ***Do not connect the canister at this time***.

5.2. Assemble or obtain the necessary fittings and vacuum gauge to create a soil gas probe and sampling manifold as shown in Figure 1. This manifold must be clean, free of oils, and flushed free of VOCs prior to use. Note: use only gas tight fittings such as Swagelok® or equivalent. Be sure to place the helium leak check enclosure over the probe, and push the sample tubing through the hole in the cap before attaching the sampling manifold.

5.3. Adjust the purge system evacuation pump sampling rate to achieve the desired flow rate of 200 milliliters/min. This should be performed at the outlet of the vacuum pump prior to purging, either by using a suitable flow meter, or determining the amount of time required to fill a 1- liter Tedlar bag.

5.4. Summa canisters are pre-evacuated by the laboratory. The vacuum will need to be verified in the field prior to use with a pressure gauge.

5.5. Flow controllers (if used) should come pre-set by the laboratory to sample at a pre-determined rate based on specific project requirements (see Table 1 for the most common options). In some cases [that is, project-specific quality assurance (QA)], the flow rate will need to be verified in the field prior to use. This is accomplished with a bubble meter, vacuum source, and instructions supplied by the laboratory.

6. System Leak Checking and Purging

6.1. ***Physical Leak Check*** - Perform a leak check of the sample manifold system by:

6.1.1. Make sure the gas probe valve (valve #1) is closed and the sample valve (valve #2) is open.

6.1.2. Open the purge valve (valve #3) and start the purge pump. Verify that the flow is set to 200 milliliters per minute (ml/min).

6.1.3. Close the sample valve (valve #2) and achieve a vacuum gauge reading of approx. 15 inches of mercury ("Hg).

6.1.4. A leak-free system will be evident by closing off the purge valve (valve #3), turning off the purge pump, and observing no loss of vacuum within the sampling manifold system for a period of 30 seconds. Repair any leaks prior to use.

6.1.5. Record the leak check date and time on the field sampling log.

6.2. ***System Purge and Helium Leak Check*** -A purge of the soil gas probe and sampling manifold system is required before taking each sample. The helium leak check procedure is also performed during this step. This leak check will verify the integrity of the implant as well as the probe and ground interface. This is accomplished by:

6.2.1. Where the ground surface is soft, the helium leak check enclosure is pressed down slightly into the ground surface. In situations where the ground surface is hard (for example, asphalt), apply a slight downward pressure to achieve a buildup of helium in the leak check enclosure.

6.2.2. Start the flow of helium under the leak check enclosure at 200 ml/min. Try and position the tube so the helium is directed at the interface of the probe and the ground. Let the helium fill the enclosure for a couple of minutes.

6.2.3. Turn the helium leak detector on and make sure that the detector is not reading any helium before proceeding. Verify that the helium concentration inside the leak check enclosure is >10% by placing the probe of the helium detector into the hole where the sample tubing comes out or under the enclosure wall. It is not necessary to verify that the helium concentration is 100% as this is bad for the detector. Safety factors will be incorporated into measured purge gas helium concentration to verify the probe seal integrity.

6.2.4. Purging is carried out by pulling soil gas through the system at a rate of 200 ml /min for a time period sufficient to achieve a purge volume that equals at 3 dead volumes (internal volume of the in-ground annular space, sample line, and sampling manifold system). When calculating the dead volume, be sure to take into account the inside diameter and length of the Teflon sample tubing, as well as the probe outside diameter and retract distance for the annular space for temporary probes. For permanent probes, calculate the volume of the annular space using a nominal 30% porosity for the sand or glass bead pack. If during the purge (or sampling) the vacuum exceeds 7 "Hg, then reduce the pump flow rate. The system vacuum must stay below this level at all times.

6.2.5. Open the sample valve (valve #2) and the purge valve (valve #3) and start the purge pump. Verify that the flow rate is still 200 ml/min.

6.2.6. To start the soil gas probe purge, open the gas probe valve (valve #1) and close the sample valve (valve #2) at the same time, and start timing.

6.2.7. During the last 5 minutes of the purge (or the entire purge time if less than 5 minutes), attach a Tedlar bag to the purge pump exhaust on open the bag's valve.

6.2.8. If the vacuum gauge reads >7 "Hg during the purge, then close the purge valve (valve #3) and monitor the vacuum in the manifold and probe. If there is no significant change after a minute, then there is an insignificant amount of soil gas and the vacuum is too great to take a soil gas sample. Several things can cause this. Consult with the project manager and take corrective action.

6.2.8.1. The soil formation is too 'tight' (that is, high clay or moisture content). Try using a lower flow rate. (temporary or permanent probe)

6.2.8.2. The soil formation is too 'tight'. Try a different depth or location. (temporary probe)

6.2.8.3. With a temporary probe system, the expendable tip may not have released when the probe was retracted. Try retracting the probe a little further, or use a long thin rod to poke the tip loose.

6.2.8.4. If water is visible in the flexible soil gas tubing, stop the purging immediately. It is not possible to take a soil gas sample at that depth or location.

6.2.9. At the end of the pre-determined purge time and after the system is verified to be leak free, close the purge valve (valve #3), close the valve to the Tedlar bag, and turn off the pump. Do not open the purge valve again. Doing so will result in loss of the purge integrity and will require re-purging.

6.2.10. Attach the Tedlar bag to the helium detector using a piece of flexible rubber tubing and open the valve. If a helium reading of >0.1%, or 1000 ppmv, is observed, then the probe leak check has failed and corrective action should be taken. This includes first checking the fittings and connections and trying another purge and leak check. It may also be necessary to remove the soil gas probe and re-install it in a nearby location. Using a limit of 0.1 % allows for a 10x safety margin to verify that the leak check was <1% (verify that this limit is consistent with appropriate project-specific agency guidance).

6.2.11. Remove Tedlar bag and turn off the helium leak detector.

6.2.12. Record the purge date, time, purge rate, leak check result, and purge volume on the field sampling log.

6.2.13. Immediately move on to the sampling phase. Little to no delay should occur between purging and sampling.

7. Sample Collection

7.1. 'Clean' sampling protocols must be followed when handling and collecting samples. This requires care in the shipping, storage, and use of sampling equipment. Cleanliness of personnel who come in contact with the sampling equipment is also important: no smoking, no eating, no drinking, no perfumes, no deodorants, no dry cleaned clothing, etc. Canisters should not be transported in vehicles with gas-powered equipment or gasoline cans. Sharpie markers should not be used for labeling or note-taking during sampling.

7.2. The SUMMA canisters are certified clean and evacuated by the laboratory to near absolute zero pressure. Care should be used at all times to prevent inadvertent loss of canister vacuum. ***Never open the canister's valve unless the intent is to collect a sample or check the canister pressure.***

7.3. Verify that the vacuum pressure of the canister is between 28 – 30 inches Hg. Do not use a canister that has an initial pressure less than 28 inches Hg because that canister likely leaked during shipment.

7.3.1. Remove the protective cap from the valve on the canister.

7.3.2. If using an external gauge, attach the gauge to the canister and open the valve. If the pressure gauge has two openings, make sure that the other opening is closed; the canister cap can be used for this. After taking the reading, close the canister and remove the gauge.

7.3.3. If using assigned pressure gauges, attach the pressure gauge to the canister, then attach the flow controller. When sample collection begins, record the initial pressure.

7.4. Attach the canister to the flow controller and then connect the flow controller to the sample valve (valve #2) on the sampling manifold. Open the sample valve (valve #2)

7.5. Before taking the sample, confirm that the sampling system valves are set as follows: 1) the purge valve (valve #3) is confirmed to be closed, gas probe valve (valve #1) is open, and 2) the sample valve is (valve #2) is open.

7.6. Slowly open the canister's valve approximately one full turn.

7.7. After sampling for the appropriate amount of time (determined from project instructions, see Table 1), close the sample valve (valve #2) and the canister's valve. If the canister has a built-in or assigned pressure gauge, allow the canister to fill until the vacuum pressure reaches 0 – 10 inches Hg. Remove the canister from the sampling manifold.

7.8. If using an external vacuum gauge, re-attach it, open the canister valve, and record the final pressure. Close the valve, remove the gauge, and replace and tighten the cap on the canister. Ideal pressure in the canister is between 0-10 inches Hg. More than 10 inches Hg can greatly increase reporting limits. Consult with the project team if this condition is encountered.

7.9. Record the sampling date, time, canister identification (ID), flow controller ID, and any other observation pertinent to the sampling event on the field sampling log. The temperature and barometric pressure should be recorded.

7.10. Fill out all appropriate documentation (sampling forms, sample labels, chain of custody, sample tags, etc.).

7.11. Disassemble the sampling system.

8. Sample Handling and Shipping

8.1. Fill out all appropriate documentation (chain of custody, sample tags) and return canisters and equipment to the laboratory

8.2. The canisters should be shipped back to the laboratory in the same shipping container in which they were received. The samples do not need to be cooled during shipment. DO NOT put ice in the shipping container.

8.3. When packing the canisters for shipment, verify that the valve (just past finger tight) and valve caps are snug (1/4 turn past finger tight), and use sufficient clean packing to prevent the valves from rubbing against any hard surfaces. Never pack the cans with other objects or materials that could cause them to be punctured or damaged.

8.4. Do not place sticky labels or tape on any surface of the canister!

8.5. Place a custody seal over the openings to the shipping container.

8.6. Make sure to insure the package for the value of the sample containers and flow controllers.

8.7. Ship canisters for overnight delivery.

9. Quality Control

9.1. Canister supplied by the laboratory must follow the performance criteria and quality assurance prescribed in U.S. Environmental Protection Agency (EPA) Method TO-14/15 for canister cleaning, certification of cleanliness, and leak checking. SOPs are required.

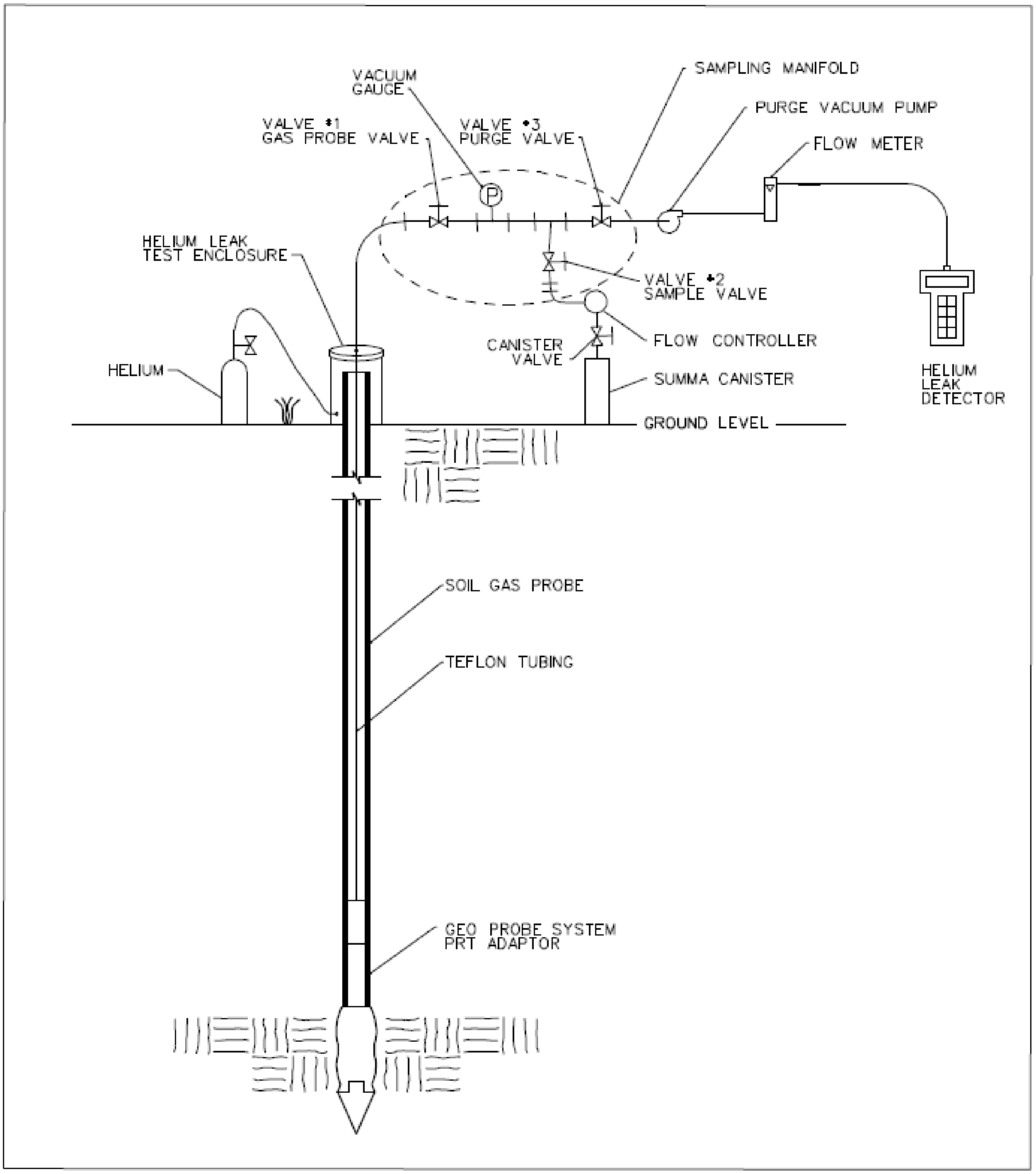
9.2. Flow controllers supplied by the laboratory must follow the performance criteria and QA prescribed in EPA Method TO-14/15 for flow controller cleaning and adjustment. SOPs are required.

Table 1 – Common Sampling Rates for Soil Gas Sampling

Can Size	Length of sampling time	Sampling Flow Rate (ml/min)
6 Liter	1 hour	90
6 Liter	8 hours	11.25
6 Liter	24 hours	3.75
1 Liter	5 minutes	180
1 Liter	1 hour	15
850 ml	5 minutes	150
850 ml	1 hour	12

Figure 1

Soil Gas Sampling System



CH2MHILL ***Applied Sciences Laboratory***

Indoor Vapor Intrusion Assessment
Soil Gas Sampling Field Log

Sheet 1 of 2

Project Info

Project Name: ______________________ **Project # :** __________

By: ______________________ **Date:** __________

Structure

Identification: ______________________

Address: ______________________

Sample Location type:

- ☐ concrete slab on grade
- ☐ concrete footing w/crawl space
- ☐ basement
- ☐ Yard or Driveway
- ☐ other (describe) ______________________

Soil Gas Sampling System

Probe type (describe): ______________________

Probe to sample interface system (describe): ______________________

Sample collection type: ☐ Syringe ☐ Tedlar bag ☐ Summa canister

Other info (describe other aspects) ______________________

Soil Gas Probe Purging & Sampling Log

Sample location (show in diagram)	1	2	3	4
Sample Identification (field ID)				
Time Installed				
Depth of installed probe (feet bgs)				
Leak check, vacuum (probe/sampling interface)				
Calculated dead volume (1 purge volume), cc				
Calculated purge volume (3 purge volume), cc				
Purge rate, cc/min.				
Purge duration, min.				
Purge started (time of day)				
Purge vacuum, " Hg				
Max Helium Leak Check Reading				
Purge completed (time of day)				
Sampling period started (time of day)				
Sampling rate, cc/min				
Sampling vacuum, " Hg				
Sampling period ended (time of day)				

Observations and Comments: ______________________

SOP-B19

Remote Equipment Refueling
Standard Operating Procedures for PG&E Topock Program

Background

Pacific Gas and Electric Company PG&E is conducting a soil investigation near the intersection of Park Moabi Road and Interstate 40, approximately 10 miles west of Needles, California, at and near the PG&E Topock Compressor Station. This Standard Operating Procedure summarizes the methods required to remotely refuel the equipment used during this work. These methods are to be followed by all contractors conducting this work.

Policy and Permission to Proceed

PG&E strongly prefers for equipment refueling to be conducted at commercial fueling stations or at the Topock Compressor Station fueling facilities whenever feasible. However, PG&E also realizes that some refueling is best conducted remotely, when the equipment is located at the worksite and should not be moved.

For onsite refueling at the Topock Compressor Station fueling facilities, the first step is for the contractor to discuss the onsite process and procedures with PG&E’s onsite remediation staff (Chris Smith, Curt Russell, or Glen Riddle). This includes the process of filling portable fuel containers at Topock Compressor Station, if PG&E allows.

If the Topock Compressor Station onsite fueling facilities are not the best way to refuel remote equipment, the contractor must receive positive permission from one of the PG&E staff employees listed above before proceeding to remotely refuel equipment following the procedures below. The contractor must also obtain PG&E permission prior to bringing or storing any fuel onsite.

Remote Refueling Procedure

Several steps must be accomplished before remote refueling can be initiated to avoid spills and incident. The following considerations and procedure will be followed during refueling:

Preparation and Pre-fueling Considerations

- Turn off all equipment or engines before refueling.
- Stage/inspect fire extinguisher to ensure that is in within specifications and is accessible.
- Stage spill containment such as a spill pad (bermed) and absorbent pads under the equipment that is being refueled.
- Distinguish all ignition sources (that is, cigarettes, torches, etc.).
- Allow small engines (such as generators) to cool down before refueling because gasoline spilled on hot engine parts may ignite.

- Do not leave the equipment fueling point while refueling to avoid spills and spark ignition. (Do not enter your vehicle during refueling.)
- Never jam or force the hold-open latch open by using some other object.
- Use only an approved container for portable gasoline storage cans.
- When filling a portable container, always place the container on level ground and keep the pump nozzle in contact with the container when refueling to avoid a static electricity ignition of fuel vapors.
- Never store fuel near a generator or near any ignition sources.
- If a flash fire occurs during refueling, you should attempt to stop the flow of fuel before backing away from the equipment or vehicle.

General Remote Fueling Procedure

1. Position the fuel supply source as close to the equipment to be fueled, as practicable and safe. Chock wheels of involved vehicles to avoid adjustments in vehicle position during fueling.
2. Prepare the work area by positioning bermed spill pad(s) at both the fuel source, equipment fill point, and ALL areas between. A spill containment kit containing sorbent pads should be positioned nearby and its contents should be verified prior to fueling.
3. Don appropriate personal protective equipment, as defined in the Health and Safety Plan.
4. Inspect fuel conveyance hose/equipment and all connections and fittings for signs of wear or defects prior to the initiation of fuel pumping or pouring. If pouring fuel from a portable container, a funnel constructed of suitable material must be used to avoid splashing.
5. In the event a defect is identified in fuel conveyance equipment; notify the appropriate personnel, and stand down from fueling operations immediately.
6. Ensure the area is free from ignition sources (that is, hot equipment/work, sources of spark or static electricity).
7. Position one crew member at the fuel pump and one crew member at the equipment fill point and begin fueling. Station fire extinguisher within 10 feet of fueling operations. Only one crew member is required for filling equipment from a portable container. Do not over fill or top off the fuel tank.
8. Once fueling is complete, deactivate the fuel supply pump prior to removing the fill nozzle from the equipment, and ensure that residual fuel has been emptied from the conveyance hose (as appropriate based on design of the equipment used).
9. Replace all fueling equipment and re-inspect for signs of wear or defect (that is, identify areas that may be seeping fuel at a slow rate).
10. Inspect work area for any signs of spills, and remove spill pad(s), as appropriate.

Communication and Contingency Action

If a spill occurs, the appropriate clean-up actions should commence as efficiently and safely as possible. Further, the reason for the spill will be investigated, and the team will modify the fueling procedure or conduct equipment repairs, as determined appropriate to minimize the potential for future spills. Further, the following communication protocol must be followed:

- **If the spill is contained by the spill containment measures:** the contractor's field team leader must be notified.
- **If the spill is not contained by the spill containment measures:** the contractor's field team leader must be immediately notified. Subsequently, the contractor's field team leader must immediately notify Chris Smith, Curt Russell, or Glen Riddle.

Waste Management

Waste generated during refueling, such as oily absorbent pads, must be transported and disposed at Interim Measures No. 3 oil waste-storage area, or as directed by Chris Smith, immediately following generation. Do not dispose of any oil/fuel-contaminated pads or rags in the soil rolloff bins or waste dumpsters.

Appendix H
PG&E Program QAPP and QAPP Addendum

(Provided on CD Only)

Revision 2

PG&E Program Quality Assurance Project Plan

Prepared for

Pacific Gas and Electric Company

August 2012

CH2MHILL®

155 Grand Ave. Suite 1000
Oakland, CA 94612

Document Title:	PG&E Program Quality Assurance Project Plan
Site Name:	PG&E Program wide
Site Location:	Multiple
Anticipated Sampling Dates:	Various
Prepared By:	CH2M HILL Date: August 2012
Address:	155 Grand Avenue, Suite 1000
City/State/Zip:	Oakland, California 94612
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Program Manager:	Eliana Makhlouf Phone: (415) 728-0625 x37025

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Approved ______________________________ Date ____________
CH2M HILL Program Manager

Approved ______________________________ Date ____________
CH2M HILL PG&E Program Chemist

Approved ______________________________ Date ____________
CH2M HILL PG&E Program Quality Officer

Contents

Contents, Continued

Contents, Continued

Tables
(Tables appear at the end of the section in which they are first referenced.)

Contents, Continued

Acronyms and Abbreviations

%D	percent difference or drift
%R	percent recovery
°C	degrees Celsius
µg/L	microgram(s) per liter
µmhos/cm	micromhos per centimeter
AB	ambient blank
AFCEE	Air Force Center for Engineering and the Environment (formerly the Air Force Center for Environmental Excellence)
ASTM	American Society for Testing and Materials
AutoDV	automated data validation
BTEX	benzene, toluene, ethylbenzene, and xylene
CAS	Chemical Abstract Service
CF-IRMS	continuous-flow isotope ratio mass spectrometry
CHHSL	California Human Health Screening Levels
CoC	chain-of-custody
COPC	contaminate of potential concern
DOC	dissolved organic carbon
DQO	data quality objective
DTSC	California Department of Toxic Substance Control
EB	equipment rinsate blank
EDD	electronic data deliverable
EPA	U.S. Environmental Protection Agency
FB	field blank
FD	field duplicate
ICAL	initial calibration
ICP	inductively coupled plasma
ICP-MS	inductively coupled plasma/mass spectrometry
ID	identifier
IDW	investigation-derived waste
IPC	instrument performance check

LCS	laboratory control sample
MCT	matrix concentration threshold
MDL	method detection limit
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
ml	milliliter
MS	matrix spike
MSA	method of standard addition
MSD	matrix spike duplicate
MQO	method quality objective
PARCC	precision, accuracy, representativeness, completeness, and comparability
PCB	polychlorinated biphenyls
pCi/L	picocuries per liter
PDF	portable document format
PG&E	Pacific Gas and Electric Company
PNA	polynuclear aromatic hydrocarbon
PPE	personal protective equipment
PST	planned sample table
QA	quality assurance
QAPP	quality assurance project plan
QC	quality control
RCRA	Resource Conservation and Recovery Act
RL	reporting limit
RPD	relative percent difference
RRF	relative response factor
RSD	relative standard deviation
RT	retention time
SAP	sampling and analysis plan
SIM	selected ion monitoring
SOP	standard operating procedure
STLC	soluble threshold limit concentration
SVOC	semivolatile organic compound
TB	trip blank

TCLP	toxicity characteristic leaching procedure
TDS	total dissolved solids
TKN	total Kjeldahl nitrogen
TOC	total organic carbon
TPH	total petroleum hydrocarbon
TSS	total suspended solids
TTLC	total threshold limit concentration
VOA	volatile organic analysis
VOC	volatile organic compound

SECTION 1

Introduction

This *Pacific Gas and Electric Company Program Quality Assurance Project Plan* (QAPP), Revision 2 was prepared to ensure that data of appropriate quality are collected and used for multiple sites for Pacific Gas and Electric Company (PG&E) projects that CH2M HILL supports. Each project will have a sampling and analysis plan (SAP), this QAPP, and QAPP addenda required to meet the project-specific requirements.

1.1 Background

CH2M HILL has been providing services to PG&E since the 1970s. Currently, CH2M HILL and affiliate companies are working at approximately 35 sites for PG&E. CH2M HILL provides services for the following:

- **Site management.** Projects include soil and groundwater monitoring, site characterization, and remediation design systems.
- **Remediation construction.** Projects include soil excavation, disposal, and treatment system construction.
- **Ecosystems and permitting.** Projects include proponent's environmental assessments, California Environmental Quality Act documentation, and other permitting and planning projects.
- **Engineering design.** Projects include computer-aided design and support and structural analysis.

1.2 PG&E Program Objectives

1.2.1 PG&E Program Objectives and Scope

This QAPP presents the quality assurance (QA) and quality control (QC) requirements designed to ensure that environmental data collected for the PG&E Program will be of the appropriate quality to achieve the objectives defined in the project-specific SAPs or QAPP addenda, unless otherwise defined. Specific protocols for sampling, sample handling and storage, chain-of-custody (CoC), laboratory analyses, data handling, and data evaluation and assessment are discussed. Requirements for performance evaluations, corrective actions, and preventive maintenance of equipment are specified. The elements included in this QAPP are consistent with those specified in the *EPA Requirements for Quality Assurance Project Plans* (U.S. Environmental Protection Agency [EPA], 2001a) and *EPA Requirements for Quality Management Plans* (EPA, 2001b) (note that the latter was reissued in March 2006). The objectives of this QAPP are as follows:

- Ensure that data collection and measurement procedures are standardized among all participants.

- Monitor the performance of the various measurement systems within the PG&E Program to maintain statistical control and provide rapid feedback so that corrective measures, if needed, can be implemented before data quality is compromised.
- Periodically assess the performance of these measurement systems and their components.
- Verify that reported data are sufficiently complete, comparable, representative, unbiased, and precise so that they are suitable for their intended use.

This QAPP is intended for use by CH2M HILL and its subcontractors that provide services associated with the environmental data collection effort. The QAPP supplements all SAPs and any other project-specific documents. The PG&E Program quality officer and the program chemist are primarily responsible for implementation of this QAPP.

1.2.2 PG&E Program QAPP versus SAPs and QAPP Addenda

Elements such as the general description, sources of contamination, information from previous investigations, and proposed investigations are addressed in project or site-specific SAPs or QAPP addenda. PG&E Project-specific QAPP addenda will cover items not included in this QAPP or any in conflict with it. The guidance set forth in this QAPP will be followed in the absence of site specific SAPs or QAPP addenda.

The PG&E project-specific SAPs or QAPP addenda should specify project-specific analytes and analytical methods that differ from the QAPP. The project manager or a designee will determine the reporting limit (RL) requirements, evaluate the QAPP specifications to make certain they meet those requirements, and address any differences in a QAPP addendum. The QAPP addendum will be included as part of the project-specific documents when project requirements dictate variance from the QAPP.

Project-specific preliminary cleanup goals or action levels will be included in the SAPs or QAPP addenda, if available. The project-specific documents will indicate sources for the preliminary cleanup goals or action levels. In cases where available technology does not offer analytical methods that are sufficiently sensitive to detect concentrations at or below the reference levels cited by the source, the method RLs will be used as the preliminary cleanup goals or action levels. All goals are subject to revision and will be documented.

Appendix A presents the analytical requirements for Reporting Limits, Accuracy, and Precession Limits.

1.2.3 Analytical Project Planning

The PG&E Program has a laboratory procurement process, modeled after the Air Force Center for Engineering and the Environment (AFCEE) (formerly the Air Force Center for Environmental Excellence), EPA, the U.S. Navy, and other federal programs. The process balances the PG&E Program quality, defensible data, and costs. The model has identified three steps in planning the analytical needs of a project:

1. **Determine the requirements.** To determine project-specific requirements, the program chemist should attend kick-off meetings (or equivalent) to understand the project goals and help develop the analytical scope of work.

2. **Determine the laboratory needs and select the laboratory.** Factors influencing the selection of analytical, geotechnical, radiochemistry laboratories include the matrices sampled; laboratory capabilities, recent performance, and location; and price. The program chemist ensures that the laboratory selected is appropriate to meet project objectives. The more information regarding the project objectives given to the chemists, the better chance they have to control liabilities related to analytical work.

3. **Decide what level of data validation is required to provide defensible data at the appropriate level of QC.** See Section 6.3 for descriptions of the data validation process. When a request for proposal is received from PG&E, there is a kickoff meeting of key people, including the project manager, the responsible contract administrator, the program chemist (or sometimes a project-specific chemist), a representative from project delivery, and others, depending on the type of project. Laboratory scope is discussed and a plan is determined that will provide the appropriate analytical services.

1.2.4 Data Quality Objectives

The specific needs for the data collected during each activity will be examined to ensure that project objectives for each investigation will be optimally achieved. A graded approach will be used in developing the project data quality objectives (DQO) to ensure that the DQO process will be appropriate for the nature, size, cost, and risk associated with the task or project. All projects will begin by examining EPA's seven-step DQO process (EPA, 2000); based on the level of project complexity and intended use of the data, the level of detail and applicability of the seven-step process will be assessed. The DQO process should consider the following steps (if applicable):

1. **State the problem.** Concisely describe the problem to be investigated. This determines the need for data collection. Review existing information to define the problem.

2. **Identify the decision**. Identify the decision that will solve the problem by using the data to be collected.

3. **Identify the inputs to the decision**. Identify the information and environmental measurements that are needed to support the decision.

4. **Define the study boundaries**. Specify the times, spatial areas, and other conditions (e.g., target analytes) that determine when and where data should be collected.

5. **Develop a decision rule**. For each decision, define the conditions that would cause the decision maker to choose between alternate actions (the decision rule is usually in the form of an "if…then" statement).

6. **Specify tolerable limits for decision errors**. Define how much uncertainty can be tolerated by the decision maker. Determine the acceptable error rates based on the consequences of making an incorrect decision.

7. **Optimize the design**. Evaluate information from the previous steps and choose the most resource-efficient design for data collection that will support a reliable decision.

SECTION 2

PG&E Program Organization and Responsibility

2.1 PG&E Program Organization

The PG&E Program management team has been structured with a program manager, program quality control manager, program health and safety manger and a program chemist to ensure that the goals of the PG&E Program are met.

2.2 Project/Task Organization

The organization chart and descriptive text identifying task managers and individuals charged with specific responsibilities for each project can be found in project-specific SAPs. Lines of authority and the scope of authority given to each key member of the project team, including the authority to initiate and approve corrective actions, are discussed in the SAPs. All subcontractors and scopes of work are also identified in the project- or site-specific SAPs.

2.3 Training and Certification Requirements

All personnel engaged in field activities will have completed the Occupational Safety Health Administration, 40-hour health and safety training that meet the requirements of Title 29 Code of Federal Regulations Section 1910.120 and Title 8 Code of California Regulations Section 5192. All CH2M HILL personnel working on the PG&E Program will read applicable project-specific health and safety plans. Documentation will be maintained to demonstrate that all requirements of the plan are followed.

All laboratories contracted for analytical services will be certified under the California Department of Health Environmental Laboratory Accreditation Program, when appropriate and where accreditation is afforded under the California program. No analyses may be performed or reported if accreditation is revoked. Any loss or suspension of accreditation must be communicated to CH2M HILL within 24 hours of notification. Laboratory managers will ensure that all laboratory personnel have been properly trained and are qualified to perform the assigned tasks.

SECTION 3

Sampling Procedures

3.0 Standard Operating Procedures

All sample collection and related activities will follow the appropriate standard operating procedure (SOP). SOPs are located in the project work plan, SAP, QAPP addendum, or other project documents.

3.1 Sampling Design

The number and location of samples are specific to each site and are discussed in the project-specific SAPs. The rationale for the sampling design is also described in the SAPs as part of the project DQOs. The sampling design is a function of the medium sampled, information about the sampling site, the type of data to be collected, and how the data are to be used.

All projects should use the field database and provide a planned sample table (PST), CoC forms, and other database-generated paperwork whenever possible. All samples collected for offsite laboratories will be documented on a CoC form.

The procedures described in the following sections may be superseded or supplemented by the project-specific SAPs or QAPP addenda.

3.2 Sampling Method Requirements

This section addresses the requirements for soil and groundwater sampling. Many projects will require site-specific SOPs because of unique conditions that should be addressed in the project-specific work plan, SAP, QAPP addenda or other project-specific documents. Small projects will need to have sampling SOPs, but may find an existing SOP that can be adopted for the specific needs of the project.

3.2.1 Field Calibration

Field equipment will be calibrated before the start of work and recorded in the field notebook or daily calibration log. Any instrument drift from prior calibration should be noted. Calibration will be in accordance with procedures and schedules in the particular instrument's operations manual.

Calibrated equipment will be uniquely identified by using the manufacturer's serial number or other means. A label with the identification number and the date when the next calibration is due (scheduled calibrations) will be physically attached to the equipment. If this is not possible, records traceable to the equipment (e.g., showing the equipment identification) will be readily available for reference. Instrument identification and the results of calibrations and records of repairs will also be recorded in the logbook or daily calibration log.

Scheduled periodic testing equipment calibration does not relieve field personnel of the responsibility of using properly functioning equipment. If equipment malfunction is suspected, the device shall be removed from service, tagged so that it is not inadvertently used, and the appropriate personnel notified so that a recalibration can be performed or substitute equipment can be obtained. Equipment that fails calibration or becomes inoperable during use will be removed from service and either segregated to prevent inadvertent use or tagged to indicate it is out of calibration. Such equipment will be repaired and satisfactorily recalibrated. Equipment that cannot be repaired will be replaced.

3.2.2 Soil Sampling

Sampling locations will be specified in the project-specific SAPs, but the exact locations will be determined in the field based on such factors as accessibility and topography. The exact locations will be recorded in the field logbook or on the field sampling form when sampling is completed. A sketch of the sampling location will be entered into the logbook, if necessary, with reference points labeled including distances to the sampling location. Location of the sampling point by a global positioning system may be required.

Soil sampling using decontaminated equipment will be performed as described in the following sections. Each sample container will be closed as soon as it is filled; it will be chilled and processed for shipment to an offsite laboratory to allow laboratory analysis within the applicable holding time.

ALL SOILS SAMPLE RESULTS WILL BE REPORTED IN DRY WEIGHT UNLESS OTHERWISE SPECIFIED IN THE SAP.

3.2.2.1 Surface Soil Sampling

Surface soil sampling will follow the project-specific SOPs, but generally, samples will be collected as grab samples at the depth interval specified in the project-specific SAP for each location. Samples will be collected using a decontaminated stainless steel or nonmetallic hand trowel or equivalent equipment (sampling equipment should be chosen based on the analyte of concern for the specific sample). A Terra Core sampler, EasyDraw Syringe, cutoff disposable syringe or equivalent equipment will be used for volatile organic compounds (VOC), as described in Section 3.2.1.4. Samples to be analyzed for VOCs will be collected first. Samples to be analyzed for all other analytes should be placed in a sample-dedicated, 1-gallon, disposable pail or a decontaminated stainless steel bowl. The samples will be homogenized (using the trowel), and transferred to the appropriate containers. To prevent potential contaminant migration from the sample, sample containers will be filled to the top, taking care to prevent soil from remaining in the lid threads prior to being sealed.

3.2.2.2 Subsurface Soil Sampling

Subsurface soil sampling will follow the project-specific SOPs, but generally, samples will be collected by boring to the depth specified in the project-specific SAP using an appropriately sized hand auger or equivalent equipment. Once the specified depth is reached, the hand auger will be removed, and accumulated soil will be set aside in a sample-dedicated disposable pail or tarp. A different, clean hand auger will be inserted into the hole to collect the sample (decontamination of the boring implement is sufficient if multiple boring implements are not available). Other sampling devices, such as push tubes or split-spoon samplers, may be used. A Terra Core sampler, EasyDraw Syringe, cutoff disposable syringe, or equivalent equipment will be used for VOCs, as described below. Samples to be analyzed for VOCs will be collected first. Samples to be analyzed for all other analytes should be placed in a sample-dedicated, 1-gallon, disposable pail or a decontaminated stainless steel bowl. The samples will be homogenized (using the trowel) and transferred to the appropriate containers. To prevent potential contaminant migration from the sample, sample containers will be filled to the top, taking care to prevent soil from remaining in the lid threads prior to being sealed.

3.2.2.3 Confirmation Sampling for Soil Excavation

This procedure is outlined in the project-specific SOPs. Confirmation sampling will be performed prior to closure of any excavation. Confirmation samples are usually collected from the bottom and sides of the excavation. The number and type of samples collected should be of sufficient quantity to be representative of the excavated site. The project- or site-specific SAP should address the number, type, and quantity of samples to be collected. All confirmation samples should be analyzed by the analytical methodology specified herein or in the project-specific QAPP addendum (collection of soil samples for determination of VOCs shall be in accordance with Section 3.2.1.4.). Field or laboratory screening data should not be used to verify that contamination has been removed below project action levels unless specifically approved by the overseeing regulatory agency.

3.2.2.4 Soil Sampling for Volatile Organic Compounds

See project-specific SOP for procedure. Guidelines for collecting soil samples for VOC analysis are provided in Method SW5035B. These sampling techniques are applicable to analysis by methods SW8260B or C and SW8015B or D (volatile parameters). Sampling for VOCs may be accomplished by using an EasyDraw Syringe, a Terra Core sampler, a cutoff plastic syringe, or any equivalent sampling device.

VOC samples will be collected into pre-tarred vials with or without preservatives. Preserved samples will be chilled and sent to the lab in accordance with the appropriate SOP. Unpreserved VOC samples will be frozen or chilled in the field. If chilled to 4 degrees Celsius (°C) (±2°C), the samples will be shipped by overnight express delivery (or courier) the same day they are collected. If frozen, appropriate measures should be taken to ensure that frozen samples remain frozen until receipt by the laboratory. If samples remain frozen, the laboratory has 14 days from date of collection to analyze the samples. If samples thaw to temperatures higher than 4°C (±2°C), they must be analyzed within 48 hours of collection. If the temperature does not exceed 4°C (±2°C), the laboratory may (1) freeze the samples between -7 and -20ºC within 48 hours of collection and keep them frozen or (2) preserve them in sodium bisulfate or methanol within 48 hours of collection. Either of these procedures will extend the holding time to 14 days.

Sampling Using Cutoff Syringe. A disposable syringe capable of measuring 1 to 5 milliliters (ml) (±0.5 ml) is required. Calibration in the field will be needed for the specific soil type and the type of syringe to determine the proper setting on the syringe to collect the samples. For example, the plunger is set to 5 ml, and the sample is collected and weighed; if 5 grams (±0.5 gram) are not obtained, the process is repeated until the correct plunger setting is identified. The same procedure is repeated for the 1-gram sample. Once the volume setting is identified, all soils of similar type will be collected at this volume. Samples can be collected with or without field preservation. When field preservation is chosen, the samples are collected into vials pre-preserved with methanol or sodium bisulfate. Otherwise, samples can be collected into vials without preservative, and preservation can be performed by the laboratory upon receipt of the samples within 48 hours of collection.

Sampling with Terra Core Sampler or EasyDraw Syringe. The sample is collected into the Terra Core or equivalent sampler following the manufacturer's instructions. A minimum of three samples will be collected. Two aliquots are needed for low-level analysis and reanalysis if necessary. The third aliquot is needed for extraction in methanol by the laboratory in case high-concentration analysis is indicated. Exposure to air must be minimized.

Sampling with Field Preservation. Before using this option, determine if the soil is amenable to the sodium bisulfate preservative. Soil samples that contain carbonate minerals may effervesce upon contact with the preservative. If the amount of gas generated is small (little if any effervescence with the preservative), field preservation may be used. If rapid or vigorous gas generation is observed, the sample should be collected without field preservation. If the sample is amenable to field preservation, it is collected using one of the methods listed above and quickly transferred into a VOC vial with preservative. The vial should be quickly sealed to avoid significant loss of volatiles components. The laboratory will supply a minimum of three preweighed VOC vials with 5 ml of aqueous sodium bisulfate preservative as described in Method SW5035B, as well as a single preweighed VOC vial without the preservative for each sample to be analyzed for VOCs. Two 5-gram aliquots in bisulfate are required for low-concentration analysis and reanalysis, when necessary. One 5-gram aliquot without sodium bisulfate is required for extraction in methanol by the laboratory in case high-concentration analysis is indicated by a low-concentration or screening analysis of the sample. One 1-gram sample in bisulfate is needed because the possibility exists that neither the 5-gram sample intended for low-concentration analysis, nor the 5-gram sample intended for high-concentration analysis, will have all target analyte concentrations within the calibration range. Exposure of the sample to air must be minimized.

If VOC analyses are the only analyses being performed for samples collected from any location; an additional 2- or 4-ounce soil sample must also be collected to analyze for percent moisture.

Sampling without Field Preservation. The samples will be collected using one of the methods listed above and quickly transferred into a minimum of three preweighed, vials without preservative supplied by the laboratory. These preweighed vials may be empty, they may contain reagent water, or they may be preserved with methanol, depending on whether the contaminant concentration is at low- or high-level concentration. Two 5-gram aliquots are needed for low-concentration analysis and reanalysis, when necessary. In addition, one 5-gram aliquot is required for extraction in methanol by the laboratory in case high-concentration analysis is indicated by a low-concentration or screening analysis of the sample. One 1-gram sample is also recommended because the possibility exists that neither the 5-gram sample intended for low-concentration analysis, nor the 5-gram sample intended for high-concentration analysis, will have all target analyte concentrations within the calibration range. Exposure of the sample to air must be minimized. Freezing the samples between -7 and -20° C within 48 hours and keeping them frozen until analysis allows a 14-day holding time.

If VOC analyses are the only analyses being performed for samples collected from any location; an additional 2- or 4-ounce soil sample must also be collected to analyze for percent moisture.

3.2.3 Groundwater Sampling

3.2.3.1 Water Level Measurement

See project specific SOP for procedure. Field meter probes and water level sounding equipment will be decontaminated before and after each use at each well. Water levels in wells that are known or suspected to be least contaminated will be measured first. Water levels in wells that are known or suspected to have the highest contamination will be measured last.

If well heads are accessible, all wells will be sounded from the top of the casing to determine the depth to water and total well depth prior to purging. An electronic sounder, accurate to ±0.01 foot, will be used to measure depth to water in each well. Annual calibration documentation shall be maintained on file. The serial number of the meters shall be recorded in the sampling logbook. When using an electronic sounder, the probe will be lowered down the casing to the top of the water column, and the graduated markings on the probe wire or tape will be used to measure the depth to water from the surveyed point on the rim of the well casing. (Typically, the measuring device emits a constant tone when the probe is submerged in standing water. Most electronic level sounders have a visual indicator consisting of a small light bulb or diode that turns on when the probe encounters water.) The total well depth will be sounded from the surveyed top of the casing by lowering the weighted probe to the bottom of the well. The weighted probe will sink into silt, if present, at the bottom of the well screen. The total well depth will be measured by recording the depth to the nearest 0.1 foot.

3.2.3.2 Well Purging

See project specific SOPs for procedure. All wells will be purged prior to sampling. All equipment that will contact the sample during purging and sampling will be decontaminated prior to each use.

Low-flow Purge. One option for well sampling is low-stress (low-flow) purging using a pump capable of a purge rate of 1 liter per minute or less. Typically, a pneumatic or small electric submersible pump is used. The water level should be monitored approximately every 5 minutes. The flow rate should be started at the minimum flow capacity of the pump, then gradually increased until initial drawdown is observed. The flow rate should then be reduced slightly to achieve a stabilized pumping level. This reduced rate should become the maximum purge rate for the well. Each adjustment to the flow rate and the water level measured after each adjustment should be recorded. The flow rate should not exceed 1 liter per minute. Care should be taken to maintain pump suction and avoid entrapment of air in the tubing.

Casing Volume Purge. Another option for well sampling is three casing volume (macro-purging) using a pump capable of purging 1 to 5 gallons per minute, usually an electrical submersible pump. Purging will be conducted at a flow rate sufficient to remove water from the entire screened interval of the well. However, the purge rate should not result in substantial drawdown, which is defined as 5 percent of the water column or the top of the screened interval. Purging will consist of the removal of a minimum of three casing volumes of water.

For low-yield wells (wells that exhibit less than 80 percent recovery [%R], within 2 hours), one casing volume of water shall be removed. If pump capability allows, the well will be purged at a rate of less than 1 gallon per minute. The well will then be allowed to recover to 80 percent and sampled within 24 hours of purging.

Water Quality Parameter Stabilization. To ensure representative sampling, water quality parameters (dissolved oxygen, pH, redox potential, specific conductance, and turbidity) must be stable before samples are collected, regardless of purge technique. Parameters will be measured approximately every 3 to 5 minutes, depending on the rate and duration of the purge. Purging is considered complete when the following water quality parameters are stable (i.e., for three consecutive readings):

- The pH varies by no more than 0.1 pH unit.
- Specific conductance readings are within 10 percent of the average.
- The redox potential varies by no more than 10 millivolts.
- The dissolved oxygen readings are within 10 percent of the average.

The water used to make measurements will not be used to fill sample bottles.

If the macro-purge technique is used, three casing volume well purges must be complete **and** the water quality parameters must be stable before the sample is collected. The total amount of water purged will be recorded in the field logbook or well-specific purge and sample collection form.

Grab-sample Collection. In some instances, it is appropriate to collect a grab sample from a monitoring well. For example, when a low-yield well has been purged and allowed to recharge. A bailer can be used to collect the sample without additional purge, eliminating the need to deploy a well pump for sample collection.

If a bailer is used to collect samples, a sufficient volume of water must be collected to fill the sample bottles and perform one measurement of water quality parameters. The water quality parameters will be recorded in the field logbook or well-specific purge and sample collection form.

3.2.3.3 Well Sampling

See project specific SOPs for procedure. Prior to sampling each well, the water level will be measured and the well purged, as previously described. All wells will be sampled within 24 hours of purging. Wells without a dedicated pump will be sampled using a bailer of appropriate material, such as Teflon or stainless steel. Wells with a dedicated pump will be sampled directly from the tap closest to the well head. All aerators, strainers, and hoses will be removed from the tap prior to sample collection. The flow will be adjusted so that a gentle stream is obtained. To minimize volatilization, a flow rate of less than 100 milliliters per minute is recommended for samples to be analyzed for VOCs.

At each sampling location, sample bottles designated for a particular analysis will be filled sequentially before bottles designated for other analyses are filled. Vials for VOCs will be filled first to minimize aeration of water in the well. All vials for VOCs will be provided, pre-preserved by the subcontract laboratory. The vials will be filled directly from the tap. Each vial will be inverted and checked for air bubbles and checked for headspace. If a pea-size or larger air bubble appears, the cap can be removed and additional sample added to eliminate the air space. If there is any likelihood of contamination being introduced into the sample, the vial contents will be emptied into the container used to measure purge volumes, the vial discarded, and a new sample collected in a new vial.

If a duplicate sample is to be collected, all sample bottles designated for a particular analysis for both duplicates will be filled sequentially before bottles for another analysis are filled. For example, duplicate samples will be collected sequentially for semivolatile organic compounds (SVOC), followed by duplicate samples collected sequentially for metals. EPA recommends the following collection order:

1. Volatile organic compounds and total organic compounds
2. Dissolved gasses and total organic carbon
3. Semivolatile compounds – Acid/Base extractables, pesticides, and PCBs
4. Metals and general chemistry
5. Radionuclides

It is considered good management practice to plan sample collection from the least to the most contaminated area of the site to decrease the risk of cross contamination (assuming no other factors that drive the priority of sampling location order).

Groundwater samples will be transferred from the bailer, tap, or pump tubing directly into the appropriate pre-preserved sample containers, if required. When transferring samples, care must be taken not to touch any nondedicated equipment to the sample container. The containers will be chilled and processed for shipment to the laboratory.

3.3 Equipment Decontamination

See project specific SOPs for procedure. Sampling equipment must be consistently decontaminated to ensure the quality of the samples collected. All equipment that comes into contact with potentially contaminated soil or water samples will be decontaminated. Disposable equipment intended for one use will not be decontaminated but will be packaged for appropriate disposal. In addition, equipment that is dedicated for repeated use at only one location does not need to be decontaminated. Equipment decontamination will occur prior to each use.

The following decontamination sequence is recommended:

1. Nonphosphate detergent and tap water wash, using a brush if necessary

2. Tap water rinse

3. Two rinses with deionized/distilled water

4. Organic-free water rinse (high-performance liquid chromatography grade) for organic samples

Large and bulky sampling equipment might need to be steam cleaned. Equipment will be decontaminated in a predesignated area on pallets or plastic sheeting. The cleaned equipment will be wrapped or covered to prevent contamination and stored in an uncontaminated area.

3.4 Disposal of Investigation-derived Wastes

The disposal of investigation-derived waste (IDW) should be addressed in the project-specific SAP. Each project or task can have different IDW disposal requirements, depending on site-specific conditions and the work performed. The following potentially contaminated IDW might be generated during field activities:

- **Used personal protective equipment (PPE) and disposable equipment.** Used PPE will be double-bagged and placed in a municipal refuse dumpster onsite. PPE and disposable equipment that is still serviceable will be rendered unusable before disposal into the dumpster.
- **Decontamination fluids.** Decontamination fluids include dilute nitric acid, deionized water, residual contaminants, and water with nonphosphate detergent. These fluids will be collected and disposed of in accordance with site requirements and applicable regulatory requirements
- **Soil cuttings.** Soil cuttings generated during subsurface sampling will be collected and disposed of in accordance with site requirements and applicable regulatory requirements.
- **Purged groundwater and excess groundwater collected for sample container filling.** These wastes will be collected and disposed of in accordance with site requirements and applicable regulatory requirements.

Each project SAP should address IDW. Any samples collected for waste characterization should include IDW in the sample identifier (ID).

3.5 Field Quality Control Samples

QC samples will be collected to monitor accuracy, precision, and the potential presence of field contamination for analytical methods to be performed in the offsite laboratory. All field QC samples, except matrix spike/matrix spike duplicates (MS/MSD), will be sent blind to the laboratory along with regular field samples. These blind samples will be labeled similar to regular field samples to disguise them. Sampling frequencies may vary according to the project needs, as defined in the project-specific SAP or QAPP addendum. The recommended frequency of collection for QC samples is discussed in the following sections and should be reviewed and updated to achieve project-specific DQOs.

3.5.1 Field Duplicate Samples

A field duplicate (FD) is an independent sample collected as close as possible to the original sample, from the same source, and under identical conditions. FDs are used to document sampling and analytical precision. FDs will be collected at a minimum frequency of 10 percent or one per sampling event, whichever is more frequent, for each matrix and type of analysis. The sampling procedures described in Section 3.2 will be followed. The sampling locations for FD samples will be recorded in the field logbook or field sampling form, or both.

3.5.2 Equipment Blanks

Equipment blanks (EB) will be collected to evaluate field sampling and decontamination procedures by pouring deionized or organic free water over the decontaminated equipment. EBs will be collected at a frequency of one EB per day for each non-dedicated equipment type per sampling team. The EBs will be preserved, packaged, and shipped in the same manner described for the environmental samples. A separate sample ID will be assigned to each EB sample, and the sample will be submitted blind to the laboratory. EBs will be analyzed in the offsite laboratory for the same parameters specified for the corresponding matrix or for the main contaminate of potential concern (COPC).

3.5.3 Field Blanks

Field blanks (FB) (also known as ambient blanks [AB]) are collected to evaluate (or to monitor) whether contaminants have been introduced during sampling because of ambient conditions. FBs will be collected by pouring deionized water (or organic free water for organic samples) into a sample container at the sampling location and leaving the sample exposed to the atmosphere during the time a sample is collected. FBs will be collected at a frequency of one per location that warrants concern because of environmental conditions or project-specific QC concerns, as determined by the project chemist or project manager. Generally, FBs need to be collected if the analyte concentrations are high enough to allow mobile contaminants to affect the sample results and field conditions such as upwind environments cannot be controlled. FB will be analyzed for the same parameters specified for the associated samples.

3.5.4 Trip Blanks

Trip blanks (TB) are used to monitor contamination during sample shipping and handling and for cross contamination through VOC migration among the collected samples. They are prepared in the laboratory by pouring American Society for Testing and Materials (ASTM) Type II or organic-free water into a VOC sample container. They are then sealed, transported to the field, stay sealed while VOC samples are taken, and transported back to the laboratory in the same cooler as the VOC samples. One TB should accompany each VOC sample cooler.

3.5.5 Matrix Spike/Matrix Spike Duplicate

A MS/MSD consists of duplicate field sample aliquots spiked by the laboratory with analytes of concern to evaluate the effects of the matrix on the recoveries of these analytes. For every 20 field samples of each matrix collected at each site, additional duplicate aliquots of one of the samples should be collected for each analysis and designated on the CoC form for use as an MS/MSD by the laboratory. Separate line entries are not required for matrix spikes. The increased number of sample containers should be noted. The duplicate aliquots for MS/MSD analyses should be collected simultaneously or in immediate succession with the parent sample. They will be treated in exactly the same manner as the parent sample during storage and shipment. The sampling locations for the MS/MSD will be documented in the field logbook or the field sampling form, or both if the MS/MSD are specifically requested by the project; if not, document the extra volume on the CoC and in the field logbook or on the field sampling form.

3.5.6 Split Samples

Split samples may be collected periodically for comparison of data between analytical laboratories. A split sample is collected from a thoroughly homogenized original sample and is used to document analytical precision. Split samples will be collected for each matrix and for each analytical method, except those for volatiles when project objectives dictate the need. The sampling procedures described in Section 3.2 or those described in the project- or site-specific SAPs or QAPP addenda will be followed. The sampling locations will be recorded in the field logbook or field sampling form, or both. Split samples will be sent to a second certified laboratory, and results will be compared with those from the primary laboratory.

SECTION 4

Sample Handling and Custody

4.1 Sample Documentation and Tracking

Projects with large sampling events should take advantage of the field database to provide a PST, CoCs, and sample container labels. The use of Mobil Integrated Sample Tracking (MIST) and the field database are recommended. All projects must keep sample documentation.

The laboratories will provide pre-preserved sample containers with labels identifying the preservative, unless approved by the project chemist. Laser-printed labels and indelible ink pens will be used whenever possible to complete sample labels. Immediately prior to sample collection, the sample ID, date, time of sampling and sampler's initials will be recorded onto the waterproof label. Samples will be placed into resealable bags, and ice used in shipping containers double bagged. Vital information regarding the collection of each sample will be recorded into a field logbook, field sampling form, or CoC form.

A separate logbook will be used for each project. It will be bound with consecutively numbered pages. All entries will be legibly written in black ink and signed and dated by the individual making the entries. Factual and objective language will be used. All entries will be complete and accurate to allow reconstruction of each field activity. A line will be placed through any portion of a field notebook that is unused. One line strike-through will be used to show corrections to entries. The strike-through will be initialed and dated. No correction fluid will be used. The following information for each sample will be recorded into the field logbook, field sampling form, or CoC form, whichever is appropriate:

- Sampling location and description. (Sketch and measured distances from reference points will be recorded if there is no established identification for the sample location.)
- Sample ID.
- Sampler's name.
- Date and time of sampling.
- Sample designation as composite or grab.
- Sample matrix.
- Type and ID of sampling equipment.
- Field measurement data (e.g., pH, temperature, conductivity).
- Field observations that may be relevant to the analysis or sample integrity (e.g., odor, color, and weather conditions).
- Associated QC blanks.

- Preservative used.
- CoC form number, custody seal number, and lot numbers of sample containers (when appropriate).
- Shipping details. (If the laboratory is providing courier service, the courier must sign and date the CoC forms. Copies of the signed CoC forms should be transmitted to the office as soon as practical. If Federal Express, United Parcel Service, or other courier is used, include shipping information for each shipment.)
- Destination laboratory.

4.2 Containers and Preservatives

The contracted analytical laboratory will provide the required sample containers for all samples including QC samples. All sample containers for PG&E projects will be pre-cleaned and certified to EPA standards. No sample containers will be reused. The contracted laboratory will add preservatives, if required, prior to shipping the sample containers to the field or supply the preservative as appropriate. The laboratory, upon receipt of the samples, will verify and record the adequacy of preservation and will add additional preservative, if necessary. For VOCs, the sample label or CoC will indicate the presence of preservative and the laboratory will verify and record the pH after the analysis. The containers, minimum sample quantities, required preservatives, and maximum holding times for many parameters are shown in Table 4-1 (tables appear at the end of the section in which they are first referenced). The project- or site-specific SAP or QAPP addendum will contain the specific containers required for each project if they differ from the containers listed in Table 4-1.

4.3 Chain-of-Custody

Collecting data of known quality begins at the point of sample collection. Legally defensible data are generated by using proven evidentiary procedures. These procedures are described in the following sections and must be followed to preserve and ensure the integrity of all samples from the time of collection through analysis. Sample custody records must be maintained in the field and subcontractor laboratory. A sample is considered to be in custody if it is either in physical possession or view, locked up, or kept in a secured and restricted area. Until the samples are shipped, custody will be the responsibility of the sampling team leader.

CoC forms document sample collection and shipment to the laboratory. CoC form(s) will be completed for each sampling event. The original copy will be provided to the laboratory with the sample shipping cooler, and a copy will be retained in the field documentation files. The CoC form will identify the contents of each shipment and maintain the custodial integrity of the samples. All CoC forms will be signed and dated by the responsible sampling team personnel, as applicable. The “Relinquished By” field will be signed by the responsible sampling team personnel, with the date, time, and air bill number noted on the CoC form. The laboratory will provide a PDF copy of the CoC forms, with the sample login information included, within 48 hours of sample receipt, along with information related to the condition of receipt of the samples. The laboratory will also include the original or a copy with the final hardcopy report (the final "hardcopy" can be in a paper or PDF format or both, depending on project-specific requirements).

A self-adhesive custody seal will be placed across the lid and side of each sample to maintain its integrity until the laboratory opens it. The shipping coolers containing the samples will be sealed with a custody seal any time they are not in an individual's possession or view before shipping. All custody seals will be signed and dated by the responsible sampling team personnel.

At a minimum, the CoC form must include the following information:

- Project information such as project number or identification of investigation monitoring program, Project Manager, etc.
- Unique sample ID
- Date and time of sample collection
- Source of sample (including name, location, sample type, and matrix)
- Number of containers
- Designation of MS/MSD (if applicable)
- Preservative used
- Analyses required
- Name of sampler
- Custody transfer signatures, dates, and times of sample transfers from the field to transporters and to the laboratories
- Bill of lading or transporter tracking number (if applicable)

4.4 Laboratory Responsibilities

After the samples reach the laboratory, they shall be checked against information on the CoC form for anomalies. The condition, temperature, and appropriate preservation of samples shall be checked and documented on the CoC form or a sample receipt checklist. Checking an aliquot of each sample container, at the time of receipt, using litmus paper is an acceptable procedure to determine the pH of all sample containers received, except VOCs. The pH check should be conducted in the sample receiving area or in the appropriate laboratory department. Samples for VOC analysis require that the pH check be performed after the vial has been opened for analysis; the pH shall be recorded at the time of analysis in the department log books. Anomalies in the received samples and their resolution shall be documented in laboratory records and summarized in the final analytical report case narrative. All sample information shall then be entered into a tracking system, and unique analytical sample IDs shall be assigned. A copy of this information shall be reviewed by the laboratory for accuracy. Sample holding time tracking begins with the collection of samples and continues until the analysis is complete.

Samples not preserved or analyzed in accordance with the requirements in this QAPP or the project-specific SAP or QAPP addendum may be resampled and analyzed at no additional cost to CH2M HILL. Any subcontracted analyses shall be documented on a CoC form by the laboratory and noted in the case narrative. Internal laboratory CoC procedures shall also be documented and implemented by the laboratory. Sample custody within the laboratory will, at a minimum, include storage of samples in a secure, restricted access area when not in use; samples must be checked out and checked back in by the analysts who use them. Internal custody records must be maintained by the laboratory as part of the documentation file for each sample. Specific instructions concerning the analysis specified for each sample shall be communicated to the analysts. Analytical batches shall be created, and laboratory QC samples shall be introduced into each batch.

While in the laboratory; samples shall be stored in controlled-access, temperature-applicable areas. Refrigerators, coolers, and freezers shall be monitored for temperature 7 days a week. Acceptance criterion for the temperatures of the refrigerators and coolers is 4°C ±2°C. Acceptance criterion for the temperatures of the freezers shall be between -7°C and -20°C. All of the cold-storage areas shall be monitored by using thermometers that have been calibrated with a National Institute of Standards and Technology approved traceable thermometer. As indicated by the calibration results, correction factors shall be applied to each thermometer.

Records that include acceptance criteria shall be maintained. Samples for volatile organics analysis shall be stored separately from other samples, standards, and sample extracts. Samples shall be stored after analysis until disposed of in accordance with applicable local, state, and federal regulations. Disposal records shall be maintained by the laboratory.

The following information shall be documented on the CoC form, the sample receipt form, or the sample login form (or on more than one of these forms, as applicable):

- Date samples received
- CH2M HILL sample ID
- Laboratory sample ID
- Analytical tests requested for the sample batch
- Sample matrix
- Number of samples in the batch
- Container description and location in the laboratory
- Verification of sample preservation

All of the information must be retained and traceable in the laboratory sample tracking system, with summary information provided in the analytical reports.

SOPs describing sample control and custody shall be maintained by the laboratory.

4.5 Sample Packaging and Transport

The following sections provide guidelines for sample packaging and transport that may be superceded, amended, or replaced in the project- or site-specific SAPs or QAPP addenda.

4.5.1 Sample Container Preparation

The following procedures shall be implemented:

- Labels will be checked for completeness and comparability with the COC.
- Container lids will be checked for tightness; if the container is not full, the sampler will note the COC, field notebook, or field sampling form.
- Sample bottles will be double-bagged in heavy-duty plastic. Glass sample containers will be covered with bubble wrap to prevent breakage.

4.5.2 Shipping Cooler Preparation

The following procedures shall be implemented:

- All previous labels and broken custody seals used on the sample shipping cooler will be removed.
- Drain plugs will be sealed with fiberglass or similar tape (outside and inside) to prevent melting ice from leaking.
- A cushioning layer of packing material, such as bubble wrap (approximately 1 inch thick), will be placed at the bottom of the cooler to prevent breakage during shipment.
- The cooler will be lined with a large plastic bag (same type used to contain samples).
- All ice will be double-bagged in zip-lock plastic bags.

4.5.3 Placing Samples in the Cooler

The following procedures shall be implemented:

- The CoC form will be placed in a zip-lock bag and taped inside the top of the cooler if shipment is to be made through commercial carrier.
- Samples will be placed in an upright position in the cooler. Sample containers will never be placed onto their side, except for a soil VOC that is to be frozen.
- Ice will be placed on top of samples and between samples. Ideally, ice will be placed in resealable plastic bags in duplicate to minimize leakage of ice melt into the cooler.
- Void space between samples should be filled with packing material or ice packs (vermiculite is not acceptable packing material unless required by DOT).

4.5.4 Closing the Cooler

The following procedures shall be implemented if the cooler is to be shipped by commercial carrier:

- The cooler lid will be taped with strapping tape, encircling the cooler several times.
- Custody seals should also be affixed to the cooler lid to further ensure the integrity of the samples. Custody seals should be initialed and dated.

4.5.5 Transport

Sample coolers will be transported to the laboratory immediately after sample collection. An overnight courier may be used to transport the samples. Intermediate stops should be avoided, except for emergencies, in which case, the situation should be noted in the field notebooks. The laboratory should be notified that samples are being shipped.

TABLE 4-1
Sample Containers, Preservation, and Holding Times
PG&E Program Quality Assurance Project Plan

Analyte	Method	Container and Minimum Quantity: Water	Container and Minimum Quantity: Soil/Sediment	Preservation	Holding Time
Metals (except hexavalent chromium)	SW6010B or C, SW6020A, EPA200.7, EPA200.8, SM3120B, EPA245.1, SW7000 series methods	1-liter P or G	8-oz/P, G, or T	Water: Add HNO_3 to pH<2; soil/sediment: None	28 days for mercury; 180 days for all others
Hexavalent Chromium	SW7199		4-oz/P, G, or T	Soil/sediment: Chill to 4°C (±2°C)	Soil: 30 days to extraction, 7 days to analysis
Hexavalent Chromium	EPA218.6	250-ml P	Not applicable	chill to ≤6°C Laboratory or field filtration within 24 hours. After filtration adjust the pH to 9–9.5 by adding $(NH_4)_2SO_4$/ NH_4OH buffer solution	28 days
Hexavalent Chromium	SM3500-Cr B	250-ml P	Not applicable	chill to ≤6°C Laboratory or field filtration within 24 hours. After filtration adjust the pH to 9–9.5 by adding $(NH_4)_2SO_4$/ NH_4OH buffer solution	28 days
Purgeable TPH	SW8015B, C or D Preparation methods: SW5035B (soil) SW5030B (water)	Three 40-ml G-TLC	Three 40-ml G-TLC	Water: Add HCl to pH<2; chill to 4°C (±2°C) Soil/sediment: Chill to 4°C (±2°C) or: • Frozen in 48 hours • Frozen onsite • Sodium bisulfate • Methanol	Water: 14 days (preserved); 7 days (unpreserved) Soil: 48 hours unless preserved within 48 hours 14 days if solid samples preserved by the following methods: • 4ºC/frozen in 48 hours • Frozen onsite • Sodium bisulfate • Methanol

TABLE 4-1
Sample Containers, Preservation, and Holding Times
PG&E Program Quality Assurance Project Plan

Analyte	Method	Container and Minimum Quantity: Water	Container and Minimum Quantity: Soil/Sediment	Preservation	Holding Time
Extractable TPH	SW8015B, C or D	Two 1-liter G	8-oz/G or T	Chill to 4°C (±2°C)	Water: 7 days to extraction; 40 days to analysis Soil: 14 days to extraction; 40 days to analysis
Pesticides	SW8081A or B	Two 1-liter G	8-oz/G or T	Chill to 4°C (±2°C)	Water: 7 days to extraction; 40 days to analysis Soil: 14 days to extraction; 40 days to analysis 90 days to extraction if frozen to -10°C (±2°C)
PCB	SW8082 or SW8082A	Two 1-liter G	8-oz/G or T	Chill to 4°C (±2°C)	Water: 7 days to extraction; 40 days to analysis Soil: 14 days to extraction; 40 days to analysis 90 days to extraction if frozen to -10°C (±2°C)
VOCs	SW8260B or C Preparation methods: SW5035B (Soil) SW5030B (Water)	Three 40-ml G-TLC	Three 40-ml G-TLC	Water: Add HCl to pH<2; chill to 4°C (±2°C) Soil/sediment: Chill to 4°C (±2°C) or: • Frozen in 48 hours • Frozen onsite • Sodium bisulfate • Methanol	Water: 14 days (preserved); 7 days (unpreserved) Soil: 48 hours unless preserved with 48 hours 14 days if solid samples preserved by the following methods: • 4ºC/frozen in 48 hours • Frozen onsite • Sodium bisulfate • Methanol
SVOC	SW8270C or D	Two 1-liter G	8-oz G or T	Chill to 4°C (±2°C)	Water: 7 days to extraction; 40 days to analysis Soil: 14 days to extraction; 40 days to analysis
Herbicides	SW8151A	Two 1-liter G	8-oz G or T	Chill to 4°C (± 2°C)	Water: 7 days to extraction; 40 days to analysis Soil: 14 days to extraction; 40 days to analysis

TABLE 4-1
Sample Containers, Preservation, and Holding Times
PG&E Program Quality Assurance Project Plan

		Container and Minimum Quantity			
Analyte	**Method**	**Water**	**Soil/Sediment**	**Preservation**	**Holding Time**
PNA	SW8270SIM	Two 1-liter G	8-oz G or T	Chill to 4°C (±2°C)	Water: 7 days to extraction; 40 days to analysis Soil: 14 days to extraction; 40 days to analysis
Carbon Dioxide, Methane, Ethane, and Ethane	RSK-175	Three 40-ml G-TLC	Not applicable	Add HCl to pH<2; chill to 4°C (±2°C)	Water: 14 days
Carbon Dioxide	SM5400-CO2	1-liter P or G		≤6°C	14 days
Ammonia	EPA350.1 Revision 2 or SM4500-NH3	1-liter P or G	4-oz P, G, or T	Water: Add H_2SO_4 to pH<2; chill to ≤6°C Soil/sediment: 4°C (±2°C)	Water: 28 days Soil: Not available
Anions	EPA300.0 or SM4500	500-ml P or G	4-oz P, G, or T	Chill to ≤6°C (none required for chloride and fluoride) ortho-Phosphate requires filtering within 15 minutes after sample collection	Bromide, chloride, fluoride, sulfate, and iodide in 28 days Nitrate and ortho-Phosphate in water 48 hours
Metabolic Acids	EPA300.M	500-ml P or G		Chill to ≤6°C	Water: 28 days
Alkalinity (total, bicarbonate, carbonate, hydroxide)	EPA310.2 or SM2320 B	500-ml P or G		Chill to ≤6°C	14 days
TDS	SM2540 C	500-ml P or G		Chill to ≤6°C	7 days
TSS	SM2540 D	500-ml P or G		Chill to ≤6°C	7 days
Turbidity	EPA180.1 Revision 2 or SM2130	500-ml P or G		Chill to ≤6°C	48 hrs
Color	SM2120 E	125-ml P or G		Chill to ≤6°C	48 hours
Specific Conductance	EPA120.1 Revision 1, or SM2510 SW9050	500-ml P or G	4-oz P, G, or T	Chill to ≤6°C Soil/sediment: Chill to 4°C (±2°C)	28 days
Hardness	SM2340 B or C	500-ml P or G		Chill to ≤6°C	6 months
pH	SM4500H+B or SW9040	500-ml P or G	4-oz P, G, or T	Chill to ≤6°C	15 minutes
BOD	SM5210 B	500-ml P or G		Chill to ≤6°C	48 hours

TABLE 4-1
Sample Containers, Preservation, and Holding Times
PG&E Program Quality Assurance Project Plan

Analyte	Method	Container and Minimum Quantity: Water	Container and Minimum Quantity: Soil/Sediment	Preservation	Holding Time
TOC/DOC	SM 5310 C	500-ml G or 40-ml VOA	4-oz P, G, or T	Water: For 500-ml: Add H_2SO_4 to pH<2; chill to ≤6°C For 40-ml VOA: Add H_2PO_4 to pH<2; chill to ≤6°C	28 days
TOC	Walkley Black	Not applicable	4-oz P, G, or T	Chill to ≤6°C	28 days
Perchlorate	EPA314.0	500-ml P or G	4-oz P, G, or T	Chill to ≤6°C	28 days
Sulfide	SM4500-S²	500-ml P or G		Add zinc acetate and NaOH to pH>9, chill to ≤6°C	7 days
Acid Volatile Sulfide	E821/R-91-100	Check with Laboratory prior to sample collection			
TKN	EPA351.1/2 or SM4500	500-ml P or G	4-oz P, G, or T	Add H_2SO_4 to pH<2; chill to Chill to ≤6°C	28 days
Ferrous Iron (Fe +2)	SM3500D	500-ml P or G		Chill to ≤6°C	24 hours
Dissolved Silica	EPA200.7 or SM4500-Si or SM3120 B	500-ml P only		Chill to ≤6°C	28 days
18 O and deuterium	Laboratory SOP (continuous flow mass spectrometer – CF-IRMS)	100-ml P or 40-ml VOA		Chill to ≤6°C	6 months
Cyanide	EPA335.4 (R1) or SM4500-CN C/D/E (water) SW9010B, SW9012, or SW9014 (soil)	500-ml P or G	4-oz P, G, or T	Water: Add NaOH to pH>12; chill to ≤6°C Soil/sediment: Chill to 4°C (±2°C)	Water and soil: 14 days
Gross Alpha	SM7110C	500 ml P or G		Add HNO_3 to pH<2	6 months
Gross Beta	E900.0	500-ml P or G		Add HNO_3 to pH<2	6 months
Radium-226	E903.1	500-ml P or G	4-oz P, G, or T	Add HNO_3 to pH<2; soil/sediment: None	6 months
Radium-228	E904.0	500-ml P or G	4-oz P, G, or T	Add HNO_3 to pH<2; soil/sediment: None	6 months
Strontium	E905.0	500-ml P or G	4-oz P, G, or T	Add HNO_3 to pH<2; soil/sediment: None	6 months
Tritium	E906.0	500-ml P or G	4-oz P, G, or T	Add HNO_3 to pH<2; soil/sediment: None	6 months
Uranium	R908.0 or 200.8	500-ml P or G	4-oz P, G, or T	Add HNO_3 to pH<2; soil/sediment: None	6 months

TABLE 4-1
Sample Containers, Preservation, and Holding Times
PG&E Program Quality Assurance Project Plan

Analyte	Method	Container and Minimum Quantity: Water	Container and Minimum Quantity: Soil/Sediment	Preservation	Holding Time
Dioxins and furans	SW8290	Two 1-liter Amber G	8-oz G	Chill to 4°C (±2°C)	Water and Soil: 30 days to extraction; 45 days after extraction to analysis Soils: 365 days to extraction if frozen to -10°C (±2°C)
Dioxins and furans (Drinking water)	EPA1316B	Two 1-liter Amber G		Chill to 4°C (±2°C)	7 Days to extraction 40 days after extraction to analysis
Asbestos	Water: EPA 100.1/100.2-TEM	1-liter sonicated P		Chill to 4°C (±2°C)	Water: 48 hour holding time
	Soil: PLM/BULK (present/absent); CARB435/PLM; TEM		4-oz G	Chill to 4°C (±2°C)	Soil: I year

TABLE 4-1
Sample Containers, Preservation, and Holding Times
PG&E Program Quality Assurance Project Plan

		Container and Minimum Quantity			
Analyte	Method	Water	Soil/Sediment	Preservation	Holding Time

Notes:

>	=	greater than
<	=	less than
≤	=	less than or equal to
BTEX	=	benzene, toluene, ethylbenzene, and xylene
CF-IRMS	=	continuous-flow isotope ratio mass spectrometry
DOC	=	dissolved organic compounds
G	=	glass
G-TLC	=	glass with teflon-lined cap
H_2PO_4	=	phosphoric acid
H_2SO_4	=	sulfuric acid
HCl	=	hydrochloric acid
HNO_3	=	nitric acid
NaOH	=	sodium hydroxide
NH_4	=	ammonium
NH_4OH	=	ammonium hydroxide
$(NH_4)_2SO_4$	=	ammonium sulfate
oz	=	ounce
P	=	polyethylene
PCB	=	polychlorinated biphenyls
PLM	=	Polarized light microscopy
PNA	=	polynuclear aromatic hydrocarbons
SIM	=	selected ion monitoring
SO_4	=	sulfate
T	=	brass sleeves in the sample barrel (sometimes called California brass)
TDS	=	total dissolved solids
TEM	=	Transmission Electron Microscopy
TKN	=	total kjeldahl nitrogen
TLC	=	teflon lined closure
TOC	=	total organic compounds
TPH	=	total petroleum hydrocarbons
TSS	=	total suspended solids

SECTION 5

Method Quality Objectives and Quality Assurance Program

Programmatic method quality objectives (MQOs) are defined in this section but may differ in individual projects, as specified in the project-specific QAPP addenda. MQOs are the basis for ensuring that the quality of the data collection meets the project-specific DQOs of the plan. They specify the type, quality, and quantity of QA/QC data to be collected and how the data are to be used to make the appropriate decisions for the project. The final output of the data must meet the qualitative and quantitative needs of the project.

5.1 Data Categories

Both screening and definitive data may be generated. Screening data are generated by rapid analytical methods, and calibration and QC requirements are less rigid than those required for definitive data. Quantitation from a screening method is usually imprecise. Definitive data are generated by rigorous analytical methods using standardized calibration and QC and are reported on specified deliverables. The data are analyte-specific, and both identification and quantitation are confirmed.

In general, screening data will be confirmed by definitive data for use in decision making for the PG&E Program. However, screening data may be used for decision making purposes on a project-specific basis, depending upon the DQOs. The project-specific documents will describe the advantages of collecting screening data that might be less precise but will more adequately define the characteristics of the site by increasing the number of samples collected. This approach can reduce overall error in the data collection process.

5.2 Precision, Accuracy, Representativeness, Completeness, and Comparability

Data quality will be evaluated for precision, accuracy, representativeness, completeness, and comparability (PARCC). Both definitive and screening data will be subject to PARCC requirements. PARCC objectives for screening methods may be identical to those for definitive data, or they may be less stringent depending on the project-specific objectives. Sampling frequencies may vary according to the project needs, as defined in the project-specific SAPs or QAPP addenda.

5.2.1 Precision

Precision is a measure of reproducibility of analytical results. It can be defined as the degree of mutual agreement among individual measurements obtained under similar conditions. Total precision is a function of the variability associated with both sampling and analysis. Precision will be evaluated as the relative percent difference (RPD) between field duplicate sample results or between the MS and MSD results. Field duplicates will comprise 10 percent of the sampling effort. MS/MSD samples will be analyzed at a 5-percent frequency. The MS/MSD samples will be field designated, if so required by project specific requirements. Laboratory-generated precision control limits can be used for data evaluation; however, all precision control limits listed in Appendix A and Tables 5-3 through 5-15 must be met.

5.2.2 Accuracy

Accuracy is the degree of agreement between a measured value and the "true" or expected value. It represents an estimate of total error from a single measurement, including both systematic error, or bias, and random error that may reflect variability due to imprecision. Accuracy is evaluated in terms of percent recovery (%R) determined from results of MS/MSD and laboratory control sample (LCS) analyses. Surrogate recoveries from samples analyzed for organic parameters are also used to assess accuracy. Laboratory-generated accuracy control limits can be used for data evaluation; however, the accuracy control limits listed in Appendix A and Tables 5-3 through 5-15 must be met.

5.2.3 Representativeness

Representativeness is the degree to which sample data accurately reflect the characteristics of a population of samples. It is achieved through a well-designed sampling program and by using standardized sampling strategies and techniques and analytical procedures. Factors that can affect representativeness include site homogeneity, sample homogeneity at a single point, and available information around which the sampling program is designed.

5.2.4 Completeness

Completeness is the number of valid measurements compared with the total number of measurements generated. Completeness will be determined for each method, matrix, and analyte combination. The completeness goals of each project are optimized to meet the DQOs. The goals for the PG&E Program are 95 percent for aqueous samples and 90 percent for soil samples.

5.2.5 Comparability

Comparability is the confidence with which one data set can be compared to another. It is achieved by maintaining standard techniques and procedures for collecting and analyzing samples and reporting the analytical results in standard units. Results of performance evaluation samples and systems audits will provide additional information for assessing comparability of data among subcontracting laboratories.

5.3 Method Detection Limits, Reporting Limits, and Instrument Calibration Requirements

5.3.1 Method Detection Limits

The method detection limit (MDL) is the minimum concentration of a substance that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero. Each participating laboratory will determine the MDL for each method, matrix, and analyte for each instrument that will be used to analyze samples. The MDLs will be initially determined prior to analyzing samples and again at least once every 12 months; a quarterly MDL verification can be substituted for the annual MDL study. The following steps should be followed:

1. Estimate the MDL using one of the following:
   - The concentration value that corresponds to an instrument signal/noise ratio in the range of 2.5 to 5
   - The concentration equivalent of three times the standard deviation of replicate measurement of the analyte in reagent water
   - The region of the standard curve where there is a significant change in sensitivity (i.e., a break in the slope of the standard curve)
2. Prepare (e.g., extract and digest) and analyze seven samples of an MS (ASTM Type II water for aqueous methods; Ottawa sand for soil methods; 1-mm glass beads, or smaller, for metals) containing the analyte of interest at a concentration three to five times the estimated MDL.
3. Determine the variance for each analyte by using Equations 1 and 2:

$$S^2 = \frac{1}{n-1}\left[\sum_{i=1}^{n}\left(x_i - \overline{x}\right)^2\right] \tag{1}$$

where:

S^2 = variance
x_I = the nth measurement of the variable x and
$\overline{x}$ = the average value of x

$$\overline{X} = \frac{1}{n}\sum_{i=1}^{n} x_i \tag{2}$$

4. Determine the standard deviation(s) for each analyte by using Equation 3:

$$s = (S^2)^{1/2} \tag{3}$$

5. Determine the MDL for each analyte by using Equation 4:

$$MDL = 3.14(s) \tag{4}$$

   Note: 3.14 is the one-sided t-statistic at the 99-percent confidence level appropriate for determining the MDL using seven samples.

6. If the spike level used in Step 2 is more than 10 times the calculated MDL, repeat the process using a smaller spiking level.

CH2M HILL requires a verification check be performed on the calculated MDLs for each target compound (AFCEE, 2006). The MDL check standard shall be spiked at approximately two times the current reported MDL. The MDL is verified if the check standard produces a response at least 3 times above the instrument's noise level and greater than the blank associated with the MDL verification study. If the verification response is too low, spike at a successively higher concentration until verification criteria are met, and use the first successful concentration as the reported MDL. The MDL verification check will be sent to CH2M HILL for review and approval.

5.3.2 Reporting Limits

In general, RLs must be greater than two times the calculated MDL. RLs used by the laboratory should not be greater than the reporting limit objectives listed in Appendix A.

When calibrating instruments, a standard at a concentration equal to or less than the RL must be included. In the project-specific SAP or QAPP addendum, reporting of analytical data will be addressed. One of the following options will be selected when establishing reporting requirements for each project:

- Analytes at concentrations greater than the laboratory MDL but less than the RL will be flagged "J" and reported as an estimate. Analytes that are not detected at or above the laboratory MDL will be flagged "U" and reported as not detected at the RL.
- Only analytes at a concentration greater than the project-specific RL will be reported. Analytes detected at less than the RL will be flagged "U" and reported as not detected at the RL.

For consistency, RLs and sample results shall be reported to two significant figures if less than 10 micrograms per liter (µg/L) (parts per billion) and to three significant figures otherwise.

RLs shall be reported on a dry-weight basis for soil samples.

5.3.3 Instrument Calibration

Laboratory instruments shall be calibrated by qualified personnel prior to sample analysis according to the procedures specified for each method. Calibration shall be verified at method-specified intervals throughout the analysis sequence. The frequency and acceptance criteria for calibration are specified for each analytical method in Tables 5-3 through 5-15, with supplemental requirements defined in the following sections for organic methodologies. When multipoint calibration is specified, the concentrations of the calibration standards should bracket those expected in the samples. Samples should be diluted, if necessary, to bring analyte responses within the calibration range. Data that exceed the calibration range cannot be reported by the laboratory. The initial calibration (ICAL) curve shall be verified as accurate with a standard purchased or prepared from an independent second source. ICAL verification involves the analysis of a standard containing all the target analytes, typically in the middle of the calibration range, each time the ICAL is performed. Quantitation based on extrapolation is not desirable.

Calibration requirements

In the initial calibration (for all instruments), a standard at a concentration equal to or less than the RL must be included.

Initial calibration must be re-established if the following conditions exist:

- The last calibration was established more than 1 year prior to the start of a sample's analysis [gas chromatography, gas chromatography-mass spectrometry, inductively coupled plasma, and inductively coupled plasma-mass spectrometry (ICPMS)]
- The last calibration was established more than 2 weeks prior to the start of a sample's analysis for hexavalent chromium by ion chromatography.
- Two consecutive continuing calibration standards fail
- The operating conditions change; for example, any of the following:
  - Major maintenance is performed
  - The fluid or gas "carrier" type changes
  - The instrument requires relocation
  - The analytical column is replaced

5.3.3.1 Initial Calibration Models for the Determination of Organic Compounds

Organic methodologies often provide multiple options for ICAL curve fits and associated acceptance criteria for use. The following sections describe the required laboratory practices that will be employed by the laboratory. The hierarchy that the laboratory will use when selecting the calibration curve fit for use in quantitation of sample results is described in the following section.

Calibration Techniques. The following procedures will be implemented:

- The analyst will verify that correct instrument operating conditions and routine maintenance as specified in the method and laboratory SOP are employed. All maintenance activities will be documented in a laboratory notebook for troubleshooting and scheduling of future routine, periodic maintenance.
- Ensure that the instrument is free of contamination prior to calibration. **Do not** perform any blank subtraction.
- The entire ICAL must be performed and meet method performance criteria prior to sample analyses. The calibration standards must be analyzed in sequential order from the lowest to highest concentration. If **one** calibration standard fails to meet criteria, it may be reanalyzed at the end of the calibration sequence. Justification for removing a calibration point from the selected curve fit includes circumstances such as, improper purge, injection failure, nonspiked level, or other obvious failures. The failure of multiple standards suggests an instrument problem or operator error and corrective action is required.
- Only the lowest or the highest calibration points can be removed from the calibration curve without justification. If the lowest calibration point is removed, the RL for that compound increases to the level of the next lowest calibration point. Approval to elevate RLs greater than the project-specific objectives **must** be approved by the program or project chemist. If the highest calibration point is removed, the linear range is shortened for that compound.

- The lowest calibration point in the calibration curve must be at or below the required RL.
- The other standard concentrations must define the working range of the instrument or the expected range of concentrations found in the samples.
- Either external or internal calibration can be employed for methods not involving mass spectrometry detectors. Internal calibration must be used when a mass spectrometry detector is employed.
- A minimum of five calibration points must be used for the calibration curve for gas chromatography/mass spectrometry and gas chromatography methods.
- Most compounds tend to be linear, and a linear approach should be favored when linearity is suggested by the calibration data. Nonlinear calibration should be considered only when a linear approach cannot be applied. It is not acceptable to use an alternate calibration procedure when a compound fails to perform in the usual manner. When this occurs it is indicative of instrument issues or operator error.
- If a nonlinear calibration curve fit is employed, a minimum of six calibration levels must be used for second-order (quadratic) curves, and a third order polynomial requires a minimum of seven calibration levels.
- When more than five levels of standards are analyzed in anticipation of using second- or third-order calibration curves, all calibration points **must** be used regardless of the calibration option employed. The highest or lowest calibration point may be excluded to narrow the calibration range and meet the requirements for a specific calibration option. Otherwise, unjustified exclusion of calibration data is expressly forbidden.
- Using the average (mean) relative standard deviation (RSD) of all analytes to meet ICAL criteria is **not** acceptable.

Calibration Options. This section describes the acceptable calibration options and the hierarchy that the laboratory should use when selecting a specific option. The choice of calibration option may also be based on previous experience or prior knowledge of detector response.

The following are calibration options:

- **Linear calibration using average calibration or response factors.** Calibration factors for external calibrations or response factors for internal calibrations must have RSDs not exceeding 20 percent or 15 percent, respectively, for quantitation. A minimum response factor of 0.05 for most target analytes or 0.01 for the least responsive target analytes must be achieved to ensure detectability.

- **Linear calibration using a linear regression equation (y=mx+b).** The correlation coefficient must equal 0.995 or better. The line should **not** be forced through the origin. The equation and a plot of the linear regression must be included in the raw data generated by the laboratory and made available in the data package upon request.

- **Nonlinear calibration.** This model may be a second-order or third-order polynomial. The model must be continuous without a break in the function and should **not** be forced through the origin. The coefficient of determination of the nonlinear regression must be

0.99 or better. The equation and a plot of the nonlinear regression must be included in the raw data generated by the laboratory and made available in the data package upon request. This method of calibration **must** be approved by the program or project chemist prior to analysis and is intended for nonlinear responding compounds only.

5.3.3.2 Continuing Calibration

Periodic verification of the ICAL is essential in generating analytical data of known quality. The continuing calibration verification analyses ensure that the instrument has not been adversely affected by the sample matrix or other instrument failures that would increase or decrease the sensitivity or accuracy of the method. The laboratory will perform continuing calibration for all methods in accordance with the specific requirements in the method and laboratory SOP.

Method SW8000B allowed the use of the average of all analytes percent difference or drift (%D) to meet the continuing calibration requirements for the method. Method SW8000B will not be allowed for the PG&E Program QAPP. Using the average (mean) %D to meet continuing calibration criteria is **not** acceptable. All analytes must meet the continuing calibration criteria for %D (see Method SW8000C).

5.4 Elements of Analytical Quality Control

Laboratory QC checks indicate the state of control that prevailed at the time of sample analysis. QC checks that involve field samples, such as matrix and surrogate spikes and field duplicates, also provide an indication of the presence of matrix effects. Field-originated blanks (see Section 3.5) provide a way to monitor potential contamination that field samples are subjected to. The QAPP specifies requirements for method blanks, LCSs, surrogate spikes, and MS/MSD that must be followed by subcontracting laboratories.

A laboratory QC batch is defined as a method blank, LCS, MS/MSD, or a sample duplicate (depending upon the method) and 20 or fewer environmental samples of similar matrix that are extracted or analyzed together. For gas chromatography/mass spectrometry volatile analyses, a method blank, LCS, and MS/MSD must be analyzed in each 12-hour calibration period. The number of environmental samples allowed in the laboratory QC batch is defined by the remaining time in the method-prescribed 12-hour calibration period divided by the analytical run time. Each preparation or analytical batch should be identified in a way that will associate environmental samples with the appropriate laboratory QC samples.

5.4.1 Method Blanks

Method blanks are used to monitor each preparation or analytical batch for interference or contamination from glassware, reagents, and other potential contaminant sources in the laboratory. A method blank is an analyte-free matrix (laboratory reagent water for aqueous samples or Ottawa sand for soil samples) to which all reagents are added in the same amount or proportions as are added to samples. It is processed through the entire sample preparation and analytical procedures along with the samples in the batch. There should be at least one method blank per preparation or analytical batch. If a target analyte is found at a concentration that exceeds the RL, corrective action must be performed to identify and eliminate the contamination source. **All** associated samples must be re-prepared or reanalyzed, or both, after the contamination source has been eliminated if the compounds detected in the associated blank are also present in the field samples. No analytical data may be corrected for the concentration found in the blank (no blank correction).

5.4.2 Laboratory Control Sample

An LCS consists of an analyte-free matrix (laboratory reagent water for aqueous samples and Ottawa sand or glass beads for soil samples) spiked with known amounts of analytes that come from a source different than that used for calibration standards. A **complete target analyte list** for each method specified in the QAPP will be spiked into the LCS. The spike levels should be less than or equal to the midpoint of the calibration range. If LCS results are outside the specified control limits, corrective action must be taken, including sample re-preparation or reanalysis, or both, if appropriate. Documentation of the re-preparation or reanalysis, or both, must be provided in the analytical report. If more than one LCS is analyzed in a preparation or analytical batch, the results for each of the LCSs analyzed must be reported. Any LCS recoveries that are above or below the QC limits affect the accuracy for the entire batch and require corrective action.

5.4.3 Surrogates

Surrogates are organic analytes that behave similarly as the analytes of interest but are not expected to occur naturally in the samples. They are spiked into the standards, the samples, and QC samples prior to sample preparation. Surrogate recoveries are used as an indicator of accuracy, method performance, and extraction efficiency. If surrogate recoveries are outside the specified control limits, corrective action must be taken, including sample re-preparation or reanalysis, or both, if appropriate. Documentation of the re-preparation or reanalysis, or both, must be provided in the analytical report.

5.4.4 Matrix Spike/Matrix Spike Duplicate

An MS is a sample matrix fortified with known quantities of specific compounds; it is subjected to the same preparation and analytical procedures as the native sample. Target analytes are spiked into the sample. MS recoveries are used to evaluate the effect of the sample matrix on the recovery of the analytes of interest. An MSD is a second fortified sample matrix. The RPD between the results of duplicate MSs measures the precision of sample results. One MS/MSD (MSD where appropriate) per 20 project-specific samples will be analyzed. A complete target analyte list for each method specified in the QAPP will be spiked into the MS/MSD (with the exception of PCBs; see Appendix A -notes). Project-specific samples designated on the CoC form will be spiked. The spike levels will be less than or equal to the midpoint of the calibration range. Exceedances of control limits should be flagged in the analytical report.

5.4.4.1 Matrix Spike for Hexavalent Chromium Analyses

Interference from groundwater is known to reduce the sensitivity of MethodEPA218.6. This can result in an incorrect assessment of the analyte identification or the specific RL if the “Matrix Spike and Dilution Protocol” is not followed. Samples being analyzed by Method EPA218.6 may be required to follow the protocol in the following section.

Matrix Spike and Dilution Protocol. Matrix interference has been encountered that affects the sensitivity for hexavalent chromium by ion chromatography methods. CH2M HILL shall direct the laboratories to perform an additional QA/QC analyses to aid in assessing any effect on method sensitivity for each project due to the sample matrix.

For nondetect sample results, the laboratory will analyze an MS by spiking the samples with 1 µg/L of hexavalent chromium to ensure that identification is accurate and verify that false negatives are detected. For samples with detected results, the laboratory will analyze an MS by spiking the sample with hexavalent chromium at a level not less than 25 percent of the sample concentration. Laboratories will follow the standard protocol of 1 MS and 1 laboratory sample duplicate per 20 samples, unless directed by the project chemist to analyze the MS more frequently.

If the MS is not recovered or the peak is outside of the established retention time window for either detected or nondetect results, the laboratory will make a fivefold dilution of two aliquots of the sample. The first aliquot will be analyzed without the spike; the second aliquot will be spiked with hexavalent chromium at a concentration consistent with the concentrations previously listed and the recovery and peak retention times evaluated. If this MS recovery is not within laboratory QC limits or the peak is not within the laboratory retention time window, the laboratory will dilute two additional aliquots of the sample tenfold, spike one of the aliquots, and analyze the sample/MS. This procedure will be performed at successively greater dilutions of 25:1, 50:1, or 100:1 until the peak identified in the post spike analysis is within the established retention time window for hexavalent chromium and the recovery of the spike is within the laboratory QC limits listed in Appendix A.

The detected result that is reported by the laboratory on the final data package will be chosen from the dilution where both the peak detected in the unspiked and the spiked sample are within the appropriate retention time and the MS is recovered within the QC control limits. The RLs will be raised to the level of the appropriate dilution.

For nondetect results, the dilution selected by the laboratory for reporting will be taken from the smallest dilution that yields an MS recovery within QC control limits and within the appropriate retention time window.

5.4.5 Internal Standards

Internal standards are compounds that have similar properties as the analytes of interest but are not expected to occur naturally in the samples. Some methods require the use of internal standards to compensate for losses during injection or purging or losses due to viscosity. A measured amount of the internal standard is added to the standards, the samples, and QC samples following preparation. When the internal standard results exceed the control limits, corrective action must be taken, including sample reanalysis, if appropriate. Corrective action must be documented in the analytical report.

5.4.6 Laboratory Sample Duplicate

For some methods, a laboratory duplicate is performed instead of a matrix spike duplicate. A laboratory sample duplicate is a sample duplicate selected by the laboratory. It is subjected to the same preparation and analytical procedures as the native sample. The RPD between the results of the native sample and laboratory sample duplicate measures the precision of sample results. The data collected may also yield information regarding whether the sample matrix is homogenous or heterogeneous.

5.4.7 Interference Check Samples

Interference check samples are used in inductively coupled plasma (ICP) analyses to verify background and interelement correction factors. They consist of two solutions, A and AB. Solution A contains the interfering analytes, and Solution AB contains the analytes of interest and the interfering analytes. Both solutions are analyzed at the beginning and at the end of each analytical sequence. When the interference check sample results exceed the control limits, corrective action must be taken, including sample reanalysis, if appropriate.

5.4.8 Retention Time Windows

Retention time windows for gas and liquid chromatographic analyses must be established by replicate injections of the calibration standard over multiple days as described in SW846 8000B, analytical method, or appropriate laboratory SOP. The absolute retention time of the calibration verification standard at the start of each analytical sequence will be the centerline of the window. For an analyte to be reported as positive, its elution time must be within the retention time window.

5.5 Additional Quality Control Requirements

5.5.1 Holding Time

The holding time requirements specified in this QAPP (see Table 4.1) must be met. For methods requiring both sample preparation and analysis, the preparation holding time will be calculated from the time of sampling to the completion of preparation. The analysis holding time will be calculated from the time of completion of preparation to the time of completion of the analysis, including required dilutions, confirmation analysis, and reanalysis. For methods requiring analysis only, the holding time is calculated from the time of sampling to completion of the analysis, including required dilutions, confirmation analysis, and reanalysis.

5.5.2 Confirmation

Confirmation analysis must be performed as specified for specific organic methods when the result is at or above the RL. Both the primary and confirmation results will be reported. Unless one of the analysis is specifically designated as the confirmation by the method, the more concentrated result will be reported as the sample result and the lesser concentration result as the confirmation. All calibration and QC requirements must be met when confirmation analysis is performed.

5.5.3 Cleanup Procedures to Minimize Matrix Effects

To maintain the lowest possible RLs, appropriate cleanup procedures should be employed when it is indicated by the method to remove or minimize matrix interference. Methods for sample cleanup include, but are not limited to, gel permeation chromatography, silica gel, alumna, florisil, mercury (sulfur removal), sulfuric acid, and acid/base partitioning. Method blanks, MS/MSDs, and LCSs must be subjected to the same cleanup procedures performed on the samples to monitor the efficiencies of these procedures.

5.5.4 Sample Dilution

Dilution of a sample results in elevated RLs and ultimately affects the usability of the data related to potential actions at the sampling site. It is important to minimize dilutions and maintain the lowest possible RLs. When dilutions are necessary because of high concentrations of target analytes, lesser dilutions should also be reported to fully characterize the sample for each analyte. The level of the lesser dilution should be such that it will provide the lowest possible RLs without having a lasting deleterious effect on the analytical instrumentation.

When a sample exhibits characteristics of matrix interference that are identified through analytical measurement or visual observation, appropriate cleanup procedures specified in Section 5.5.3 must be proven ineffective or inappropriate prior to proceeding with dilution and analysis. Any analyses conducted at a dilution where all analytes will be reported as non-detect above the QAPP RL, must be discussed with the project chemist prior to finalizing the report.

5.5.5 Standard Materials and Other Supplies and Consumables

Standard materials must be of known high purity and traceable to an approved source. Pure standards must not exceed the manufacturer's expiration date or 1 year after receipt if no expiration date is provided. Solutions prepared by the laboratory from the pure standards must be used within the expiration date specified in the laboratory's SOP.

All other supplies and consumables must be inspected prior to use to ensure that the supplies meet the requirements specified in the appropriate SOP. The laboratory's inventory and storage system should ensure their use within the manufacturer's expiration date and storage under proper conditions.

5.5.6 Manual Integration

The laboratory is required to provide all analysts performing methods that rely on interpretation of chromatographic data with training on appropriate software or manual integration practices. The laboratory also will make every effort to minimize the use of manual integration of data. If the need arises to use manual integration to correct a software autointegration error, the manual integration will be clearly identified in the instrument data. Before and after enlargements of the region of the chromatogram where the manual integration was performed will be provided on an appropriate scale that allows an independent reviewer to evaluate the need and quality of the manual integration. The analyst will also document the reason for the manual integration on the chromatogram along with their date and initials. The laboratory manager or designee will approve the manual integration by dating and initialing the chromatogram.

5.5.7 Laboratory Quality Assurance Program

The laboratory will maintain a quality assurance manual or equivalent document. The manual must include all of the requirements provided in the California Environmental Laboratory Accreditation Program (ELAP), and, if applicable, the National Environmental Laboratory Accreditation Program (NELAP). The manual will define the laboratory's internal procedures for QA/QC as follows:

- QA policies, objectives, and requirements
- Organization and personnel
- Document control
- SOPs (analytical methodology and administrative)
- Data generation
- Software verification
- Quality assurance
- Quality control
- Nonconformance/corrective action procedures
- Data review

5.5.7.1 Laboratory Standard Operating Procedures

The laboratory will maintain SOPs for all analytical methods and laboratory operations. The format for SOPs will conform with the following:

- *Test Methods for Evaluating Solid Waste, Physical and Chemical Methods, SW-846, Third Edition, Update III, Section 1* (EPA, 1996)
- "Good Laboratory Practices" in *Principles and Guidance to Regulations for Ensuring Data Integrity in Automated Laboratory Operations* (EPA, 1995)

All SOPs must have a unique identification number that is traceable to previous revisions of the same document. SOP review must be completed annually.

5.5.7.2 Demonstration of Capability

Laboratory QA department personnel will maintain records documenting the ability of each analyst to perform applicable method protocols. Documentation will include annual checks for each method and analyst. In addition, internal, blind performance evaluation samples for each method and matrix demonstrating overall laboratory performance must be submitted annually. The laboratory may receive additional blind performance evaluation samples in conjunction with the PG&E Program.

5.6 Analytical Procedures

The allowed sample preparation methods are presented in Table 5-2. Any changes or alternatives to this list will be included in site-specific SAPs or QAPP addenda. Analytical and preparation methods for SW7000 series are provided in Table 5-2 as alternate methods to SW6020 (with the exception of mercury and soil hexavalent chromium, the SW 7000 series must be approved by the project chemist). These methods will be allowed, provided the RL objectives are met. After a method is chosen, it must be used throughout the duration of a specific project to maintain data comparability.

This QAPP includes common analytical procedures that may be required for the PG&E Program. Appendix A, Tables A -1 through A -3 contain representative lists of the analytes of concern, the methods to be used, and the RL objectives. Some of the listed analytes may not necessarily be of concern for a particular project; project-specific SAPs or QAPP addenda will list the analytes of concern. The RLs included herein reflect quantifiable levels that are attainable with a specified degree of confidence using the specified methods. The RLs should meet most preliminary cleanup goals or action levels. If changes to the methods or RLs are necessary to meet cleanup goals, the QAPP will be updated or amended by addendum.

General QC requirements are discussed in Section 5.3.3. The calibration and QC requirements specified for each method will be followed and are included in Appendix A and Tables 5-3 through 5-15. Appropriate corrective action will be taken when acceptance criteria are not met. If corrective action is not effective, and data quality is potentially degraded, the occurrence must be documented in a corrective action report and in the data package case narrative. The laboratory manager or a designated person must notify the project chemist.

Analytical services will be provided by laboratories contracted by CH2M HILL or its subcontractors. Analytical laboratories will be accredited, in accordance with the California ELAP, for all parameters where accreditation is available. Subcontract laboratories will be required to follow the SAP and QAPP addenda that are applicable to specific projects or activities and must be approved by the CH2M HILL project chemist.

Field measurements will be performed or supervised directly or indirectly by CH2M HILL field personnel.

5.7 Title 22 Metals

The California Code of Regulations - Title 22, Division 4.5 – Environmental Health Standards for the Management of Hazardous waste has a waste characterization protocol that specifies the following stepped procedure for determining hazardous waste disposal:

1. If the sample is suspected of containing high levels of metals, analyze for the Title 22 metals – total threshold limit concentration (TTLC) (see Appendix A, Table A-3).
2. Compare the TTLC sample results with column G of Appendix A, Table A-3.
3. If the TTLC sample results are greater than the concentrations listed in column G of Appendix A, Table A-3, extract and analyze the samples using the waste extraction test (WET) [only required for analytes that exceed the concentrations listed in column G of Appendix A, Table A-3].
4. If the soluble threshold limit concentration (STLC) sample result, from the waste extraction test extraction, is greater than the concentration listed in column H of Appendix A, Table A-3 for any of the Resource Conservation and Recovery Act metals listed in column E of Appendix A, Table A-3., extract the sample by toxicity

characteristic leaching procedure (TCLP) Method 1311 and analyze for the specific metals that exceeded the STLC threshold.

TABLE 5-1
Maximum Concentrations for Title 22 – Organic Compounds – SW8000 Series
PG&E Program Quality Assurance Project Plan

Constituent	CAS	Method
Mirex	2385-85-5	SW8081
Methyl chloromethyl ether (Chloromethyl methyl ether)	107-30-2	SW8021B
2-Acetylaminofluorene (2-AAF)	53-96-3	SW8270C
Acrylonitrile	107-13-1	SW8260B
4-Aminodiphenyl (4-Aminobiphenyl)	92-67-1	SW8270C
Benzidine and its salts	92-87-5	SW8270C
bischloromethyl ether (BCME)	542-88-1	SW8270C
1,2-Dibromo-3-chloropropane (DBCP)	96-12-8	SW8270C
4-Dimethylaminoazobenzene (DAB)	60-11-7	SW8270C
Ethyleneimine (EL)	151-56-4	
ALPHA-NAPHTHYLAMINE (1-NA)	134-32-7	SW8270C
BETA-NAPHTHYLAMINE (2-NA)	91-59-8	SW8270C
4-Nitrobiphenyl (4-NBP)	92-93-3	SW8270C
N-Nitrosodimethylamine (DMN)	62-75-9	SW8270C
beta-Propiolactone (BPL)	57-57-8	SW8260B

Note:

If the sample contains any of the compounds listed in this table at a single or combined concentration equal to or exceeding 0.001 percent by weight, the sample is considered to be toxic under CA Title 22 Section 66261.24 (Characteristic of Toxicity)

TABLE 5-2
Extraction and Digestion Methods
PG&E Program Quality Assurance Project Plan

Analytical Method	Parameter	Preparatory Methods
SW6010B	Trace metals by ICP	SW3005A, SW3010A, SW3015, SW3050B, SW3051
SW6020	Trace metals by ICP-MS	SW3005A, SW3010A, SW3015, SW3050B, SW3051
SW7000 Series[a]	Various elements (unless specified separately) Does Not include Mercury or soil Hexavalent chromium	SW3015, SW3020A, SW3050B, SW3051
EPA200.7 and EPA200.8	Trace metals by ICP/ICP-MS	See analytical method
SW7470A, SW7471A, and EPA245.1	Mercury by cold vapor atomic adsorption	See analytical method
SW7196A, SW7199, and EPA218.6	Hexavalent chromium	See analytical method for water, Use SW3060A for soil preparation prior to SW7199
SW8015B or D	TPH volatile and extractable (water and soil)	Volatiles: SW5030BB, SW5031, SW5035 Extractables: SW3510C, SW3520C, SW3545C, SW3541, SW3545, SW3550B
SW8081A	Organochlorine pesticides (water and soil)	SW3510C, SW3520C, SW3540C, SW3541, SW3545, SW3550B
SW8082	PCBs (water and soil)	SW3510C, SW3520C, SW3540C, SW3541
SW8151A	Chlorinated herbicides (water and soil)	SW3510C, SW3520C, SW3540C, SW3541, SW3550B
SW8260B	Volatile organics (water and soil)	SW3585, SW5021, SW5030B, SW5031, SW5032, SW5035
SW8270C and SW8270C SIM	Semivolatile organics (water and soil)	SW3510C, SW3520C, SW3535, SW3540C, SW3541, SW3545, SW3550B
Laboratory SOP (CF-IRMS)	Stable isotopes	See laboratory SOP
Various[b]	General chemistry	See analytical method

[a]Must be approved by the project chemist.

[b]EPA120.1/SW9050, EPA150.1/SW9040, EPA160.1, EPA160.2, EPA180.1, EPA300.0/SW9056, EPA310.1, EPA350.3, EPA354.1, EPA365.1, EPA370.1, EPA376.1/2, SM3500, EPA335.2, SW9010B, SW9014, and EPA415.2.

Note:

ICP-MS = inductively coupled plasma/mass spectrometry

TABLE 5-3
Surrogate Recovery for Organic Compounds – SW8000 Series
PG&E Program Quality Assurance Project Plan

	Liquid Matrix % Recovery		Solids Matrix % Recovery	
Compound	**Lower Limit**	**Upper Limit**	**Lower Limit**	**Upper Limit**
SW8015-E[a]				
Benzo (a) pyrene	70	125	60	125
Bromobenzene	50	140	50	150
Hexacosane	60	140	60	140
Octacosane	26	152	25	162
Triacontane	40	140	30	150
Ortho-Terphenyl	57	132	47	142
Fluorobenzene	75	125	65	135
SW8015-P				
Bromofluorobenzene	70	130	64	148
Chlorobenzene[b]	74	138	64	148
Trifluorotoluene	70	130	70	130
SW8021				
Trifluorotoluene	65	125	65	125
SW8082[c]				
Decachlorobiphenyl	29	133	26	125
Tetrachloro-m-xylene	50	120	48	121
SW8260B[d]				
1,2-Dichloroethane-d4	72	119	52	149
4-Bromofluorobenzene	76	119	65	135
Dibromofluoromethane	85	115	65	135
Toluene-d8	81	120	75	125
SW8270C				
1,2-Dichlorobenzene-d4[e, f]	27	100	25	110
2,4,6-Tribromophenol[g]	42	124	36	126
2-Chlorophenol-d4[e, g]	34	98	30	100
2-Fluorobiphenyl[f]	48	120	43	125
2-Fluorophenol[g]	20	120	37	125
Nitrobenzene-d5[f]	41	120	37	125
Phenol-d5[g]	20	120	40	125
Terphenyl-d14[f]	51	135	32	125
SW8270SIM				
1,2-Dichlorobenzene-d4	27	100	25	110
2-Fluorobiphenyl	34	135	34	135
Nitrobenzene-d5	25	135	25	135
Terphenyl-d14	34	167	14	129

TABLE 5-3
Surrogate Recovery for Organic Compounds – SW8000 Series
PG&E Program Quality Assurance Project Plan

Compound	Liquid Matrix % Recovery Lower Limit	Liquid Matrix % Recovery Upper Limit	Solids Matrix % Recovery Lower Limit	Solids Matrix % Recovery Upper Limit
SW8081A				
Decachlorobiphenyl	29	135	26	125
Tetrachloro-m-xylene	33	138	36	124
SW8151A				
2,4-dichlorophenylacetic acid	50	130	51	146

[a]Choose two from the list
[b]Required by method
[c]Use tetrachloro-m-xylene as a surrogate if DCBP is used as an IS.
[d]Choose three from the list
[e]Approved alternatives
[f]Base fraction
[g]Acid fraction

TABLE 5-4
Calibration and QC Requirements for Metals – SW6010B and EPA200.7
PG&E Program Quality Assurance Project Plan

QC Check	Frequency	Criteria	Corrective Action
ICAL (a blank and at least one standard)	When modifications are made to the system, or when continuing calibration verification fails.	If more than one standard is used, correlation coefficient must be >0.995.	Not applicable.
Second-Source Calibration Verification	Immediately following each ICAL.	All analytes within ±10% of expected value for SW6010B and within ±5% of expected value for EPA200.7.	Correct problem and repeat ICAL.
Calibration Blank	After every second-source or continuing calibration verification analysis.	No analytes detected at or above the RL.	Correct the problem and reanalyze previous 10 samples.
Continuing Calibration Verification	After every 10 samples and at the end of the analysis sequence.	All analytes within ±10% of expected value for SW6010B and within ±10% of expected value for EPA200.7.	Recalibrate and reanalyze all samples since the last acceptable continuing calibration verification.
Method Blank	At least one per analytical batch.	No analytes detected at or above the RL.	Correct the problem, re-prepare, and reanalyze all associated samples.
Interference Check Standard	At the start and end of each analytical sequence or twice during an 8-hour period, whichever is more frequent.	All analytes within ±20% of expected value.	Correct the problem, recalibrate, and reanalyze ICS and all affected samples.

TABLE 5-4
Calibration and QC Requirements for Metals – SW6010B and EPA200.7
PG&E Program Quality Assurance Project Plan

QC Check	Frequency	Criteria	Corrective Action
MS/MSD	One set per 20 project-specific samples. MSD is optional if a laboratory sample duplicate is performed.	All analytes within limits specified in Appendix A.	None.
Laboratory Sample Duplicate	Once per analytical batch if MSD not performed.	Concentration of reported analytes are >5 times the RL in either sample and RPD >20%. One sample result <RL and a difference of ±2 times the RL.	None.
LCS	At least one per analytical batch.	All analytes within limits specified in Appendix A.	Correct the problem, re-prepare and reanalyze the LCS and all samples in the analytical batch.
Postdigestion Spike Addition	When MS/MSD fails.	Recovery within 75 to 125% of expected value.	None.
Dilution Test	Each new sample matrix. Or when the PDS fails	Result from 1:5 dilution must be within ±10% of the undiluted sample result (applies only if undiluted sample result is at least 25 times the RL).	Perform postdigestion spike addition.
Linear Range Calibration Check Standard	Once per quarter.	All analytes within +10% of expected value.	Correct problem and reanalyze or reset linear range.

TABLE 5-5
Calibration and QC Requirements for Metals – SW6020 and EPA200.8
PG&E Program Quality Assurance Project Plan

QC Check	Frequency	Criteria	Corrective Action
ICAL (a blank and at least one standard)	Before initial sample analysis, when modifications are made to the analytical system, or when continuing calibration verification fails.	Not applicable	Not applicable
Second-source Calibration Verification	Immediately following each ICAL.	All analytes within ±10% of expected value.	Correct problem and repeat ICAL.
Calibration Blank	After every Second-source or Continuing calibration verification analysis.	No analytes detected at or above the RL.	Correct the problem and reanalyze previous 10 samples.

TABLE 5-5
Calibration and QC Requirements for Metals – SW6020 and EPA200.8
PG&E Program Quality Assurance Project Plan

QC Check	Frequency	Criteria	Corrective Action
Continuing Calibration Verification	After every 10 samples and at the end of the analysis sequence.	All analytes within ±10% of expected value.	Recalibrate and reanalyze all samples since the last acceptable continuing calibration verification.
Method Blank	At least one per analytical batch.	No analytes detected at or above the RL.	Correct the problem, re-prepare, and reanalyze all associated samples.
Interference Check Standard	At the start and end of each analytical sequence or twice during an 8-hour period, whichever is more frequent.	All analytes within ±20% of expected value.	Correct the problem, recalibrate and reanalyze ICS and all affected samples.
MS/MSD	One set per 20 project-specific samples. MSD is optional if a laboratory sample duplicate is performed.	All analytes within limits specified in Appendix A.	None.
Laboratory Sample Duplicate	Once per analytical batch if MSD not performed.	Concentration of reported analytes are >5 times the RL in either sample and RPD >20%. One sample result <RL and a difference of ±2 times the RL.	None.
LCS	At least one per analytical batch.	All analytes within limits specified in Appendix A.	Correct the problem, re-prepare, and reanalyze the LCS and all samples in the analytical batch.
Postdigestion Spike Addition	When MS/MSD fails.	Recovery within 75 to 125% of expected value.	None.
Dilution Test	Each new sample matrix. Or when the PDS fails	Result from 1:5 dilution must be within ±10% of the undiluted sample result (applies only if undiluted sample result is at least 25 times the RL).	Perform postdigestion spike addition.

TABLE 5-6
Calibration and QC Requirements for Metals – SW7000 Series and EPA245.1
PG&E Program Quality Assurance Project Plan

QC Check	Frequency	Criteria	Corrective Action
Multipoint ICAL (a blank and at least five standards)	Before initial sample analysis, when modifications are made to the analytical system, or when continuing calibration verification fails.	Correlation coefficient of linear regression is ≥0.995.	Correct the problem and repeat the ICAL.
Second-source Calibration Verification	Immediately following each ICAL.	All analytes within ±20% of expected value.	Correct the problem and repeat ICAL.
Calibration Blank	After every second-source or continuing calibration verification analysis.	No analytes detected at or above the RL.	Correct the problem, then reanalyze previous 10 samples.
Continuing Calibration Verification	After every 10 samples and at the end of the analysis sequence.	All analytes within ±20% of expected value.	Recalibrate and reanalyze all samples since the last acceptable continuing calibration verification.
Method Blank	At least one per analytical batch.	No analytes detected at or above the RL.	Correct the problem, re-prepare, and reanalyze all associated samples.
MS/MSD	One set per 20 project-specific samples. MSD is optional if a laboratory sample duplicate is performed.	All analytes within limits specified in accuracy and precision table.	None.
Laboratory Sample Duplicate	Once per analytical batch if MSD not performed.	Concentration of reported analytes are >5 times the RL in either sample and RPD >20%. One sample result <RL and a difference of ±2 times the RL.	None.
LCS	At least one per analytical batch.	All analytes within limits specified Appendix A.	Correct the problem, re-prepare, and reanalyze the LCS and all samples in the analytical batch.
Recovery Test (PDS)	When MS/MSD fails.	Recovery within 85 to 115% of expected value.	Analyze all samples by MSA.
Dilution Test	Each new sample matrix. Or when the PDS fails	Result from 1:5 dilution must be within ±10% of the undiluted sample result (applies only if undiluted sample result is at least 25 times the RL).	Perform recovery test.

Note:
MSA = method of standard addition

TABLE 5-7
Calibration and QC Requirements for General Chemistry and Other Parameters[a]
PG&E Program Quality Assurance Project Plan

QC Check	Frequency	Criteria	Corrective Action
Multipoint ICAL (a blank and at least five standards); Does Not Apply to Titrimetric Method	Before initial sample analysis, when modifications are made to the analytical system, or when continuing calibration verification fails.	Correlation coefficient of linear regression is ≥0.995.	Correct the problem and repeat the ICAL.
Second-source calibration verification	Immediately following each ICAL.	Analytes within ±15% of expected value (±10% for SW9056/EPA300.0).	Correct the problem and repeat ICAL.
Calibration blank; does not apply to titrimetric method	After every second-source or continuing calibration verification analysis.	No analytes detected at or above the RL.	Correct the problem, then reanalyze previous 10 samples.
Continuing calibration verification	After every 10 samples and at the end of the analysis sequence.	Within ±15% of expected value (±10% for SW9056/EP300.0).	Recalibrate and reanalyze all samples since the last acceptable continuing calibration verification.
Method blank	At least one per analytical batch.	No analytes detected at or above the RL.	Correct the problem, re-prepare, and reanalyze all associated samples.
MS/MSD	One set per 20 project-specific samples. MSD is optional if a laboratory sample duplicate is performed.	All analytes within limits specified in Appendix A.	None.
Laboratory Sample Duplicate	Once per analytical batch if MSD not performed.	Concentration of reported analytes are >5 times the RL in either sample and RPD >20%. One sample result <RL and a difference of ±2 times the RL.	None.
LCS	At least one per analytical batch.	All analytes within limits specified in Appendix A.	Correct the problem, re-prepare, and reanalyze the LCS and all samples in the analytical batch.
IPC (EPA314.0 only)	Daily, before sample analysis.	Conductance within 10% of original value (original value within ±10% of MCT).	Prepare fresh IPC solution.
		$PD_{A/H}$ <25%, instrument response within ±20% of expected response.	Redetermined MCT or correct problem and reanalyze IPC.
		Retention time shifts <5%, or overall retention time <80% of original recorded value.	Correct problem, clean or replace column.

TABLE 5-7
Calibration and QC Requirements for General Chemistry and Other Parameters[a]
PG&E Program Quality Assurance Project Plan

QC Check	Frequency	Criteria	Corrective Action
ICAL Verification (ICCS) (EPA314.0 only)	Daily, before sample analysis or when eluent is changed.	Instrument response within ±25% of expected value using a standard at or below the RL.	Correct problem then repeat ICAL.
Pretreated Laboratory Reagent Blank (EPA314.0 only)	Required in any analytical batch which includes samples that have been pretreated to reduce the common anion levels.	Perchlorate must be ≤½ RL.	Correct problem, re-prepare, and analyze method blank and all samples processed with the contaminated blank.
Low-level MDL Check Standard (EPA314.0 only)	Weekly and with ICAL.	Must meet QC acceptance criteria, 50 to 150% of its true concentration.	Reanalyze low-level MDL check standard, if still out of criteria, repeat ICAL.

[a]Unless calibration and QC requirements are specified for an individual method.

Notes:

ICCS = initial calibration check standard

IPC = instrument performance check

MCT = matrix conductivity threshold

TABLE 5-8
Calibration and QC Requirements for Hexavalent Chromium – SW7199 and EPA218.6
PG&E Program Quality Assurance Project Plan

QC Check	Frequency	Criteria	Corrective Action
Multipoint ICAL (a blank and at least five standards)	Before initial sample analysis, when modifications are made to the analytical system, or when continuing calibration verification fails.	Correlation coefficient of linear regression is ≥0.999.	Correct the problem and repeat the ICAL.
Second-source Calibration Verification	Immediately following each ICAL.	All analytes within ±10% of expected value.	Correct the problem and repeat ICAL.
Calibration Blank	After every second-source or continuing calibration verification analysis.	No analytes detected at or above the RL.	Correct the problem, then reanalyze previous 10 samples.
Continuing Calibration Verification	After every 10 samples and at the end of the analysis sequence.	All analytes within ±10% of expected value for SW7199 and within ±5% of expected value for EPA218.6.	Recalibrate and reanalyze all samples since the last acceptable continuing calibration verification.
Low-level Calibration verification at the RL of 0.2µg/L	Immediately following each ICAL.	Result within ±20% of expected value.	Correct the problem and repeat ICAL.
Duplicate Sample Injections (SW7199 only)	Every sample.	RPD between injections must be <20%.	Correct the problem, re-prepare, and reanalyze all associated samples.

TABLE 5-8
Calibration and QC Requirements for Hexavalent Chromium – SW7199 and EPA218.6
PG&E Program Quality Assurance Project Plan

QC Check	Frequency	Criteria	Corrective Action
Method Blank	At least one per analytical batch.	No analytes detected at or above the RL.	Correct the problem, re-prepare, and reanalyze all associated samples.
MS	One per 20 project-specific samples.	All analytes within limits specified in Appendix A.	None.
Laboratory Sample Duplicate	Once per analytical batch if MSD not performed.	Concentration of reported analytes are >5 times the RL in either sample and RPD >20%. One sample result <RL and a difference of ±2 times the RL.	None.
LCS	At least one per analytical batch.	All analytes within limits specified in Appendix A.	Correct the problem, re-prepare, and reanalyze the LCS and all samples in the analytical batch.
pH Buffer Solution Modification	As needed because of sample matrices that cause the analytical column to overload. All QC samples and analyses will use the modified buffered solution when needed.	A modified pH-adjustment buffer that contains 10 times less ammonium sulfate (33 g/L) but the same concentration of ammonium hydroxide as the buffer prescribed in SW7199/ EPA218.6.	None.
MS Dilute and Spike (see Section 5.3.3.1)	As directed in Section 5.3.3.1.	Spike recovery 85 to 115% and peak within RT window.	Dilute two aliquots 1:5, spike one with 1 μg/L of hexavalent chromium and analyze the other unspiked. Continue the procedure using successively greater dilutions of two aliquots until RT and recovery criteria are met.

Note:
RT = retention time

TABLE 5-9
Soil Preparation Method SW3060A for Method SW7199
PG&E Program Quality Assurance Project Plan

QC Check	Frequency	Criteria	Corrective Action
2.5 grams sample to a final volume of 100 ml must be used for each sample	Each sample in the preparation batch.	Follow method preparation for all samples, method blank, and QC samples.	
Method Blank	One per preparation batch.	No analytes detected at or above the RL.	Correct the problem, re-prepare, and reanalyze all associated samples.
LCS	One per preparation batch.	Spike at concentration specified in method. Recovery range 80 to 120%.	Correct the problem, re-prepare, and reanalyze the LCS and all samples in the analytical batch.
Soluble Matrix Spike	One per preparation batch.	Spike at concentration specified in method. Recovery range 75 to 125%.	None.
Insoluble Matrix Spike	One per preparation batch.	Spike at concentration specified in method. Recovery range 75 to 125%.	None.
Post Digestion Spike	One per preparation batch.	Spike at concentration specified in method. Recovery range 85 to 115%.	None.

TABLE 5-10
Calibration and QC Requirements for Stable Isotopes[a]
PG&E Program Quality Assurance Project Plan

QC Check	Frequency	Criteria	Corrective Action
Instrument Standardization	Daily, prior to sample analysis.	Laboratory SOP.	Perform instrument maintenance.
Laboratory Sample Duplicate	Every sample analyzed five times.	Laboratory SOP.	Perform instrument maintenance and reanalyze samples.

[a] ^{18}O and deuterium

TABLE 5-11
Calibration and QC Requirements for TPH, BTEX, Herbicides, and Dissolved Gases – SW8015B, SW8021B, SW8151A, and RSK-175S
PG&E Program Quality Assurance Project Plan

QC Check	Frequency	Criteria	Corrective Action
Multipoint ICAL (minimum 5 points)	Prior to sample analysis, or when calibration verification fails.	If the %RSD is ≤20%, the average RRF may be used for quantitation; otherwise use calibration curve with coefficient of correlation or determination ≥0.99.	Correct the problem and repeat the ICAL.
Continuing Calibration Verification	At the start of each analytical sequence and after every 10 samples, and at the end of the sequence.	Analytes within ±15% of expected value.	Correct the problem, recalibrate, and reanalyze all samples since the last acceptable continuing calibration verification.
Method Blank	At least one per analytical batch.	No analytes detected at or above the RL.	Correct the problem, re-prepare, and reanalyze all associated samples.
Surrogate Spike	Every standard, sample, method blank, MS/MSD, and LCS.	All surrogates in samples, method blank, MS/MSD, and LCS within limits specified in Appendix A.	Correct the problem and reanalyze (re-prepare if necessary).
MS/MSD	One set per 20 samples.	Full target list spike required within limits specified in Appendix A. Not applicable for RSK-175.	None.
LCS	At least one per analytical batch.	Full target list spike required within limits specified in Appendix A.	Correct the problem, re-prepare, and reanalyze the LCS and all samples in the analytical batch.
Second Detector or Second Column Confirmation (does not apply to SW8015B or RSK-175)	All samples with results above the RL objectives must be confirmed within the holding time.	Confirmation to be done using a second detector, or second column of dissimilar phase and retention characteristics (or gas chromatography/mass spectrometry if sample concentration is sufficiently high). All calibration and QC acceptance criteria specified for primary analysis must be met in the confirmation analysis.	Failure to perform confirmation will result in potential resampling and analysis at no cost to the project.

Note:
RRF = relative response factor

TABLE 5-12
Calibration and QC Requirements for Pesticides and PCBs – SW8081A and SW8082
PG&E Program Quality Assurance Project Plan

QC Check	Frequency	Criteria	Corrective Action
Multipoint ICAL (minimum 5 points) for single-response pesticides; single-point calibration for toxaphene and chlordane; multipoint calibration for Aroclors 1016 and 1260 only, but include midpoint standard for all other Aroclors for pattern recognition; if a specific Aroclor is found in any sample, quantitation for that Aroclor must be done using 5-point calibration	Prior to sample analysis or when calibration verification fails.	To use average RRF for quantitation of any analyte, % RSD must be ≤20%; otherwise use calibration curve with coefficient of correlation or determination ≥0.99.	Correct the problem and repeat the ICAL.
Second-source calibration verification – pesticides and Aroclors 1016 and 1260 (or Aroclors identified in samples)	Once for each multipoint ICAL.	All analytes within ±15% of expected value.	Correct the problem, then recalibrate and reanalyze all samples since the last acceptable continuing calibration verification.
Continuing calibration verification – pesticides and Aroclors 1016 and 1260 (or Aroclors identified in samples)	At the start of each analytical sequence; after every 12 hours or 10 samples, whichever is more frequent; and at the end of the sequence.	All analytes within ±15% of expected value.	Correct the problem, then recalibrate and reanalyze all samples since the last acceptable continuing calibration verification.
Endrin/DDT breakdown check (not applicable when analyzing for Aroclors/PCBs only)	At start of each 12-hour period.	Breakdown of either endrin or DDT ≤15%.	Evaluate injector port and take corrective action; recalibrate and reanalyze affected samples if necessary.
Method Blank	At least one per analytical batch.	No analytes detected at or above the RL.	Correct the problem, re-prepare, and reanalyze all associated samples.
Surrogate Spike	Every standard, sample, method blank, MS/MSD, and LCS.	At least one of the surrogates in samples, method blank, MS/MSD, and LCS within limits specified in Appendix A.	Correct the problem and reanalyze (re-prepare if necessary).
MS/MSD	One set per 20 project-specific samples.	Full target list spike required within limits specified in corresponding Appendix A.	None.
LCS	At least one per analytical batch.	Full target list spike required within limits specified in corresponding Appendix A.	Correct the problem, re-prepare, and reanalyze the LCS and all samples in the analytical batch.

TABLE 5-12
Calibration and QC Requirements for Pesticides and PCBs – SW8081A and SW8082
PG&E Program Quality Assurance Project Plan

QC Check	Frequency	Criteria	Corrective Action
Second Column Confirmation	All samples with results above the RL objectives must be confirmed within the holding time.	Confirmation to be done using second column of dissimilar phase and retention characteristics (or gas chromatography/mass spectrometry if sample concentration is sufficiently high). All calibration and QC acceptance criteria specified for primary analysis must be met in the confirmation analysis.	Failure to perform confirmation will result in potential resampling and analysis at no cost to the project.

Note:

DDT = dichloro-diphenyl-trichloroethane

TABLE 5-13
Calibration and QC Requirements for VOCs – SW8260B
PG&E Program Quality Assurance Project Plan

QC Check	Frequency	Criteria	Corrective Action
BFB Tuning	Prior to ICAL and calibration verification (every 12 hours).	Refer to criteria listed in the method.	Retune instrument and verify.
Multipoint ICAL (minimum 5 points)	Prior to sample analysis, or when calibration verification fails.	SPCCs average RRF ≥0.30a and %RSD for RRFs for CCCs ≤30% and one of the following options: Option 1 Linear – RSD for each analyte <15%. Use of the mean %RSD for all analytes ≤15% may **not** be used. Option 2 Linear – least squares regression r ≥0.995. Option 3 Nonlinear – coefficient of determination ≥0.99 (6 standards to used for a second order; 7 standards to be used for a third order).	Correct the problem and repeat the ICAL.
Second-source Calibration Verification	Once for each multipoint ICAL.	All analytes within ±25% of expected value.	Correct the problem and repeat ICAL.

TABLE 5-13
Calibration and QC Requirements for VOCs – SW8260B
PG&E Program Quality Assurance Project Plan

QC Check	Frequency	Criteria	Corrective Action
Continuing Calibration Verification	At the start of each analytical sequence and every 12 hours thereafter.	SPCCs average RF ≥0.30c and %D for RFs for CCCs ≤20%. All other analytes within ±20% of expected value.	Correct the problem, recalibrate, and reanalyze all samples since the last acceptable continuing calibration verification.
Retention Time Window Calculated for Each Analyte	Each analyte.	Relative retention time of each analyte within ±0.06 relative retention time units of the ICAL.	Not applicable (used for identification of analyte).
Internal Standards	Each sample and QC sample, method blank, MS/MSD and LCS.	Continuing calibration verification retention time within ±30 seconds from retention time of the ICAL midpoint standard. Sample retention time within ±30 seconds from retention time of the daily continuing calibration verification. Continuing calibration verification EICP area within –50% to +100% of the internal standard responses in the ICAL midpoint standard. Sample EICP area within –50% to +100% of the daily continuing calibration verification.	Inspect mass spectrometer and gas chromatography for malfunctions; reanalyze all affected samples.
Method Blank	At least one per analytical batch.	No analytes detected at or above the RL.	Correct the problem, re-prepare, and reanalyze all associated samples.
Surrogate Spike	Every standard, sample, method blank, MS/MSD and LCS.	All surrogates in samples, method blank and LCS within limits Appendix A.	Correct the problem and reanalyze (re-prepare if necessary).
MS/MSD	One set per 20 project-specific samples.	Full target list spike required within limits specified in Appendix A.	None.
LCS	At least one per analytical batch.	Full target list spike required within limits specified in Appendix A.	Correct the problem, re-prepare, and reanalyze the LCS and all samples in the analytical batch.

[a]SPCC average RRF ≥0.10 for bromoform, chloromethane, and 1,1-dichloroethane.

Notes:

BFB = bromofluorobenzene

CCC = calibration check compounds

EICP = extracted ion current profile SPCC

TABLE 5-14
Calibration and QC Requirements for Semivolatile Organic Compounds – SW8270C
PG&E Program Quality Assurance Project Plan

QC Check	Frequency	Criteria	Corrective Action
DFTPP Tuning	Prior to ICAL and calibration verification (every 12 hours).	Refer to criteria listed in the method.	Retune instrument and verify.
Multipoint ICAL (minimum 5 points)	Prior to sample analysis, or when calibration verification fails.	SPCCs average RF ≥0.050 and %RSD for RFs for CCCs ≤30% and one of the following options: Option 1: Linear – RSD for each analyte <15%. Use of the mean %RSD for all analytes ≤15% may **not** be used. Option 2: Linear – least squares regression r ≥0.995. Option 3: Nonlinear – coefficient of Determination ≥0.99 (6 standards to used for a second order; 7 standards to be used for a third order).	Correct the problem and repeat the ICAL.
Second-source Calibration Verification	Once for each multipoint ICAL.	All analytes within ±25% of expected value.	Correct the problem and repeat ICAL.
Continuing Calibration Verification	At the start of each analytical sequence and every 12 hours thereafter.	SPCCs average RF ≥0.050 and %D for RFs for CCCs ≤20%. All other analytes within ±20% of expected value.	Correct the problem, recalibrate, and reanalyze all samples since the last acceptable continuing calibration verification.
Retention Time Window Calculated for Each Analyte	Each analyte.	Relative retention time of each analyte within ±0.06 relative retention time units of the ICAL.	Not applicable (used for identification of analyte).
Internal Standards	Each sample and QC sample, method blank, MS/MSD and LCS.	Continuing calibration verification retention time within ±30 seconds from retention time of the ICAL midpoint standard. Sample retention time within ±30 seconds from retention time of the daily continuing calibration verification. Continuing calibration verification EICP area within -50% to +100% of the internal standard responses in the ICAL midpoint standard.	Inspect mass spectrometer and gas chromatography for malfunctions; reanalyze all affected samples.

TABLE 5-14
Calibration and QC Requirements for Semivolatile Organic Compounds – SW8270C
PG&E Program Quality Assurance Project Plan

QC Check	Frequency	Criteria	Corrective Action
		Sample EICP area within -50% to +100% of the daily continuing calibration verification.	
Method Blank	At least one per analytical batch.	No analytes detected at or above the RL.	Correct the problem, re-prepare, and reanalyze all associated samples.
Surrogate Spike	Every standard, sample, method blank, MS/MSD and LCS.	At least two surrogates per fraction in samples, method blank and LCS within limits specified in Appendix A.	Correct the problem and reanalyze (re-prepare if necessary).
MS/MSD	One set per 20 project-specific samples.	Full target list spike required within limits specified in Appendix A.	None.
LCS	At least one per analytical batch.	Full target list spike required within limits specified in Appendix A.	Correct the problem, re-prepare, and reanalyze the LCS and all samples in the analytical batch.

Note:

DFTPP = decafluorotriphenylphosphene

TABLE 5-15
Calibration and QC Requirements for Polynuclear Aromatic Hydrocarbons – SW8270C SIM
PG&E Program Quality Assurance Project Plan

QC Check	Frequency	Criteria	Corrective Action
DFTPP Tuning	Prior to ICAL and calibration verification (every 12 hours).	Refer to criteria listed in the method.	Retune instrument and verify.
Multipoint ICAL (minimum 5 points)	Prior to sample analysis, or when calibration verification fails.	SPCCs average RF ≥0.050 and %RSD for RFs for CCCs ≤30% and one of the following options: Option 1 RSD for each analyte <15%. Option 2 Least squares regression r ≥0.990. Option 3 Nonlinear – Coefficient of Determination ≥0.99 (6 standards to used for a second order; 7 standards to be used for a third order).	Correct the problem and repeat the ICAL.

TABLE 5-15
Calibration and QC Requirements for Polynuclear Aromatic Hydrocarbons – SW8270C SIM
PG&E Program Quality Assurance Project Plan

QC Check	Frequency	Criteria	Corrective Action
Second-source Calibration Verification	Once for each multipoint ICAL.	All analytes within ±30% of expected value.	Correct the problem and repeat ICAL.
Continuing Calibration Verification	At the start of each analytical sequence and every 12 hours thereafter.	All analytes within ±20% of expected.	Correct the problem, recalibrate, and reanalyze all samples since the last acceptable continuing calibration verification.
Retention Time Window Calculated for Each Analyte	Each analyte.	Relative retention time of each analyte within ±0.06 relative retention time units of the ICAL.	Not applicable (used for identification of analyte).
Internal Standards	Each sample and QC sample, method blank, MS/MSD, and LCS.	Continuing calibration verification retention time within ±30 seconds from retention time of the ICAL midpoint standard. Sample retention time within ±30 seconds from retention time of the daily continuing calibration verification. Continuing calibration verification EICP area within -50% to +100% of the internal standard responses in the ICAL midpoint standard. Sample EICP area within -50% to +100% of the daily continuing calibration verification.	Inspect mass spectrometer and gas chromatography for malfunctions; reanalyze all affected samples.
Method Blank	At least one per analytical batch.	No analytes detected at or above the RL.	Correct the problem, re-prepare, and reanalyze all associated samples.
Surrogate Spike	Every standard, sample, method blank, MS/MSD and LCS.	At least two surrogates in samples, method blank and LCS within limits specified in Appendix A.	Correct the problem and reanalyze (re-prepare if necessary).
MS/MSD	One set per 20 project-specific samples.	Full target list spike required within limits specified in Appendix A.	None.
LCS	At least one per analytical batch.	Full target list spike required within limits specified in Appendix A.	Correct the problem, re-prepare, and reanalyze the LCS and all samples in the analytical batch.

SECTION 6

Data Reduction, Validation, and Reporting

6.1 Laboratory Data Management

Data reduction will be performed manually or by using appropriate computer software. Quantitation procedures specified for each method must be followed. If data reduction is performed manually, the documentation must include the formulas used. Computer software used for data reduction must have been previously verified by the laboratory for accuracy. Documentation of the software verification must be maintained in the laboratory. All data reduction documentation must allow re-creation of the calculations.

All data will undergo a minimum of three levels of review at the laboratory prior to release. The analyst performing the tests shall initially review 100 percent of the data. After the analyst's review has been completed, 100 percent of the data shall be reviewed independently by a senior analyst or by the section supervisor for accuracy, completeness and compliance with calibration, QC requirements, and holding times. Analyte identification and quantitation must be verified. Calibration and QC results will be compared with the applicable control limits. RLs should be reviewed to make sure they meet the project objectives. Results of multiple dilutions should be reviewed for consistency. Any discrepancies must be resolved and corrected. Laboratory qualifiers will be applied when there are nonconformances that could potentially affect data usability. These qualifiers must be properly defined as part of the deliverables. All issues that are relevant to the quality of the data must be addressed in a case narrative. The laboratory QC manager will review a minimum of 10 percent of data or deliverables generated for the PG&E Program against the project-specific requirements. A final data review will be conducted by the laboratory manager or client services representative to ensure that all required analyses were performed and that all documentation is complete.

The hardcopy and electronic data deliverable (EDD) laboratory reports for all samples and analyses will contain the information necessary to perform data evaluation.

The PG&E Program will request four types of deliverables from the laboratory, depending upon the DQOs of the individual project. The following is a synopsis of when it is appropriate to use each type deliverable:

- **Level 1.** Appropriate for screening-level sampling results. Noncritical project decisions are made using this data.
- **Level 2.** Appropriate for investigative sampling results that will be replaced with confirmatory data or results used for disposal purposes. Less critical project decisions are made using this data.

- **Level 3.** Appropriate for investigative, confirmatory, or closure results. Critical project decisions may be made using this data.
- **Level 4.** Appropriate for investigative, confirmatory, or closure results. Critical decisions may be made using this data and should be used for projects that require a high degree of confidence in the accuracy of the data.

Hardcopy deliverables (and a electronic copy in portable document format [PDF]), in summary format, equivalent to those specified in the latest versions of EPA *Contract Laboratory Program Statements of Work for Organics and Inorganics Analyses* are preferred. The laboratory data report should be organized in a format that facilitates identification and retrieval of data. Alternate reporting formats require approval from the program chemist or project chemist.

A Level 1 report will include, at a minimum, the following information (when applicable):

- Cover letter with the following information:
  - Title of report and laboratory unique report identification (e.g., sample delivery group number)
  - Project name and site location
  - Name and location of laboratory and second-site or subcontracted laboratory
  - Client name and address
  - Statement of authenticity and official signature and title of person authorizing release of the report
- Table of contents
- Summary of samples received that correlates field sample IDs with the laboratory IDs
- Laboratory qualifier flags and definitions
- Field identification number
- Date received
- Date prepared
- Date analyzed (and time of analysis if the holding time is less than or equal to 48 hours)
- Preparation and analytical methods
- Result for each analyte (dry-weight basis for soils)
- Percent solids results for soil samples
- Dilution factor (provide both diluted and undiluted results when available)
- Sample-specific RL adjusted for sample size, dilution/concentration

- Sample-specific MDL adjusted for sample size, dilution/concentration (when project objectives require reporting less than the RL)
- Units of measure
- Applicable flags for data associated with QC that are outside of control limits
- CoC forms

A Level 2 report will consist of all the elements included in a Level 1 deliverable plus the following:

- Case narrative that addresses the following:
  - Sample receipt discrepancies (e.g., bubbles in VOA samples or temperature exceedances)
  - Descriptions of all nonconformances in the sample receipt, handling, preparation, analytical and reporting processes, and the corrective action taken for each occurrence
  - Identification and justification for sample dilution
  - Serial dilution recoveries, if applicable (required in hardcopy format only)
  - Postdigestion spike recoveries, if applicable (required in hardcopy format only)
- Surrogate %Rs
- MS/MSD and LCS spike concentrations, native sample results, spiked sample results, %R, and RPDs between the MS and MSD results; associated QC limits must also be provided
- Method blank results
- Analytical batch reference number that cross references samples to QC sample analyses
- Completed sample receipt checklist

A Level 3 report will consist of all the elements included in Level 1 and 2 reports plus the following:

- Analytical sequence or laboratory run log that contains sufficient information to correlate samples reported in the summary results to the associated method QC information, such as initial and continuing calibration analyses
- Confirmation results
- Calibration blank results for inorganic analyses (required in hardcopy format only)
- ICP and ICP/MS interference check sample results that include true concentrations, measured concentrations, and the calculated %R of the elements included (required in hardcopy format only)
- Method of standard addition results, if applicable (required in hardcopy format only)

- Internal standard recovery and retention time information, as applicable
- ICAL summary, including standard concentrations, response factors, average response factors, RSDs or correlation coefficients, and calibration plots or equations, if applicable (required in hardcopy format only)
- Continuing calibration verification summary, including expected and recovered concentrations and percent differences (required in hardcopy format only)
- Instrument tuning and mass calibration information for gas chromatography/mass spectrometry and ICP/MS analyses
- Any other method-specific QC sample results

A Level 4 report will include all elements for Levels 1 through 3 and all of the associated raw data. It is imperative that the relative scale used for all chromatographic and other instrument data be supplied in a scale that facilitates review from hardcopy. Enlargements of sufficient size and clarity for complex areas of sample chromatograms will be provided. Additional information to be supplied includes the following:

- Sample preparation logs that include the following:
  - Preparation start and end times
  - Beginning and ending temperatures (e.g., water baths and digestion blocks)
- Each algorithm and an example calculation for at least one sample for each matrix analyzed
- Reconstructed total ion chromatograms or selected ion current profiles for each sample (or blank) analyzed and mass spectra(s) for each compound identified including the following:
  - Raw compound spectra
  - Enhanced or background spectra
  - Laboratory generated library spectra (for tentatively identified compounds, provide the reference mass spectra from software spectra library)
- Ion ratio information for dioxin/furan methods

6.2 Hardcopy and Electronic Deliverables

Within the timeframe specified in the laboratory statement of work, contract, or purchase order from sample receipt, the laboratory shall deliver two hardcopies and one PDF of documentation, as specified in this QAPP. In addition, the laboratory shall deliver one electronic copy of the data (i.e., EDD), as specified in the format described in Table 6-1 (or as directed in the project-specific addendum), on CD-ROM or by e-mail (in ASCII format) within the same timeframe (LabSpec-7 format [see Table 6-1]).

All electronic data files shall match the final hardcopy results. CH2M HILL requires receipt of final hardcopy results with electronic files.

All raw data will be maintained in the laboratory and will be available upon request, if not required by the project-specific deliverable. Complete documentation of sample preparation and analysis and associated QC information will be maintained in a manner that allows easy retrieval if additional validation or information is required. Appropriate back-up procedures must be implemented by the laboratory for data that are stored electronically. All data generated using gas chromatography/mass spectrometry must be maintained on COD-ROM or equivalent format and provided to CH2M HILL upon request. All documentation must be retained for a minimum of 5 years after data acquisition.

The primary responsibility for implementing these procedures in the laboratory will reside with the laboratory manager or equivalent. The laboratory manager will approve laboratory reports before submittal.

6.3 Data Validation and Verification

Depending on the project-specific objectives, the analytical results of the data collection effort will be validated by CH2M HILL. In general, there will be different levels of validation employed for the PG&E Program that correspond to the reports described in Section 6.1. In some instances a Level 3 or Level 4 data package may be obtained from the laboratory, but only a Level 1 or Level 2 validation may be conducted. Specific validation levels will be identified in the site-specific SAP or QAPP addendum. Validation of Levels 1 through 4 will always be performed by the project chemist or designee. The levels are summarized as follows:

Level 1 Import the laboratory results into the project database; use automated data validation (AutoDV), as applicable, to the project database. Verify that samples were analyzed by the methods requested, and review the data for outliers and anomalies. Prepare a brief summary validation report.

Level 2 Import the laboratory results into the project database; use AutoDV as applicable, to the project database. Verify that samples were analyzed by the methods requested, review the laboratory case narrative for events in the laboratory that affect the accuracy or precision of the data, review QC indicator data, and perform a cursory review of the data. Prepare a summary validation report.

Level 2B Import the Laboratory results into the project database; use AutoDV, as applicable, to the project database. Verify that samples were analyzed by the methods requested, review the laboratory case narrative for events in the laboratory that affect the accuracy or precision of the data, review QC indicator data, and perform a cursory review of the data. Review specific raw data, as specified in the QAPP addendum, and compare the current data with historical data. Prepare a summary validation report.

Level 3 Import the laboratory results into the project database; use AutoDV, as applicable, to the project database. Validate the analytical data, as described in the following sections, without reviewing any raw data or analyte verification. Prepare a summary validation report.

Level 3B Import the laboratory results into the project database; use AutoDV, as applicable, to the project database. Validate the analytical data as described in the following sections with review of specific raw data, as specified in the QAPP addendum, and compare the current data with historical data. Prepare a summary validation report.

Level 4 Import the laboratory results into the project database; use AutoDV, as applicable, to the project database. Validate analytical data as described in the following sections, including a review of the analytical raw data, and compare the current data with historical data. Prepare a summary validation report.

6.4 Level 3 and 4 Validation Procedures

Personnel involved in the data validation function will be independent of any data generation effort. The project chemist will have responsibility for oversight of the data validation effort. Data validation will be performed when the final data packages are received from the laboratory. Data validation will be performed on an analytical batch basis within each analytical report using the summary results of calibration and laboratory QC and the results from associated field samples. Data packages will be reviewed for all constituents of concern. Raw data will be reviewed when deemed necessary by the project chemist or as specified in QAPP addenda. Data validation procedures will include the following:

- Review of the data package for completeness
- Review of CoC records for discrepancies that might degrade data quality
- Review for compliance with holding time and QC frequency requirements
- Evaluation of all calibration and QC summary results against the project requirements
- Verification of analyte identification and calculations for at least 10 percent of the data
- Qualification of the data using appropriate qualifier flags, as necessary, to reflect data usability limitations
- Initiation of corrective actions, as necessary, based on the data review findings

Data validation will be patterned after the *Contract Laboratory National Functional Guidelines for Inorganic Data Review* (EPA, 2002) and *Contract Laboratory National Functional Guidelines for Organic Data Review* (EPA, 1999), substituting the calibration and QC requirements specified in this QAPP for those specified in the guidelines. The national functional guidelines will primarily be used as a guidance document for the application of data qualification criteria. The level of validation will be defined in the SAP or QAPP addendum.

The flagging criteria presented in Tables 6-2 and 6-3 will be used; the qualifier flags are defined in Table 6-4. Qualifier flags, if required, will be applied to the electronic sample results. A summary table of the data qualifications will be provided in the validation report. If multiple flags are required for a result, the most severe flag will be applied to the electronic result. The hierarchy of flags, from the most severe to the least severe, will be as follows: R, UJ, J, U.

A validation report will be generated for each method and sample delivery group. A copy of the validation report will be retained with the data package in the project chemistry file. The project chemist will be notified of any significant data quality problems.

TABLE 6-1A
Data Guidelines for Electronic Data Deliverables
PG&E Program Quality Assurance Project Plan

Field Number	Field Name	Data Type	Data Length	Requirement	Valid Values[a]	Description and Comments
1	VersionCode	Text	15	R	Yes	Code identifying the version of the EDD deliverable.
2	LabName	Text	10	R	Yes	Identification code for the laboratory performing the work. This value is used to distinguish between different facilities.
3	SDG	Text	15	R	No	Sample delivery group designation; always populated for all samples, including QC.
4	FieldID	Text	30	R	No	Client sample ID as appears on CoC forms with optional laboratory-assigned suffixes or prefixes to make it unique. If the sample ID on the CoC form and the prefix or suffix is more than 20 characters, abbreviate the value but make it unique. For laboratory QC samples (e.g., method blanks and laboratory control samples), use a unique laboratory sample ID.
5	NativeID	Text	30	R	No	Client sample ID, **exactly** as on CoC forms. **No prefix or suffix allowed** in client sample IDs. Used to identify the native sample from which other samples are derived (e.g., QAQCType = LR, MS, or SD). For laboratory QC samples (i.e., method blanks and laboratory control samples), use the FieldID value that was assigned. However, for laboratory blank spike duplicate samples, use the FieldID value that was assigned to the associated laboratory blank spike sample.
6	QAQCType	Text	2	R	Yes	The code for the sample type. Any field sample that is not used as laboratory QC and is not otherwise marked on the CoC forms should have the designation of “N” (normal field sample). No suffix allowed (i.e., do not add numbers as suffixes to the QAQCType values as called for in the ERPIMS guidelines). If all analyses for a given sample are diluted, the first dilution should be designated as the normal sample. If more dilutions are required, the next dilution should be designated as the first true dilution with a QAQCType value of “LR” and a LRType value of “DL” (see LRType,).

TABLE 6-1A
Data Guidelines for Electronic Data Deliverables
PG&E Program Quality Assurance Project Plan

Field Number	Field Name	Data Type	Data Length	Requirement	Valid Values[a]	Description and Comments
7	LRType	Text	3	C	Yes	This is the code for laboratory replicate sample type. Values are as follows: • Blank (if QAQCType value is not LR) • DL (dilution) • RE (re-analysis) • D (inorganic duplicate) • CF (confirmation) For multiple dilutions or reanalyses of the same sample, append the replicate number after the LRType value (e.g., RE, RE2, and RE3).
8	Matrix	Text	5	R	Yes	Sample matrix code. Valid values are as follows: “AIR”, “WATER”, or “SOIL” unless otherwise provided by the project data manager and marked on CoC forms. The use of other terms (e.g., “liquid” or “solid”) for laboratory QC is not allowed.
9	LabSampleID	Text	12	R	No	Laboratory sample ID assigned by the laboratory. Prefix or suffix is allowed. Dilutions or re-extractions are noted here. For example, “D97-11111RE” is acceptable.
10	AnalysisMethod	Text	20	R	Yes	Analysis method code. This is the ID of the analytical method performed on the sample. For example, “SW8260A.” Generic names such as “EPA” should not be used.
11	ExtractionMethod	Text	20	R	Yes	Preparation method code. A value in this field is required. If the preparation is described in the method, use “METHOD”. If there is no separate preparation required, use “NONE”. Total and dissolved metal analyses are differentiated by the value in this column. Total, TCLP, and SPLP analyses are differentiated by the value in the LeachMethod column (see below).
12	SampleDate	Date		C	No	Date of sample collection. A value is required for all samples sent to the laboratory and samples derived from those samples. Format = mm/dd/yyyy.
13	SampleTime	Time		C	No	Time of sample collection. A value is required for all samples sent to the laboratory and samples derived from those samples. Twenty-four-hour format (hh:mm).
14	ReceiveDate	Date		C	No	Date of sample receipt in the laboratory. A value is required for all samples sent to the laboratory and samples derived from those samples. Format = mm/dd/yyyy.

TABLE 6-1A
Data Guidelines for Electronic Data Deliverables
PG&E Program Quality Assurance Project Plan

Field Number	Field Name	Data Type	Data Length	Requirement	Valid Values[a]	Description and Comments
15	ExtractDate	Date		C	No	Date of sample preparation (extraction or digestion). A value is required if the ExtractionMethod field value is other than “NONE”. Format = mm/dd/yyyy
16	ExtractTime	Time		C	No	Time of sample preparation. A value is required if the ExtractionMethod field value is other than “NONE”. Twenty-four-hour format (hh:mm).
17	AnalysisDate	Date		R	No	Date of sample analysis. A value is required for all records. Format = mm/dd/yyyy
18	AnalysisTime	Time		R	No	Time of sample analysis. A value is required for all records. Twenty-four-hour format (hh:mm).
19	PercentSolids	Number		R	No	Percent solids within the sample; should be zero for water samples.
20	LabLotCtlNum	Text	10	C	No	ID for an autonomous group of environmental samples and associated QC samples prepared together. For example, the value can be a digestion or extraction batch ID. If there is no separate extraction or preparation performed, the field is left blank.
21	CAS	Text	20	R	No	CAS registry number of analyte, if available.
22	ParamID	Text	12	R	Yes	Parameter ID code for the parameter listed in the Analyte field.
23	Analyte	Text	60	R	No	Name of analyte, chemical name.
24	Result	Text	10	R	No	Result of the analysis. Surrogate analytes are reported in units of percent. All others are reported in sample concentration units. If undetected, report the adjusted MDL or adjusted RL, depending on the project. (Reported as a text field to preserve significant figures.)
25	ExpectedValue	Number		C	No	Report “100” for surrogates; report “0” for blanks; spike level plus parent result for LCS, and MS/MSD; parent value for laboratory duplicate.
26	Units	Text	10	R	Yes	Units of measure used in the analysis. Report “PERCENT” for surrogate analytes; report concentration units for all others.
27	Dilution	Number		R	No	Total dilution reported in the analysis. Default value is “1”. This value reflects changes to sample preparation amounts as defined by the method (e.g., less sample used for standard VOC analysis).

TABLE 6-1A
Data Guidelines for Electronic Data Deliverables
PG&E Program Quality Assurance Project Plan

Field Number	Field Name	Data Type	Data Length	Requirement	Valid Values[a]	Description and Comments
28	MDL	Number		C	No	Minimum detection limit adjusted for preparation and dilution. This value may be the method detection limit or the instrument detection limit, depending on the method and the project requirements. This value is **not** adjusted for percent moisture.
29	RL	Number		C	No	Reporting limit adjusted for preparation and dilution. Value is **not** adjusted for percent moisture. Equivalent to PQL.
30	LabQualifier	Text	6	R	No	Laboratory qualifier for the results, as reported on the hardcopy. Use "=" as first (or only) qualifier value for detected results if there are no other qualifiers for the result.
31	Surrogate	Text	1	R	Yes	If the chemical is a surrogate = Y; if not = N.
32	Comments	Text	240	O	No	Comment field.
33	ParValUncert	Text	16	C	No	Radiological parameter value uncertainty.
34	Recovery	Number		C	No	Percent recovery for MS, SD, LCS, LCSD, and surrogate compounds.
35	LowerControlLimit	Number		C	No	Lower control limit value for spiked compounds, expressed in units of percent. A value in this field is required if there is a value in the Recovery field (Field 34).
36	UpperControlLimit	Number		C	No	Upper control limit value for spiked compounds, expressed in units of percent. A value in this field is required if there is a value in the Recovery field (Field 34).
37	Basis	Text	1	R	Yes	Weight basis for soil (or solid) sample analysis; D = dry-weight basis, W = wet-weight basis, and X = not applicable.
38	ConcQual	Text	1	R	Yes	Concentration qualifier. Use "=" for detects, "J" for estimated value (value between detection limit and reporting limit), "U" for undetected result, and "E" for exceeded result.
39	MDLAdjusted	Number		C	No	Minimum detection limit adjusted for preparation, dilution **and percent moisture**. See the description of the MDL field (Field 28) for an explanation of the contents of this field.
40	RLAdjusted	Number		C	No	Reporting limit adjusted for preparation, dilution **and percent moisture**. Equivalent to PQL

TABLE 6-1A
Data Guidelines for Electronic Data Deliverables
PG&E Program Quality Assurance Project Plan

Field Number	Field Name	Data Type	Data Length	Requirement	Valid Values[a]	Description and Comments
41	SampleDescription	Text	30	C	No	Full sample ID as it appears on CoC forms. In some cases, this may be the name of the sampling location instead of the sample. Required for all samples that are either collected in the field and specified on CoC forms, or derived from samples that are collected in the field and specified on COC forms.
42	LeachMethod	Text	20	R	Yes	Analytical method used for leaching the sample; applies to TCLP, SPLP, or other leaching or pre-extraction leaching procedures. Use “NONE” if the sample was not leached.
43	LeachDate	Date		C	No	Date that the leaching method was performed (use the start date for multidate leaching procedures). Value is required if the LeachMethod field value is other then “NONE”. Format = mm/dd/yyyy.
44	LeachTime	Time		C	No	Time that the leaching procedure started. Value is required if the LeachMethod field value is other then “NONE”. Twenty-four-hour format (hh:mm).
45	LeachLot	Text	10	C	No	ID of an autonomous group of environmental samples and associated QC samples **leached** at the same time. Value is required if the LeachMethod field value is other then “NONE”. If the sample was not leached, the field is left blank.
46	AnalysisLot	Text	10	R	No	ID of an autonomous group of environmental samples and associated QC samples **analyzed** together. A value in this field is required (i.e., it should not be blank).
47	CalRefID	Text	10	C	No	ID of a group of environmental and QC samples linked by a common set of calibration records. All results with the same CalRefID value will have had the same initial calibration run.

[a]For a list of valid values see Table 6-1B.

Notes:

The EDD file from the laboratory will be a comma-delimited ASCII file in the format listed above. There will be one EDD file per hardcopy report and the filename of the EDD file will be in the format REPORTID.csv, where REPORTID is the hardcopy report ID of sample delivery group.

C = Conditionally Required
EPRIMS = Environmental Restoration Program Information Management System
R = Required

TABLE 6-1B
Values for Data Guidelines for Electronic Data Deliverables
PG&E Program Quality Assurance Project Plan

Field Name	Valid Values	Meaning
VersionCode	4.20AFCEE3	Format 4.20, AFCEE data values. LabQualifier field contains the laboratory qualifier values defined in the AFCEE QAPP, Version 3.0.
VersionCode	4.20EPACLP	Format 4.20, EPA data values. LabQualifier field contains the standard EPA CLP laboratory qualifiers.
QAQCType	N	Normal, environmental sample
QAQCType	LB	Laboratory method blank
QAQCType	MS	Laboratory matrix spike sample
QAQCType	SD	Laboratory matrix spike duplicate
QAQCType	LR	Laboratory replicate (dilution, re-analysis, duplicate)
QAQCType	BS	Laboratory method blank spike
QAQCType	BD	Laboratory method blank spike duplicate
LRType	DL	First dilution sample
LRType	DL2	Second dilution sample
LRType	DL3	Third dilution sample
LRType	RE	First re-analysis/re-extraction sample
LRType	RE2	Second re-analysis/re-extraction sample
LRType	RE3	Third re-analysis/re-extraction sample
LRType	D	Inorganic duplicate sample
LRType	CF	First confirmation analysis sample
LRType	CF2	Second confirmation analysis sample
LRType	CF3	Third confirmation analysis sample
AnalysisMethod	SW8260A	Volatiles by method 8260A in EPA SW846.
AnalysisMethod	SW8270	Semivolatiles by method 8270 in EPA SW846.
AnalysisMethod	SW6010	ICP metals by method 6010 in EPA SW846.
AnalysisMethod	SW7060	GFAA arsenic by method 7060 in EPA SW846.
ExtractionMethod	FLDFLT	Field filtration for dissolved metals analysis
ExtractionMethod	C3050	CLP-modified SW3050 acid digestion for metals analysis in soil samples.
ExtractionMethod	SW1311	TCLP extraction
ExtractionMethod	DISWAT	Distilled water extraction for analytes in soil samples.
ExtractionMethod	SW3510	Separatory funnel extraction
ExtractionMethod	SW3540	Soxhlet extraction
ExtractionMethod	TOTAL	Digestion of unfiltered waters for total metals analysis

TABLE 6-1B
Values for Data Guidelines for Electronic Data Deliverables
PG&E Program Quality Assurance Project Plan

Field Name	Valid Values	Meaning
ParamID	ACE	Acetone
ParamID	AS	Arsenic
ParamID	BHCGAMMA	gamma-BHC (Lindane)
ParamID	BZ	Benzene
ParamID	CDS	Carbon disulfide
ParamID	PB	Lead
ParamID	PHENOL	Phenol
ParamID	SE	Selenium
ParamID	TCE	Trichloroethene

TABLE 6-2
Flagging Conventions for Organic Methods
PG&E Program Quality Assurance Project Plan

Quality Control Check	Evaluation	Flag	Samples Affected
Holding Time	Holding time exceeded for extraction or analysis	J = positive results; UJ = nondetects	Sample
	Holding time exceeded by a factor of two	J = positive results; R = nondetects	
Sample Preservation SW8260B	Sample not preserved	J = positive results; UJ = nondetects	Sample
Sample Integrity SW8260B	Bubbles in VOA vial used for analysis	J = positive hits; UJ = nondetects	Sample
Temperature	>6°C	J = positive results; UJ = nondetects	All samples in same cooler
ICAL	RRF <0.050, <0.010 for poor responders (SW8260B and SW8270C)	J = positive results, R = nondetects	All associated samples in analysis batch
	%RSD >20.0% (SW8260B and SW8270C), or >20% (SW8015B, SW8081A, SW8082, and SW8151A), **AND** calibration curve not used; **OR** calibration curve used, but with coefficient of correlation or determination <0.99	J = positive results, UJ = nondetects	
Calibration Verification (second-source and continuing calibration verification)	RRF <0.050, <0.010 for poor responders (SW8260B and SW8270C)	J = positive results, R = nondetects	All associated samples in analysis batch
	%D >25.0% (SW8260B and SW8270C) or >15% (SW8015B, SW8081A, SW8082, SW8151A	J = positive results, UJ = nondetects	
	%R >UT	J = positive results	All associated samples in analytical batch
	%R <LT	J = positive results, UJ = nondetects	
Laboratory Control Sample	%R >UT	J = positive results	All samples in preparation batch
	%R< LT	J = positive results, UJ = nondetects	
	%R <10%	J = positive results; R = nondetects	
Calibration Blank Method Blank	Convert blank concentration to soil units, if applicable; multiply the highest blank concentration by five	U = positive sample results <5x highest blank concentration	All samples in preparation batch or analytical batch, whichever one applies, associated with method blank or calibration blank

TABLE 6-2
Flagging Conventions for Organic Methods
PG&E Program Quality Assurance Project Plan

Quality Control Check	Evaluation	Flag	Samples Affected
Equipment Blank Field Blank Ambient Blank			All samples, same site, matrix and date (water) or all samples, same site, matrix (soil) associated with equipment blank
Trip Blank			All samples shipped in the same cooler as the trip blank
MS/MSD			
%R	%R >UT	J = positive results	MS analytes in parent sample and field duplicate, if any.
	%R <LT	J = positive results; UJ = nondetects	
	%R <10%	J = positive results; R = nondetects	
RPDs	RPD >UT	J = positive results	MS analytes in parent sample and field duplicate, if any.
Surrogates			
SW8260B; SW8015B; SW8015B SW8081 SW8082; SW8151A; SW8310, SW8270CSIM	%R >UT	J = positive results	All analytes in sample
	%R <LT and none <10%	J = positive results; UJ = nondetects	
	%R <10%	J = positive results; R = nondetects	
SW8270C	2 or more surrogates in same fraction with %R >UT	J = positive results	All analytes in same fraction in sample
	2 or more surrogates in same fraction with %R <LT but not <10%	J = positive results; UJ = nondetects	
	2 or more surrogates in same fraction with %R <LT and <10%	J = positive results; R = nondetects	
Internal Standards (SW8260B; SW8270C, SW8270CSIM)	Area >UT	J = positive results; UJ = nondetects	Associated analytes in sample
	Area <LT but not <10%	J = positive results;	
	Area <10%	J = positive results; R = nondetects	

TABLE 6-2
Flagging Conventions for Organic Methods
PG&E Program Quality Assurance Project Plan

Quality Control Check	Evaluation	Flag	Samples Affected
Field Duplicates	Concentration of reported analytes are >5 times the RL in either sample and RPD >UT (30% for water samples; 50% for soil samples)	J = positive results	Field duplicate pair
	One or both sample results <5 times the RL and a difference of ±2 times the RL for water (±4 times for soil).	J = positive; UJ = nondetect	
Confirmation (SW8015B; SW8021B,SW8081A; SW8151A;)	RPD between primary and confirmation results > 25%	J = positive results	Sample

Notes:

All QA/QC criteria are included in Tables 5-3 through 5-15 and Appendix A and will be used for validation criteria.

Organic methods include SW8015B, SW8081A, SW8082, SW8151A, SW8260B, SW8270C, and SW8270C SIM.

Spike recovery limits do not apply when sample concentration exceeds the spike concentration by a factor of four or more.

For methods requiring confirmation, the qualifications apply to primary analysis results (either of the two columns/detectors may be designated as the primary column/detector).

Where one MS recovery meets acceptance criteria and the other MS of the pair does not, professional judgment may be used to determine if the parent sample should be qualified for matrix effects by comparing the MS recoveries to other QC results within the batch or sample site.

Qualifier may not apply in cases where a surrogate coelutes with a nontarget analyte.

Qualifier may not apply in cases where low surrogate recoveries are due to sample dilution.

< = less than
> = greater than
%R = percent recovery
LT = lower tolerance
UT = upper tolerance

TABLE 6-3
Flagging Conventions – Minimum Data Evaluation Criteria for Inorganic Methods
PG&E Program Quality Assurance Project Plan

Quality Control Check	Evaluation	Flag	Samples Affected
Holding Time	Holding time exceeded for extraction, digestion, or analysis	J = positive results; R = nondetects for mercury; UJ = nondetects for all other analytes	Sample
	Holding time for digestion or analysis exceeded by a factor of two	J = positive results; R = nondetects	
Sample Preservation	Sample preservation requirements not met (If sample preservation was not done in the field, but was performed at the laboratory upon sample receipt, no flagging is required)	J = positive results; R = nondetects	Sample
Temperature	>6°C (not applicable to metals except mercury)	J = positive results; UJ = nondetects	Samples in same cooler
ICAL (Multipoint only)	Correlation coefficient ≤0.995	J = positive; UJ = nondetects	All associated samples in analytical batch
Calibration verification (ICAL verification, continuing calibration verification)	%R >UT	J = positive results	All associated samples in analytical batch
	%R <LT	J = positive results, UJ = nondetects	
Interference check sample (SW6010B/SW6020 only)	%R >UT	J = positive results	All associated samples in analytical batch
	%R <LT	J = positive results; UJ = nondetects	
Laboratory Control Sample	%R >UT	J = positive results	All samples in preparation batch
	%R <LT	J = positive results; UJ = nondetects	
	%R <10%	J = positive results; R = nondetects	
Calibration Blank (ICB,CCB) Method Blank	Multiply the highest blank concentration by five	U = positive sample results <5x highest blank concentration	All samples in preparation batch or analytical batch, whichever one applies, associated with method blank or calibration blank
Equipment Blank			All samples, same site, matrix and date
MS/MSD	%R >UT	J = positive results	MS analytes in parent sample and field duplicate if applicable
	%R <LT	J = positive results; UJ = nondetects	
	%R <10%	J = positive results; R = nondetects	
	RPD >UT	J = positive results	

TABLE 6-3
Flagging Conventions – Minimum Data Evaluation Criteria for Inorganic Methods
PG&E Program Quality Assurance Project Plan

Quality Control Check	Evaluation	Flag	Samples Affected
MS Dilute and Spike for hexavalent chromium by Methods SW7199 or EPA218.6 (see Section 5.3.3.1)	Spike recovery 85-115% and peak within recovery time window. If criteria are not met, the laboratory is required to dilute two aliquots 1:5, spike one with 1 μg/L of hexavalent chromium and analyze the other unspiked. Continue the aforementioned procedure using successively greater dilutions of two aliquots until recovery time and recovery criteria are met.	Choose the dilution where the RT/recovery criteria are met. If RT/recovery criteria are met at a 1:1 dilution, data qualification is not required for detected or nondetected results. If RT/recovery criteria met at dilution greater than a 1:1, elevate the RL for nondetected results and qualify the data U at a level equal to the RL multiplied by the dilution factor of the acceptable analysis (apply ValAdj validation reason). If RT/recovery criteria are not met: a) Analysis performed only at a 1:1 dilution: J positive results (apply LabA&P validation reason) UJ or R nondetects determined in conjunction with Project Chemist (apply LabA&P validation reason) b) Analysis performed at subsequent dilutions and criteria are still not met: J flag positive apply LabA&P validation reason) Elevate RL - UJ or R nondetects, determined in conjunction with project chemist (apply LabA&P validation reason)	Sample
Post digestion Spikes/Recovery Test (Metals only) (Step 1 - following MS/MSD, only required if the MS/MSD fails)	Spike results indicate performance of Dilution Test required (i.e. MS/MSD Failed), but Dilution Test not done.	J = positive results, UJ = nondetects	All samples in digestion batch if Dilution test not performed
	%R >UT	J = positive	
	%R <LT	J = positive results, UJ = nondetects	

TABLE 6-3
Flagging Conventions – Minimum Data Evaluation Criteria for Inorganic Methods
PG&E Program Quality Assurance Project Plan

Quality Control Check	Evaluation	Flag	Samples Affected
Dilution Test (Step 2 - following Post digestion spike, only required if the PDS fails)	If concentration is >25 times the RL and percent difference >UT	J = positive results UJ = nondetects	Analytes in parent sample if analytical spike not performed
MSA (GFAA only) for samples where postdigestion spike (performed as a result of unacceptable serial dilution) fails	r <0.995	J = positive results	Sample
Field Duplicates Laboratory Sample Duplicates	Concentration of reported analytes are >5 times the RL in either sample and RPD >20%	J = positive results	Field duplicate pair
	One or both sample results <5 times the RL and a difference of ±2 times the RL	J = positive results; UJ = nondetects	

Notes:
< = less than
> = greater than
All QA/QC criteria are included in Tables 5-3 through 5-15 and Appendix A and will be used for validation criteria.
Spike recovery limits do not apply when sample concentration exceeds the spike concentration by a factor of four or more.
CCB = continuing calibration blank
ICB = Initial calibration blank
LabA&P = laboratory accuracy and precision criteria not met
LT = lower tolerance
MSA = method of standard addition
UT = upper tolerance
ValAdj = Value reported by laboratory adjusted because of matrix issues.

TABLE 6-4
Qualifier Flag Definitions
PG&E Program Quality Assurance Project Plan

Flag	Definition
J	Analyte was present but reported value may not be accurate or precise.
R	The result has been rejected.
U	Analyte was analyzed for but not detected at the specified detection limit.
UJ	Analyte was not detected above the detection limit objective; however, the reported detection limit is approximate and might not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

SECTION 7
Performance Evaluations

To assess sample and data collection procedures, performance evaluations will be conducted that include of technical systems audits and performance audits.

7.1 Technical Systems Audits

7.1.1 Laboratory Audits

The laboratories participating in the data collection effort will be prequalified by the project management teams. A surveillance audit program that requires routine technical system audits will be instituted. Laboratory prequalification and the surveillance audits may also be undertaken by regulatory agencies. Laboratory prequalification audits may be performed as onsite audits, desk audits, or a combination of both, depending on the scale and sensitivity of the project.

7.1.1.1 Onsite Laboratory Prequalification Audit

An onsite laboratory prequalification audit in conjunction with a desk audit (see Section 7.1.1.2) is the preferred audit when using a new laboratory. The onsite laboratory audit will start with a pre-audit meeting during which the auditor will discuss with the laboratory staff the purpose of the audit, the schedule and areas to be audited, and the procedures that will be followed. The meeting may include a brief tour of the laboratory. The audit will then be conducted. The auditor will assemble the findings at the conclusion of the audit and discuss the findings with laboratory staff.

Critical items that will be addressed in a technical system audit include, but may not be limited to, the following:

- Calibration procedures and documentation
- Treatment and handling of standards
- Completeness of data forms, notebooks, and other reporting requirements
- Data review and verification procedures
- Data storage, filing, and recordkeeping procedures
- Sample custody procedures
- QC procedures, tolerances, and documentation
- Operating conditions of facilities and equipment
- Documentation of staff training and instrument maintenance activities
- Systems and operations overview

A written audit report will be sent to the laboratory within a specified time. A copy of the audit report will be sent to the project manager, and a copy will be retained in the project files.

The need for follow-up action will be determined based on the laboratory's responses. If an audit identifies an unacceptable condition or unacceptable data, the laboratory will be responsible for developing and initiating corrective action to resolve the situation. The project manager will be notified if the nonconformance impacts the project and requires resources not normally available to the project team. In such cases, the project manager will decide whether resources to pursue corrective action will be made available.

7.1.1.2 Desk Prequalification Audit

In part, a prequalification audit is performed to provide a perspective of the laboratory operations and the internal auditing and data review processes. Noncritical samples, split samples, or performance evaluation samples will be sent to the laboratory as part of the prequalification audit to ascertain the laboratory's ability to produce quality data. Generally, this process starts by sending guidance documents (e.g., QAPP, SAP, and SOW) to the laboratory for review. After a review and confirmation, the laboratory will follow the guidance documents to the best of their ability and to the project chemist's satisfaction. The auditor will request copies of accreditation audits (e.g., ELAP, NELAP, or AFCEE), SOPs, an example data package, and the laboratory's quality assurance manual. After a review of the laboratory's documentation (including instrument output, analytical reports, and other documentation specific to a batch of samples), samples can be sent to the laboratory. The data will be validated by using the Level 4 protocol described in Section 6.3 and reviewing the laboratories QC documentation. The corrective actions described in Section 7.1.1.1 may also apply.

7.1.2 Field Audits

Field audits will be performed annually to verify the performance of field procedures. The audit will evaluate the following:

- Sample containers and preservatives
- Sample collection and identification procedures
- Sample custody, handling, and shipping procedures
- Equipment decontamination procedures
- Calibration of field instruments and performance of field tests
- Documentation of field activities, maintenance of field records, and document control

7.2 Performance Audits

7.2.1 Performance Evaluations

Laboratories are required to participate in a performance evaluation program, in accordance with the California ELAP. Any method or analyte failure in a performance evaluation that affects the certification status of the laboratory with the National Environmental Laboratory Accreditation Program or the state of California must be immediately communicated to the program chemist.

Blind performance evaluation samples will be submitted to the laboratories as deemed necessary by the project chemist or project team.

7.2.2 External Audits

Announced and unannounced audits of the field operations and laboratories may be conducted by CH2M HILL during any stage of the project.

7.2.3 Internal Audits

Annual audits of the laboratory shall be conducted by the laboratory's quality assurance officer. The audits shall verify, at a minimum, that written SOPs are being followed; standards are traceable to certified sources; documentation is complete; data review is being done effectively and is properly documented; and data reporting, including electronic and manual data transfer, is accurate and complete. All audit findings shall be documented in QA reports to management. Necessary corrective actions shall be taken within a reasonable timeframe. The quality assurance office shall verify that such actions are effective and complete and document their implementation in an audit closeout report to management.

SECTION 8

Preventive Maintenance

The primary objective of preventive maintenance is to promote the timely and effective completion of a data collection effort. The maintenance program should be designed to minimize the downtime of crucial sampling and analytical equipment caused by component failures. The maintenance program should establish the following:

- Maintenance responsibilities
- Maintenance schedules
- An adequate inventory of critical spare parts and equipment

8.1 Maintenance Responsibilities

Laboratory instrument maintenance is the responsibility of the participating laboratory. Generally, the laboratory manager or supervisor is responsible for the instruments in their work areas; they will establish maintenance procedures and schedules for each instrument. Laboratories should maintain service agreements with instrument manufacturers or a reputable service company to minimize downtime if there is an instrument malfunction.

Maintenance responsibilities for field equipment are assigned to the field team leader for specific sampling tasks. However, the field team using the equipment is responsible for checking the status of the equipment prior to use and reporting any problems encountered. The field team is also responsible for ensuring that critical spare parts are included as part of the field equipment checklist. Nonoperational field equipment should be removed from service and a replacement obtained. All field instruments will be properly protected against inclement weather conditions during the field investigation.

8.2 Maintenance Schedules

The effectiveness of any maintenance program depends, to a large extent, on adherence to specific maintenance schedules for each piece of equipment. Nonroutine maintenance activities are conducted as needed. Manufacturers' recommendations should provide the primary basis for establishing maintenance schedules. Service contracts may be used to implement maintenance schedules.

Each analytical instrument should be assigned an instrument logbook; all maintenance activities for will be the documented instrument in the logbook. Logbooks should contain the following information:

- Date of service
- Person performing the service
- Type of service performed and the reason for service
- Replacement parts installed, if appropriate
- Date of next scheduled service
- Any other useful information

8.3 Spare Parts

An adequate inventory of spare parts is required to minimize equipment down time. The inventory will include the following:

- Parts and supplies that are subject to frequent failure
- Parts and supplies that have limited useful lifetimes
- Parts and supplies that cannot be obtained in a timely manner should failure occur

Field managers and laboratory managers are responsible for maintaining an adequate inventory of spare parts. In addition to spare parts and supply inventories, an in-house source of backup equipment and instrumentation should be available.

SECTION 9

Data Assessment

9.1 Data Quality Assessment

All laboratory data will be evaluated according to the QA acceptance criteria specified in Tables 5-3 through 5-15 and Appendix A Limitations regarding data usability will be assigned, if appropriate, in accordance with the validation process described in Section 7. Field data will be evaluated according to the appropriate SOP.

9.2 Reconciliation with Project Objectives

The PG&E Program includes projects and sites with varying tasks and objectives. The procedure for data reconciliation will be a function of the project-specific objectives and will be addressed in the project-specific documents.

SECTION 10

Corrective Action

Corrective action may be required as a result of deviations from field or analytical procedures. Deficiencies identified in audits and data quality evaluations may also call for corrective action. All project personnel have the responsibility to identify, report, and solicit approval for corrective actions to resolve conditions that are adverse to data quality.

Tables 5-3 through 5-15 specify the corrective actions to be taken when deviations from calibration and QC acceptance criteria occur. Field and laboratory staff may encounter conditions requiring immediate corrective action that are not addressed in this QAPP, the SAPs, or QAPP addenda. These staff will document conditions and the results of corrective actions in a field logbook or laboratory nonconformance report and communicate their actions as soon as feasible to the appropriate people (field team leader, laboratory supervisor, project chemist, project manager, and if necessary, the PG&E Program quality manager) for immediate input. A mechanism must be in place to allow for supervisory review or client input, or both, for all deviations or deficiencies. A corrective action reporting system that requires immediate documentation of deviations or deficiencies and for supervisory review of the actions taken to correct them will be established. At a minimum, the corrective action report should include the following information:

- The type of deviation or deficiency
- The date of occurrence
- The impact of the deviation or deficiency, such as samples affected
- The corrective action taken
- Documentation that the process has been returned to control

The only time that a corrective action report may be waived is when a deviation or deficiency is immediately corrected and its impact is precluded. An example would be an unacceptable ICAL that is repeated before samples are analyzed.

Each corrective action report must be reviewed and approved by a person of authority, such as the field team leader or laboratory supervisor. The ultimate responsibility for the laboratory corrective action process is the QC manager, who must ensure that proper documentation, approval, and close out of all out-of-control or nonconformance events is performed. A nonconformance report will summarize each nonconformance condition. Corrective action reports that could potentially affect data quality must be brought to the attention of the project chemist. Report disposition will be the responsibility of the project chemist. The project manager may be notified about a particular report at the project chemist's discretion. Copies of corrective action reports must be maintained in the laboratory or field project files.

SECTION 11

Quality Assurance Reports

Where specified in the SAP, work plan, or QAPP addendum, a QA report or data quality evaluation will be submitted by the project chemist to the project manager on a predetermined interval established in the SAP or QAPP addendum. The report will summarize the results of the data validation and the data assessment. The results should be presented in a manner that facilitates decision making. For example, temporal data may be more effectively presented if supplemented by a time plot. Any significant quality problems and recommended solutions should be included in the report. Limitations on data usability identified during data validation should be highlighted. Results of the data assessment should be reconciled with the project objectives.

SECTION 12
Data Management

Electronic data associated with CH2M Hill projects will be used to generate validation reports, risk assessment calculations, modeling results, data summary tables, maps, and other figures. The data management will follow CH2M HILL standard procedures for environmental data collection. Other consultants or contractors may use other electronic data management programs, which will be described in the SAP or QAPP addendum. However, any system used must be capable of storing and managing the information as follows:

- Simple procedures to get rapid access to stored data
- Data entry methods of known accuracy and efficiency
- Well-documented validation procedures for electronic databases
- Sampling data management using unique sample IDs
- A sampling inventory of newly collected data and methods of sample inventory reconciliation
- Sample-specific attributes, including location IDs, sample type and media, and sample date
- Reporting and delivery formats to support data analysis and reduction

12.1 Archiving

Hardcopy and electronic versions will be archived in project files and on electronic archive tapes for the duration of the project, as specified in contractual agreements, or for a minimum of 5 years. All electronic data will be subject to routine back-up until it is archived for long-term retention.

12.2 Data Flow and Transfer

The data flow from the laboratory and field to the project staff and data users will be sufficiently documented to ensure that data are properly tracked, reviewed, and validated.

12.3 Record Keeping

In addition to the data management procedures for analytical data provided in Section 6.1, the laboratory will maintain electronic and hardcopy records sufficient to re-create each analytical event. At a minimum, laboratory will maintain the following records:

- Raw data, including instrument printouts, bench work sheets, and chromatograms, with compound identification and quantitation reports
- Laboratory-specific, written SOPs for each analytical method and QA/QC function implemental during the analysis of project samples

SECTION 13

References

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Appendix A
Reporting Limits, Accuracy, and Precession Limits

Table A-1
Reporting Limits, Accuracy, and Precession Limits for Soil
PG&E Program Quality Assurance Project Plan

Method	Constituent	CAS	Units	QAPP RL	EPA Regional Screening Levels - May 2012		EPA Regional Screening Levels - 2008		DTSC CHHSL		Most Stringent Screening Level[1]	Does RL Exceed Screening Level?	LCS Accuracy Control Limits (%R)		MS/MSD Accuracy Control Limits (%R)		Precision Soil
					Residential	Commercial	Residential	Commercial	Residential	Commercial			Lower Limit	Upper Limit	Lower Limit	Upper Limit	% RPD
SW 9012 or SW 9014	Cyanide	57-12-5	mg/kg	0.25	47	610	1,600	20,000	--	--	0,047	NO	*	*	*	*	30
Walkley-Black	Total organic carbon	TOC	mg/kg	50	--	--	--	--	--	--	--	NO	75	125	75	125	35
SW 9050	Specific conductance	Conductance	µmhos/cm	5	--	--	--	--	--	--	--	NO	75	125	75	125	20
SW 9045	pH	pH	pH units	0.1	--	--	--	--	--	--	--	NO	--	--	--	--	20
SM 2540 B/EPA 160.3	percent moisture	Moist	Percent	--	--	--	--	--	--	--	--	NO	--	--	--	--	20
EPA 300.0	Fluoride	Fluoride	mg/kg	2	--	--	4,700	61,000	--	--	4,700	NO	70	130	70	130	35
EPA 300.0	Chloride	Chloride	mg/kg	2	--	--	--	--	--	--	--	NO	70	130	70	130	35
EPA 300.0	Sulfate	Sulfate	mg/kg	2	--	--	--	--	--	--	--	NO	70	130	70	130	35
EPA 821/R-91-100	Sulfide, acid volatile	18496-25-8	mg/kg	80	--	--	--	--	--	--	--	NO	70	130	70	130	30
SW 7199	Chromium, hexavalent	18540-29-9	mg/kg	0.4	0.29	5.6	230	1,400	17	17	0.29	YES	85	115	85	115	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Aluminum	7429-90-5	mg/kg	10	77,000	990,000	77,000	990,000	--	--	77,000	NO	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Antimony	7440-36-0	mg/kg	2	31	410	31	410	30	380	30	NO	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Arsenic	7440-38-2	mg/kg	0.5	0.39	1.6	0.39	1.6	0.07	0.42	0.07	YES	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Barium	7440-39-3	mg/kg	1	15,000	190,000	15,000	190,000	5,200	63,000	5,200	NO	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Beryllium	7440-41-7	mg/kg	0.5	160	2,000	160	2,000	150	1,700	150	NO	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Cadmium	7440-43-9	mg/kg	0.5	70	800	70	810	1.7	7.5	1.7	NO	85	115	75	125	20
SW 6010B or C/EPA 200.7	Calcium	7440-70-2	mg/kg	100	--	--	--	--	--	--	--	NO	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Chromium	7440-47-3	mg/kg	1	--	--	280	1,400	*	*	280	NO	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Cobalt	7440-48-4	mg/kg	1	23	300	23	300	660	3,200	23	NO	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Copper	7440-50-8	mg/kg	1	3,100	41,000	3,100	41,000	3,000	38,000	3,000	NO	85	115	75	125	20
SW 6010B or C/EPA 200.7	Iron	7439-89-6	mg/kg	10	55,000	720,000	55,000	720,000	--	--	55,000	NO	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Lead	7439-92-1	mg/kg	1	400	800	400	800	150	3,500	150	NO	85	115	75	125	20
SW 6010B or C/EPA 200.7	Magnesium	7439-95-4	mg/kg	100	--	--	--	--	--	--	--	NO	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Manganese	7439-96-5	mg/kg	1	--	--	1,800	23,000	--	--	1,800	NO	85	115	75	125	20
SW 7471A/EPA 245.5	Mercury	7439-97-6	mg/kg	0.1	10	43	6.7	28	18	180	6.7	NO	75	125	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Molybdenum	7439-98-7	mg/kg	1	390	5,100	390	5,100	380	4,800	380	NO	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Nickel	7440-02-0	mg/kg	1	1,500	20,000	1,600	20,000	1,600	16,000	1,500	NO	85	115	75	125	20
SW 6010B or C/EPA 200.7	Potassium	7440-09-1	mg/kg	100	--	--	--	--	--	--	--	NO	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Selenium	7782-49-2	mg/kg	1	390	5,100	390	5,100	380	4,800	380	NO	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Silver	7440-22-4	mg/kg	1	390	5,100	390	5,100	380	4,800	380	NO	85	115	75	125	20
SW 6010B or C/EPA 200.7	Sodium	7440-23-5	mg/kg	100	--	--	--	--	--	--	--	NO	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Thallium	7440-28-0	mg/kg	2	0.78	10	5.1	66	5	63	0.78	YES	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Vanadium	7440-62-2	mg/kg	1	--	--	550	7,200	530	6,700	530	NO	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Zinc	7440-66-6	mg/kg	2	23,000	310,000	23,000	310,000	23,000	100,000	23,000	NO	85	115	75	125	20
SW 8015B or C or D	Motor Oil	TPH-motor oil	mg/kg	10	--	--	--	--	--	--	--	NO	60	120	60	120	50
SW 8015B or C or D	TPH-Diesel	TPH-diesel	mg/kg	10	--	--	--	--	--	--	--	NO	51	153	51	153	50
SW 8015B or C or D	TPH-Gasoline	TPH-gasoline	mg/kg	1	--	--	--	--	--	--	--	NO	57	146	57	146	50
SW 8081A or B	4,4'-DDD	72-54-8	ug/kg	4	2,000	7,200	2,000	7,200	2,300	9,000	2,000	NO	50	139	50	139	50
SW 8081A or B	4,4'-DDE	72-55-9	ug/kg	4	1,400	5,100	1,400	5,100	1,600	6,300	1,400	NO	68	126	68	126	50
SW 8081A or B	4,4'-DDT	50-29-3	ug/kg	4	1,700	7,000	1,700	7,000	1,600	6,300	1,600	NO	46	135	46	135	50
SW 8081A or B	Aldrin	309-00-2	ug/kg	4	29	100	29	100	33	130	29	NO	47	120	47	120	50
SW 8081A or B	alpha-HCH	319-84-6	ug/kg	4	77	270	77	270	--	--	77	NO	62	125	62	125	50
SW 8081A or B	alpha-Chlordane	5103-71-9	ug/kg	4	--	--	--	--	430	1,700	430	NO	63	121	63	121	50
SW 8081A or B	beta-HCH	319-85-7	ug/kg	4	270	960	320	1,300	--	--	270	NO	62	127	62	127	50
SW 8081A or B	delta-HCH	319-86-8	ug/kg	4	--	--	--	--	--	--	--	NO	57	130	57	130	50
SW 8081A or B	Dieldrin	60-57-1	ug/kg	4	30	110	30	110	35	130	30	NO	67	125	67	125	50
SW 8081A or B	Endosulfan I	959-98-8	ug/kg	4	--	--	--	--	--	--	--	NO	41	147	41	147	50
SW 8081A or B	Endosulfan II	33213-65-9	ug/kg	4	--	--	--	--	--	--	--	NO	37	141	37	141	50
SW 8081A or B	Endosulfan sulfate	1031-07-8	ug/kg	4	--	--	--	--	--	--	--	NO	62	135	62	135	50
SW 8081A or B	Endrin	72-20-8	ug/kg	4	18,000	180,000	18,000	180,000	21,000	230,000	18,000	NO	61	133	61	133	50
SW 8081A or B	Endrin aldehyde	7421-93-4	ug/kg	4	--	--	--	--	--	--	--	NO	37	147	37	147	50
SW 8081A or B	gamma-HCH (Lindane)	58-89-9	ug/kg	4	520	2,100	520	21,000	500	2,000	500	NO	59	123	59	123	50
SW 8081A or B	gamma-Chlordane	5103-74-2	ug/kg	4	--	--	--	--	430	1,700	430	NO	48	124	48	124	50
SW 8081A or B	Heptachlor	76-44-8	ug/kg	4	110	380	110	380	130	520	110	NO	51	140	51	140	50
SW 8081A or B	Heptachlor epoxide	1024-57-3	ug/kg	4	53	190	53	190	--	--	53	NO	66	130	66	130	50
SW 8081A or B	Methoxychlor	72-43-5	ug/kg	20	310,000	3,100,000	310,000	3,100,000	340,000	3,800,000	310,000	NO	57	143	57	143	50
SW 8081A or B	Toxaphene	8001-35-2	ug/kg	100	440	1,600	440	1,600	460	1,800	440	NO	31	136	31	136	50
SW 8082 or A	Aroclor-1016	12674-11-2	ug/kg	50	3,900	21,000	3,900	21,200	--	--	3,900	NO	41	138	41	138	50
SW 8082 or A	Aroclor-1221	11104-28-2	ug/kg	50	140	540	170	620	--	--	140	NO	45	136	45	136	50
SW 8082 or A	Aroclor-1232	11141-16-5	ug/kg	50	140	540	170	620	--	--	140	NO	45	136	45	136	50
SW 8082 or A	Aroclor-1242	53469-21-9	ug/kg	50	220	740	220	740	--	--	220	NO	43	150	43	150	50
SW 8082 or A	Aroclor-1248	12672-29-6	ug/kg	50	220	740	220	740	--	--	220	NO	44	136	44	136	50
SW 8082 or A	Aroclor-1254	11097-69-1	ug/kg	50	220	740	220	740	--	--	220	NO	41	141	41	141	50
SW 8082 or A	Aroclor-1260	11096-82-5	ug/kg	50	220	740	220	740	--	--	220	NO	61	131	61	131	50
SW 8082 or A	Total PCB	Total PCB	ug/kg	50	220	740	220	740	89	300	89	NO	--	--	--	--	--
SW 8151A	2,4-D	94-75-7	ug/kg	200	690,000	7,700,000	690	7,700	690	550	550	NO	32	121	32	121	50

					EPA Regional Screening Levels - May 2012		EPA Regional Screening Levels - 2008		DTSC CHHSL				LCS Accuracy Control Limits (%R)		MS/MSD Accuracy Control Limits (%R)		Precision Soil
Method	Constituent	CAS	Units	QAPP RL	Residential	Commercial	Residential	Commercial	Residential	Commercial	Most Stringent Screening Level[1]	Does RL Exceed Screening Level?	Lower Limit	Upper Limit	Lower Limit	Upper Limit	% RPD
SW 8151A	2,4-DB	94-82-6	ug/kg	500	490,000	4,900,000	490	4,900	--	--	490	YES	42	145	42	145	50
SW 8151A	2,4,5-T	93-76-5	ug/kg	500	610,000	6,200,000	610	6,200	7,700	6,100	610	NO	43	139	43	139	50
SW 8151A	2,4,5-TP	93-72-1	ug/kg	200	490,000	4,900,000	490	4,900	--	--	490	NO	46	128	46	128	50
SW 8151A	Dalapon	75-99-0	ug/kg	100	1,800,000	18,000,000	1,800	18,000	--	--	1,800	NO	22	125	22	125	50
SW 8151A	Dicamba	1918-00-9	ug/kg	500	1,800,000	18,000,000	1,800	18,000	--	--	1,800	NO	56	120	56	120	50
SW 8151A	Dichloroprop	120-36-5	ug/kg	500	--	--	--	--	--	--	--	NO	72	142	72	142	50
SW 8151A	Dinoseb	88-85-7	ug/kg	100	61,000	620,000	61	620	--	--	61	YES	20	131	20	131	50
SW 8151A	MCPA	94-74-6	ug/kg	1,000	31,000	310,000	31	310	--	--	31	YES	65	120	65	120	50
SW 8151A	MCPP	7085-19-0	ug/kg	1,500	--	--	61	620	--	--	61	YES	60	118	60	118	50
SW 8260B or C	1,1,1,2-Tetrachloroethane	630-20-6	ug/kg	5	1,900	9,300	2,000	9,800	--	--	1,900	NO	74	125	74	125	30
SW 8260B or C	1,1,1-Trichloroethane (TCA)	71-55-6	ug/kg	5	8,700,000	38,000,000	9,000,000	39,000,000	--	--	8,700,000	NO	68	130	68	130	30
SW 8260B or C	1,1,2,2-Tetrachloroethane	79-34-5	ug/kg	5	560	2,800	590	2,900	--	--	560	NO	59	140	59	140	30
SW 8260B or C	1,1,2-Trichloroethane	79-00-5	ug/kg	5	1,100	5,300	1,100	5,500	--	--	1,100	NO	62	127	62	127	30
SW 8260B or C	1,1,2-Trichlorotrifluoroethane (Freon 113)	76-13-1	ug/kg	5	43,000,000	180,000,000	43,000,000	180,000,000	--	--	43,000,000	NO	65	135	65	135	30
SW 8260B or C	1,1-Dichloroethane	75-34-3	ug/kg	5	3,300	17,000	3,400	17,000	--	--	3,300	NO	73	125	73	125	30
SW 8260B or C	1,1-Dichloroethylene	75-35-4	ug/kg	5	240,000	1,100,000	250,000	1,100,000	--	--	240,000	NO	65	136	65	136	30
SW 8260B or C	1,1-Dichloropropene	563-58-6	ug/kg	5	--	--	--	--	--	--	--	NO	70	135	70	135	30
SW 8260B or C	1,2,3-Trichlorobenzene	87-61-6	ug/kg	5	49,000	490,000	--	--	--	--	49,000	NO	62	133	62	133	30
SW 8260B or C	1,2,3-Trichloropropane	96-18-4	ug/kg	5	5	95	91	410	--	--	5	NO	63	130	63	130	30
SW 8260B or C	1,2,4-Trichlorobenzene	120-82-1	ug/kg	5	22,000	99,000	87,000	400,000	--	--	22,000	NO	65	131	65	131	30
SW 8260B or C	1,2,4-Trimethylbenzene	95-63-6	ug/kg	5	62,000	260,000	67,000	280,000	--	--	62,000	NO	65	135	65	135	30
SW 8260B or C	1,2-Dibromo-3-chloropropane	96-12-8	ug/kg	5	5.4	69	5.6	73	--	--	5.4	NO	49	135	49	135	30
SW 8260B or C	1,2-Dibromoethane (EDB)	106-93-4	ug/kg	5	34	170	34	170	--	--	34	NO	70	124	70	124	30
SW 8260B or C	1,2-Dichlorobenzene	95-50-1	ug/kg	5	1,900,000	9,800,000	2,000,000	10,000,000	--	--	1,900,000	NO	74	120	74	120	30
SW 8260B or C	1,2-Dichloroethane (EDC)	107-06-2	ug/kg	5	430	2,200	450	2,200	--	--	430	NO	72	137	72	137	30
SW 8260B or C	1,2-Dichloropropane	78-87-5	ug/kg	5	940	4,700	930	4,700	--	--	930	NO	71	120	71	120	30
SW 8260B or C	1,3,5-Trimethylbenzene	108-67-8	ug/kg	5	780,000	10,000,000	47,000	200,000	--	--	47,000	NO	65	133	65	133	30
SW 8260B or C	1,3-Dichlorobenzene	541-73-1	ug/kg	5	--	--	--	--	--	--	--	NO	72	124	72	124	30
SW 8260B or C	1,3-Dichloropropane	142-28-9	ug/kg	5	1,600,000	20,000,000	1,600,000	20,000,000	--	--	1,600,000	NO	76	123	76	123	30
SW 8260B or C	1,4-Dichlorobenzene	106-46-7	ug/kg	5	2,400	12,000	2,600	13,000	--	--	2,400	NO	72	125	72	125	30
SW 8260B or C	2,2-Dichloropropane	594-20-7	ug/kg	5	--	--	--	--	--	--	--	NO	67	134	67	134	30
SW 8260B or C	2-Butanone (MEK)	78-93-3	ug/kg	50	28,000,000	200,000,000	28,000,000	190,000,000	--	--	28,000,000	NO	40	135	40	135	30
SW 8260B or C	2-Chlorotoluene	95-49-8	ug/kg	5	1,600,000	20,000,000	1,600,000	20,000,000	--	--	1,600,000	NO	69	128	69	128	30
SW 8260B or C	4-Chlorotoluene	106-43-4	ug/kg	5	1,600,000	20,000,000	5,500,000	72,000,000	--	--	1,600,000	NO	73	126	73	126	30
SW 8260B or C	4-Isopropyltoluene	99-87-6	ug/kg	6	--	--	--	--	--	--	--	NO	75	133	75	133	30
SW 8260B or C	4-Methyl-2-pentanone	108-10-1	ug/kg	50	5,300,000	53,000,000	5,300,000	52,000,000	--	--	5,300,000	NO	65	135	65	135	30
SW 8260B or C	Acetone	67-64-1	ug/kg	50	61,000,000	630,000,000	61,000,000	610,000,000	--	--	61,000,000	NO	40	141	40	141	30
SW 8260B or C	Acrolein	107-02-8	ug/kg	100	150	650	160	680	--	--	150	NO	65	135	65	135	30
SW 8260B or C	Acrylonitrile	107-13-1	ug/kg	50	240	1,200	240	1,200	--	--	240	NO	65	135	65	135	30
SW 8260B or C	Benzene	71-43-2	ug/kg	5	1,100	5,400	1,100	5,600	--	--	1,100	NO	73	126	73	126	30
SW 8260B or C	Bromobenzene	108-86-1	ug/kg	5	300,000	1,800,000	94,000	410,000	--	--	94,000	NO	66	121	66	121	30
SW 8260B or C	Bromochloromethane	74-97-5	ug/kg	5	160,000	680,000	--	--	--	--	160,000	NO	71	127	71	127	30
SW 8260B or C	Bromodichloromethane	75-27-4	ug/kg	5	270	1,400	10,000	46,000	--	--	0,270	NO	72	128	72	128	30
SW 8260B or C	Bromoform	75-25-2	ug/kg	6	62,000	220,000	61,000	220,000	--	--	61,000	NO	66	137	66	137	30
SW 8260B or C	Bromomethane	74-83-9	ug/kg	5	7,300	32,000	7,900	35,000	--	--	7,300	NO	45	141	45	141	30
SW 8260B or C	Carbon disulfide	75-15-0	ug/kg	5	820,000	3,700,000	670,000	3,000,000	--	--	670,000	NO	65	135	65	135	30
SW 8260B or C	Carbon tetrachloride	56-23-5	ug/kg	5	610	3,000	250	1,300	--	--	250	NO	67	133	67	133	30
SW 8260B or C	Chlorobenzene	108-90-7	ug/kg	5	290,000	1,400,000	310,000	1,500,000	--	--	290,000	NO	75	123	75	123	30
SW 8260B or C	Chloroethane	75-00-3	ug/kg	5	15,000,000	61,000,000	15,000,000	62,000,000	--	--	15,000,000	NO	41	141	41	141	30
SW 8260B or C	Chloroform	67-66-3	ug/kg	2	290	1,500	300	1,500	--	--	290	NO	72	124	72	124	30
SW 8260B or C	Chloromethane	74-87-3	ug/kg	5	120,000	500,000	1,700	8,400	--	--	1,700	NO	51	129	51	129	30
SW 8260B or C	cis-1,2-Dichloroethene	156-59-2	ug/kg	5	160,000	2,000,000	780,000	10,000,000	--	--	160,000	NO	67	125	67	125	30
SW 8260B or C	cis-1,3-Dichloropropene	10061-01-5	ug/kg	5	--	--	--	--	--	--	--	NO	72	126	72	126	30
SW 8260B or C	Dibromochloromethane	124-48-1	ug/kg	5	680	3,300	5,800	21,000	--	--	0,680	NO	66	130	66	130	30
SW 8260B or C	Dibromomethane	74-95-3	ug/kg	5	25,000	110,000	780,000	10,000,000	--	--	25,000	NO	73	128	73	128	30
SW 8260B or C	Dichlorodifluoromethane	75-71-8	ug/kg	5	94,000	400,000	190,000	780,000	--	--	94,000	NO	34	136	34	136	30
SW 8260B or C	Ethylbenzene	100-41-4	ug/kg	5	5,400	27,000	5,700	29,000	--	--	5,400	NO	74	127	74	127	30
SW 8260B or C	Hexachlorobutadiene	87-68-3	ug/kg	5	6,200	22,000	6,200	22,000	--	--	6,200	NO	53	142	53	142	30
SW 8260B or C	Isopropylbenzene (Cumene)	98-82-8	ug/kg	5	2,100,000	11,000,000	2,200,000	11,000,000	--	--	2,100,000	NO	77	129	77	129	30
SW 8260B or C	Methylene Chloride	75-09-2	ug/kg	5	56,000	960,000	1,100	5,400	--	--	1,100	NO	63	137	63	137	30
SW 8260B or C	Naphthalene	91-20-3	ug/kg	5	3,600	18,000	3,900	20,000	--	--	3,600	NO	51	135	51	135	30
SW 8260B or C	n-Butylbenzene	104-51-8	ug/kg	5	3,900,000	51,000,000	--	--	--	--	3,900,000	NO	65	138	65	138	30
SW 8260B or C	n-Propylbenzene	103-65-1	ug/kg	5	3,400,000	21,000,000	--	--	--	--	3,400,000	NO	63	135	63	135	30
SW 8260B or C	sec-Butylbenzene	135-98-8	ug/kg	5	--	--	--	--	--	--	--	NO	63	132	63	132	30
SW 8260B or C	Styrene	100-42-5	ug/kg	5	6,300,000	36,000,000	6,500,000	38,000,000	--	--	6,300,000	NO	74	128	74	128	30
SW 8260B or C	tert-Butyl Methyl Ether (MTBE)	1634-04-4	ug/kg	20	43,000	220,000	39,000	190,000	--	--	39,000	NO	50	135	50	135	30

Table A-1
Reporting Limits, Accuracy, and Precession Limits for Soil
PG&E Program Quality Assurance Project Plan

					EPA Regional Screening Levels - May 2012		EPA Regional Screening Levels - 2008		DTSC CHHSL				LCS Accuracy Control Limits (%R)		MS/MSD Accuracy Control Limits (%R)		Precision Soil
Method	Constituent	CAS	Units	QAPP RL	Residential	Commercial	Residential	Commercial	Residential	Commercial	Most Stringent Screening Level[1]	Does RL Exceed Screening Level?	Lower Limit	Upper Limit	Lower Limit	Upper Limit	% RPD
SW 8260B or C	tert-Butylbenzene	98-06-6	ug/kg	5	--	--	--	--	--	--	--	NO	65	132	65	132	30
SW 8260B or C	Tetrachloroethene	127-18-4	ug/kg	5	22,000	110,000	570	2,700	--	--	570	NO	67	139	67	139	30
SW 8260B or C	Toluene	108-88-3	ug/kg	5	5,000,000	45,000,000	5,000,000	46,000,000	--	--	5,000,000	NO	71	127	71	127	30
SW 8260B or C	trans-1,2-Dichloroethene	156-60-5	ug/kg	5	150,000	690,000	110,000	500,000	--	--	110,000	NO	66	134	66	134	30
SW 8260B or C	trans-1,3-Dichloropropene	10061-02-6	ug/kg	5	--	--	--	--	--	--	--	NO	65	127	65	127	30
SW 8260B or C	Trichloroethene	79-01-6	ug/kg	5	910	6,400	2,800	14,000	--	--	0,910	NO	77	124	77	124	30
SW 8260B or C	Trichlorofluoromethane (Freon 11)	75-69-4	ug/kg	5	790,000	3,400,000	800,000	3,400,000	--	--	790,000	NO	49	139	49	139	30
SW 8260B or C	Vinyl Chloride	75-01-4	ug/kg	5	60	1,700	60	1,700	--	--	60	NO	58	126	58	126	30
SW 8260B or C	Xylenes, Total	1330-20-7	ug/kg	15	630,000	2,700,000	600,000	2,600,000	--	--	600,000	NO	65	125	65	125	50
SW 8260B or C	m-Xylene	108-38-3	ug/kg	10	590,000	2,500,000	4,500,000	19,000,000	--	--	590,000	NO	79	126	79	126	30
SW 8260B or C	p-Xylene	106-42-3	ug/kg	10	600,000	2,600,000	4,700,000	20,000,000	--	--	600,000	NO	79	126	79	126	30
SW 8260B or C	o-Xylene	95-47-6	ug/kg	5	690,000	3,000,000	5,300,000	23,000,000	--	--	690,000	NO	77	125	77	125	30
SW 8270C or D	1,2,4-Trichlorobenzene	120-82-1	ug/kg	330	22,000	99,000	87,000	400,000	--	--	22,000	NO	44	125	44	125	30
SW 8270C or D	1,2-Dichlorobenzene	95-50-1	ug/kg	330	1,900,000	9,800,000	2,000,000	10,000,000	--	--	1,900,000	NO	45	125	45	125	30
SW 8270C or D	1,3-Dichlorobenzene	541-73-1	ug/kg	330	--	--	--	--	--	--	--	NO	39	125	39	125	30
SW 8270C or D	1,4-Dichlorobenzene	106-46-7	ug/kg	330	2,400	12,000	2,600	13,000	--	--	2,400	NO	35	125	35	125	30
SW 8270C or D	2,4,5-Trichlorophenol	95-95-4	ug/kg	700	6,100,000	62,000,000	6,100,000	62,000,000	--	--	6,100,000	NO	49	125	49	125	30
SW 8270C or D	2,4,6-Trichlorophenol	88-06-2	ug/kg	330	44,000	160,000	44,000	160,000	--	--	44,000	NO	43	125	43	125	30
SW 8270C or D	2,4-Dichlorophenol	120-83-2	ug/kg	330	180,000	1,800,000	180,000	1,800,000	--	--	180,000	NO	45	125	45	125	30
SW 8270C or D	2,4-Dimethylphenol	105-67-9	ug/kg	330	1,200,000	12,000,000	1,200,000	12,000,000	--	--	1,200,000	NO	32	125	32	125	30
SW 8270C or D	2,4-Dinitrophenol	51-28-5	ug/kg	700	120,000	1,200,000	120,000	1,200,000	--	--	120,000	NO	25	132	25	132	30
SW 8270C or D	2,4-Dinitrotoluene	121-14-2	ug/kg	330	1,600	5,500	120,000	1,200,000	--	--	1,600	NO	48	125	48	125	30
SW 8270C or D	2,6-Dinitrotoluene	606-20-2	ug/kg	330	61,000	620,000	61,000	620,000	--	--	61,000	NO	48	125	48	125	30
SW 8270C or D	2-Chloronaphthalene	91-58-7	ug/kg	330	6,300,000	82,000,000	6,300,000	82,000,000	--	--	6,300,000	NO	45	125	45	125	30
SW 8270C or D	2-Chlorophenol	95-57-8	ug/kg	330	390,000	5,100,000	390,000	5,100,000	--	--	390,000	NO	44	125	44	125	30
SW 8270C or D	2-Methylnaphthalene	91-57-6	ug/kg	330	230,000	2,200,000	310,000	4,100,000	--	--	230,000	NO	47	125	47	125	30
SW 8270C or D	2-Methylphenol (o-Cresol)	95-48-7	ug/kg	330	3,100,000	31,000,000	3,100,000	31,000,000	--	--	3,100,000	NO	40	125	40	125	30
SW 8270C or D	2-Nitroaniline	88-74-4	ug/kg	700	610,000	6,000,000	--	--	--	--	610,000	NO	44	125	44	125	30
SW 8270C or D	2-Nitrophenol	88-75-5	ug/kg	700	--	--	--	--	--	--	--	NO	42	125	42	125	30
SW 8270C or D	3,3'-Dichlorobenzidine	91-94-1	ug/kg	1,300	1,100	3,800	1,100	3,800	--	--	1,100	YES	25	128	25	128	30
SW 8270C or D	3-Nitroaniline	99-09-2	ug/kg	700	--	--	18,000	82,000	--	--	18,000	NO	27	125	27	125	30
SW 8270C or D	4,6-Dinitro-2-methylphenol	534-52-1	ug/kg	1600	4,900	49,000	6,100	62,000	--	--	4,900	NO	29	137	29	137	30
SW 8270C or D	4-Bromophenyl phenyl ether	101-55-3	ug/kg	330	--	--	--	--	--	--	--	NO	46	125	46	125	30
SW 8270C or D	4-Chloro-3-methylphenol	59-50-7	ug/kg	600	6,100,000	62,000,000	--	--	--	--	6,100,000	NO	46	125	46	125	30
SW 8270C or D	4-Chloroaniline	106-47-8	ug/kg	700	2,400	8,600	9,000	32,000	--	--	2,400	NO	10	125	10	125	30
SW 8270C or D	4-Chlorophenyl phenyl ether	7005-72-3	ug/kg	330	--	--	--	--	--	--	--	NO	47	125	47	125	30
SW 8270C or D	4-Methylphenol (p-Cresol)	106-44-5	ug/kg	330	6,100,000	62,000,000	310,000	3,100,000	--	--	310,000	NO	41	125	41	125	30
SW 8270C or D	4-Nitroaniline	100-01-6	ug/kg	700	24,000	86,000	23,000	82,000	--	--	23,000	NO	34	125	34	125	30
SW 8270C or D	4-Nitrophenol	100-02-7	ug/kg	700	--	--	--	--	--	--	--	NO	25	138	25	138	30
SW 8270C or D	Acenaphthene	83-32-9	ug/kg	330	3,400,000	33,000,000	3,400,000	33,000,000	--	--	3,400,000	NO	46	125	46	125	30
SW 8270C or D	Acenaphthylene	208-96-8	ug/kg	330	--	--	--	--	--	--	--	NO	44	125	44	125	30
SW 8270C or D	Anthracene	120-12-7	ug/kg	330	17,000,000	170,000,000	17,000,000	170,000,000	--	--	17,000,000	NO	53	125	53	125	30
SW 8270C or D	Benzo (a) anthracene	56-55-3	ug/kg	330	150	2,100	150	2,100	--	--	150	YES	52	125	52	125	30
SW 8270C or D	Benzo (a) pyrene	50-32-8	ug/kg	330	15	210	15	210	38	130	15	YES	50	125	50	125	30
SW 8270C or D	Benzo (b) fluoranthene	205-99-2	ug/kg	330	150	2,100	150	2,100	--	--	150	YES	45	125	45	125	30
SW 8270C or D	Benzo (g,h,i) perylene	191-24-2	ug/kg	330	--	--	--	--	--	--	--	NO	38	126	38	126	30
SW 8270C or D	Benzo (k) fluoranthene	207-08-9	ug/kg	330	1,500	21,000	1,500	21,000	--	--	1,500	NO	45	125	45	125	30
SW 8270C or D	Benzoic acid	65-85-0	ug/kg	5,000	240,000,000	2,500,000,000	240,000,000	2,500,000,000	--	--	240,000,000	NO	25	125	25	125	30
SW 8270C or D	Benzyl alcohol	100-51-6	ug/kg	330	6,100,000	62,000,000	31,000,000	310,000,000	--	--	6,100,000	NO	25	125	25	125	30
SW 8270C or D	bis (2-chloroethoxy) methane	111-91-1	ug/kg	330	180,000	1,800,000	180,000	1,800,000	--	--	180,000	NO	43	125	43	125	30
SW 8270C or D	bis (2-chloroethyl) ether	111-44-4	ug/kg	330	210	1,000	190	900	--	--	190	YES	38	125	38	125	30
SW 8270C or D	bis (2-chloroisopropyl) ether	108-60-1	ug/kg	330	4,600	22,000	3,500	17,000	--	--	3,500	NO	25	125	25	125	30
SW 8270C or D	bis (2-ethylhexyl) phthalate	117-81-7	ug/kg	330	35,000	120,000	35,000	120,000	--	--	35,000	NO	47	127	47	127	30
SW 8270C or D	Butyl benzylphthalate	85-68-7	ug/kg	1000	260,000	910,000	260,000	910,000	--	--	260,000	NO	49	125	49	125	30
SW 8270C or D	Chrysene	218-01-9	ug/kg	330	15,000	210,000	15,000	210,000	--	--	15,000	NO	53	125	53	125	30
SW 8270C or D	Dibenzo (a,h) anthracene	53-70-3	ug/kg	330	15	210	15	210	--	--	15	YES	41	125	41	125	30
SW 8270C or D	Dibenzofuran	132-64-9	ug/kg	330	78,000	1,000,000	--	--	--	--	78,000	NO	51	125	51	125	30
SW 8270C or D	Diethyl phthalate	84-66-2	ug/kg	330	49,000,000	490,000,000	49,000,000	490,000,000	--	--	49,000,000	NO	50	125	50	125	30
SW 8270C or D	Dimethyl phthalate	131-11-3	ug/kg	330	--	--	--	--	--	--	--	NO	49	125	49	125	30
SW 8270C or D	Di-n-butylphthalate	84-74-2	ug/kg	330	6,100,000	62,000,000	6,100,000	62,000,000	--	--	6,100,000	NO	56	125	56	125	30
SW 8270C or D	Di-n-octylphthalate	117-84-0	ug/kg	1000	--	--	--	--	--	--	--	NO	41	132	41	132	30
SW 8270C or D	Fluoranthene	206-44-0	ug/kg	330	2,300,000	22,000,000	2,300,000	22,000,000	--	--	2,300,000	NO	54	125	54	125	30
SW 8270C or D	Fluorene	86-73-7	ug/kg	330	2,300,000	22,000,000	2,300,000	22,000,000	--	--	2,300,000	NO	49	125	49	125	30
SW 8270C or D	Hexachlorobenzene	118-74-1	ug/kg	330	300	1,100	300	1,100	--	--	300	YES	47	125	47	125	30
SW 8270C or D	Hexachlorobutadiene	87-68-3	ug/kg	330	6,200	22,000	6,200	22,000	--	--	6,200	NO	40	125	40	125	30
SW 8270C or D	Hexachloroethane	67-72-1	ug/kg	330	12,000	43,000	35,000	120,000	--	--	12,000	NO	34	125	34	125	30

Method	Constituent	CAS	Units	QAPP RL	EPA Regional Screening Levels - May 2012		EPA Regional Screening Levels - 2008		DTSC CHHSL		Most Stringent	Does RL Exceed	LCS Accuracy Control Limits (%R)		MS/MSD Accuracy Control Limits (%R)		Precision Soil
					Residential	Commercial	Residential	Commercial	Residential	Commercial	Screening Level[1]	Screening Level?	Lower Limit	Upper Limit	Lower Limit	Upper Limit	% RPD
SW 8270C or D	Indeno (1,2,3-c,d) pyrene	193-39-5	ug/kg	330	150	2,100	150	2,100	--	--	150	YES	38	125	38	125	30
SW 8270C or D	Isophorone	78-59-1	ug/kg	330	510,000	1,800,000	510,000	1,800,000	--	--	510,000	NO	43	125	43	125	30
SW 8270C or D	Naphthalene	91-20-3	ug/kg	330	3,600	18,000	3,900	20,000	--	--	3,600	NO	40	125	40	125	30
SW 8270C or D	Nitrobenzene	98-95-3	ug/kg	330	4,800	24,000	31,000	280,000	--	--	4,800	NO	41	125	41	125	30
SW 8270C or D	n-Nitrosodi-n-propylamine	621-64-7	ug/kg	330	69	250	69	250	--	--	69	YES	40	125	40	125	30
SW 8270C or D	n-Nitrosodiphenylamine	86-30-6	ug/kg	330	99,000	350,000	99,000	350,000	--	--	99,000	NO	49	125	49	125	30
SW 8270C or D	Pentachlorophenol	87-86-5	ug/kg	700	890	2,700	3,000	9,000	4,400	13,000	0,890	NO	25	125	25	125	30
SW 8270C or D	Phenanthrene	85-01-8	ug/kg	330	--	--	--	--	--	--	--	NO	50	125	50	125	30
SW 8270C or D	Phenol	108-95-2	ug/kg	330	18,000,000	180,000,000	18,000,000	180,000,000	--	--	18,000,000	NO	39	125	39	125	30
SW 8270C or D	Pyrene	129-00-0	ug/kg	330	1,700,000	17,000,000	1,700,000	17,000,000	--	--	1,700,000	NO	46	125	46	125	30
SW 8270SIM	1-methylnaphthalene	90-12-0	ug/kg	5	16,000	53,000	22,000	99,000	--	--	16,000	NO	30	111	30	111	30
SW 8270SIM	2-methylnaphthalene	91-57-6	ug/kg	5	230,000	2,200,000	310,000	4,100,000	--	--	230,000	NO	30	111	30	111	30
SW 8270SIM	Acenaphthene	83-32-9	ug/kg	5	3,400,000	33,000,000	3,400,000	33,000,000	--	--	3,400,000	NO	28	110	28	110	30
SW 8270SIM	Acenaphthylene	208-96-8	ug/kg	5	--	--	--	--	--	--	--	NO	23	126	23	126	30
SW 8270SIM	Anthracene	120-12-7	ug/kg	5	17,000,000	170,000,000	17,000,000	170,000,000	--	--	17,000,000	NO	28	136	28	136	30
SW 8270SIM	Benzo (a) anthracene	56-55-3	ug/kg	5	150	2,100	150	2,100	--	--	150	NO	31	146	31	146	30
SW 8270SIM	Benzo (a) pyrene	50-32-8	ug/kg	5	15	210	15	210	38	130	15	NO	28	128	28	128	30
SW 8270SIM	Benzo (b) fluoranthene	205-99-2	ug/kg	5	150	2,100	150	2,100	--	--	150	NO	30	139	30	139	30
SW 8270SIM	Benzo (g,h,i) perylene	191-24-2	ug/kg	5	--	--	--	--	--	--	--	NO	21	149	21	149	30
SW 8270SIM	Benzo (k) fluoranthene	207-08-9	ug/kg	5	1,500	21,000	1,500	21,000	--	--	1,500	NO	42	129	42	129	30
SW 8270SIM	Chrysene	218-01-9	ug/kg	5	15,000	210,000	15,000	210,000	--	--	15,000	NO	39	134	39	134	30
SW 8270SIM	Dibenzo (a,h) anthracene	53-70-3	ug/kg	5	15	210	15	210	--	--	15	NO	30	138	30	138	30
SW 8270SIM	Fluoranthene	206-44-0	ug/kg	5	2,300,000	22,000,000	2,300,000	22,000,000	--	--	2,300,000	NO	30	142	30	142	30
SW 8270SIM	Fluorene	86-73-7	ug/kg	5	2,300,000	22,000,000	2,300,000	22,000,000	--	--	2,300,000	NO	27	116	27	116	30
SW 8270SIM	Indeno (1,2,3-c,d) pyrene	193-39-5	ug/kg	5	150	2,100	150	2,100	--	--	150	NO	17	164	17	164	30
SW 8270SIM	Naphthalene	91-20-3	ug/kg	5	3,600	18,000	3,900	20,000	--	--	3,600	NO	29	106	29	106	30
SW 8270SIM	Phenanthrene	85-01-8	ug/kg	5	--	--	--	--	--	--	--	NO	32	127	32	127	30
SW 8270SIM	Pyrene	129-00-0	ug/kg	5	1,700,000	17,000,000	1,700,000	17,000,000	--	--	1,700,000	NO	28	130	28	130	30

Notes:

Please keep in mind, Screening Levels are constantly revised by the EPA. The appropriate Screening levels are specific to the project, the location, the agency providing oversight, and the overall Goals of the project.

mg/kg = milligrams per kilogram
ug/kg = micrograms per kilogram
µmhos/cm = micromhos per centimeter

All soil results (with the exception of Waste characterization) must be reported as dry weight
SW 7199 soil analysis must be accompanied by a SW 3060A extraction
PCB - LCS, MS, and MSD only require Aroclor-1016 and Aroclor-1260 spikes

[1] For soil, most stringent of:
EPA Regional Screening Levels - 2008 and May 2012
CHHSL = California Human Health Screening Levels, January 2005
DTSC = California Department of Toxic Substance Control, January 2005

Table A-2

Reporting Limits, Accuracy, and Precession Limits for Groundwate

PG&E Program Quality Assurance Project Plan

Method	Constituent	CAS	Units	QAPP RL	EPA Regional Screening Levels May 2012	EPA Regional Screening Levels 2008	Federal Drinking Water Standards MCLs	California Drinking Water Standards MCLs	Most Stringent Screening Level[1]	Does RL Exceed Screening Level?	LCS Accuracy Control Limits (%R) Lower Limit	LCS Accuracy Control Limits (%R) Upper Limit	MS/MSD Accuracy Control Limits (%R) Lower Limit	MS/MSD Accuracy Control Limits (%R) Upper Limit	Precision Water % RPD
EPA 300.0M	Acetate	64-19-7	mg/L	0.1	--	--	--	--	--	NO	75	125	75	125	20
SM 2320 B	Alkalinity	Alkalinity	mg/L	5	--	--	--	--	--	NO	85	115	75	125	20
SM 4500-NH3 B, C, D, E, or G	Ammonia (as N)	7664-41-7	mg/L	0.5	--	--	--	--	--	NO	85	115	75	125	20
SM 2320 B	Bicarbonate	Bicarbonate	mg/L	5	--	--	--	--	--	NO	85	115	75	125	20
SM 5210 B	BOD	BOD	mg/L	--	--	--	--	--	--	NO	--	--	--	--	10
EPA 300.0	Bromide	Bromide	mg/L	0.5	--	--	--	--	--	NO	90	110	80	120	20
EPA 300.0M	Butyrate	107-92-6	mg/L	0.1	--	--	--	--	--	NO	75	125	75	125	20
SM 4500-CO_2	Carbon dioxide	124-38-9	mg/L	5	--	--	--	--	--	NO	--	--	--	--	20
SM 2320 B	Carbonate	Carbonate	mg/L	5	--	--	--	--	--	NO	85	115	75	125	20
EPA 300.0/SM 4500-Cl B, C, E, or D	Chloride	Chloride	mg/L	0.5	--	--	--	--	--	NO	90	110	80	120	20
SM 2120 E	Color	Color	Color unit	1	--	--	--	--	--	NO	90	110	90	110	20
SM 4500-CN	Cyanide	57-12-5	mg/L	0.01							85	115	75	125	20
EPA 300.0/SM 4500-F B, C, D, or E	Fluoride	Fluoride	mg/L	0.5	--	2.2	4	--	2.2	NO	90	110	80	120	20
SM 2340 B or C	Hardness	Hardness	mg/L	2	--	--	--	--	--	NO	75	125	75	125	20
SM 2320 B	Hydroxide alkalinity	Hydroxide	mg/L	5	--	--	--	--	--	NO	85	115	75	125	20
EPA 300.0M	Lactate	50-21-5	mg/L	0.1	--	--	--	--	--	NO	75	125	75	125	20
EPA 300.0	Nitrate (as N)	14797-55-8	mg/L	0.5	25	58	10	--	10	NO	90	110	80	120	20
EPA 353.2/SM 4500-NO_3 E, F or H	Nitrate/nitrite (as N)	NO3NO2N	mg/L	0.5	--	--	--	--	--	NO	85	115	75	125	20
EPA 300.0/SM 4500-NO2 B, F or E	Nitrite (as N)	14797-65-8	mg/L	0.5	--	3.7	1	--	1	NO	90	110	80	120	20
SM 5310 B, C, or D	Organic carbon	DOC/TOC	mg/L	0.3	--	--	--	--	--	NO	85	115	75	125	10
EPA 300.0/SM 4500-P E or F	Ortho phosphate	Ortho Phosphate	mg/L	0.02	--	--	--	--	--	NO	90	110	80	120	20
EPA 314.0	Perchlorate	Perchlorate	µg/L	4	--	26	--	--	26	NO	85	115	85	115	20
SM 4500-H+ B SW 9040	pH	pH	pH units	0.1	--	--	--	--	--	NO	--	--	--	--	20
EPA 300.0M	Propionate	79-09-4	mg/L	0.1	--	--	--	--	--	NO	75	125	75	125	20
EPA 300.0M	Pyruvate	127-17-3	mg/L	0.1	--	--	--	--	--	NO	75	125	75	125	20
SM 4500-SiO_2 E	Reactive silica	7631-86-9	mg/L	1	--	--	--	--	--	NO	75	125	75	125	20
SM 4500-SiO_2 C	Silica	7631-86-9	mg/L	0.04	--	--	--	--	--	NO	75	125	75	125	20
SILICA_CALC	Soluble silica	7631-86-9	mg/L	0.04	--	--	--	--	--	NO	75	125	75	125	20
EPA 120.1/SW 9050	Specific conductance	Conductance	µmhos/cm	2	--	--	--	--	--	NO	85	115	75	125	20
EPA 300.0/SM 4110 B	Sulfate	Sulfate	mg/L	0.5	--	--	--	--	--	NO	90	110	80	120	20
SM 4500-S^{-2} F, E, D, or G	Sulfide	Sulfide	mg/L	0.05	--	--	--	--	--	NO	75	125	75	125	20
SM 2540 C	Total dissolved solids	TDS	mg/L	10	--	--	--	--	--	NO	75	125	--	--	10
SM 4500-N_{org} B or C	Total kjeldahl nitrogen	7727-37-9	mg/L	--	--	--	--	--	--	NO	75	125	75	125	20
EPA 365.1/EPA 365.3 SM 4500-P E or F	Total phosphorous	Total Phosphorous	mg/L	0.02	--	--	--	--	--	NO	75	125	75	125	20
SM 2540 D	Total suspended solids	TSS	mg/L	4	--	--	--	--	--	NO	75	125	75	125	10
EPA 180.1/SM 2130 B	Turbidity	TURB	NTU	0.1	--	--	--	--	--	NO	--	--	--	--	20
SW 6020A/EPA 200.8	Aluminum	7429-90-5	ug/L	50	16,000	37,000	50*	1,000	50	NO	85	115	75	125	20
SW 6020A/EPA 200.8	Antimony	7440-36-0	ug/L	2	6	15	6	--	6	NO	85	115	75	125	20
SW 6020A/EPA 200.8	Arsenic	7440-38-2	ug/L	0.5 (0.1)	0.045	0.045	10	--	0.045	YES	85	115	75	125	20
SW 6020A/EPA 200.8	Barium	7440-39-3	ug/L	2	2,900	7,300	2,000	1,000	1,000	NO	85	115	75	125	20
SW 6020A/EPA 200.8	Beryllium	7440-41-7	ug/L	0.5	16	73	4	--	4	NO	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Boron	7440-42-8	ug/L	50	?	?	?	?	?	?	85	115	75	125	20
SW 6020A/EPA 200.8	Cadmium	7440-43-9	ug/L	1	--	18	5	--	5	NO	85	115	75	125	20
SW 6010B/EPA 200.7	Calcium	7440-70-2	ug/L	100	--	--	--	--	--	NO	85	115	75	125	20
SW 6020A/EPA 200.8	Chromium	7440-47-3	ug/L	1	--	--	100	50	50	NO	85	115	75	125	20
EPA 218.6	Chromium, Hexavalent	18540-29-9	ug/L	0.2	0.031	110	100	--	0.031	YES	90	110	90	110	20
EPA 218.6 LL	Chromium, Hexavalent, LL	18540-29-9	ug/L	0.06	0.031	110	100	--	0.031	YES	90	110	90	110	20
SM 3500-Cr	Chromium, Hexavalent	18540-29-9	ug/L	10	0.031	110	100	--	0.031	YES	85	115	80	120	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Cobalt	7440-48-4	ug/L	5	4.7	11	--	--	4.7	YES	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Copper	7440-50-8	ug/L	1	620	1,500	1,000*	--	620	NO	85	115	75	125	20
SW 6010B or C/EPA 200.7	Iron	7439-89-6	ug/L	20	11,000	26,000	300*	--	300	NO	85	115	75	125	20
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Lead	7439-92-1	ug/L	1	--	--	15	--	15	NO	85	115	75	125	20
SW 6010B or C/EPA 200.7	Magnesium	7439-95-4	ug/L	100	--	--	--	--	--	NO	85	115	75	125	20
SW 6020A/EPA 200.8	Manganese	7439-96-5	ug/L	0.5	--	880	50*	--	50	NO	85	115	75	125	20
SW 7070A/EPA 245.1/ EPA 6020A?	Mercury	7439-97-6	ug/L	0.2	0.63	0.63	2	--	0.63	NO	75	125	75	125	20
SW 6020A/EPA 200.8	Molybdenum	7439-98-7	ug/L	2	78	180	--	--	78	NO	85	115	75	125	20
SW 6020A/EPA 200.8	Nickel	7440-02-0	ug/L	2	300	730	100*	100	100	NO	85	115	75	125	20
SW 6010B or C/EPA 200.7	Potassium	7440-09-7	ug/L	100	--	--	--	--	--	NO	85	115	75	125	20
SW 6020A/EPA 200.8	Selenium	7782-49-2	ug/L	10	78	180	50	--	50	NO	85	115	75	125	20
SW 6020A/EPA 200.8	Silver	7440-22-4	ug/L	5	71	180	--	--	71	NO	85	115	75	125	20
SW 6010B or C/EPA 200.7	Sodium	7440-23-5	ug/L	100	--	--	--	--	--	NO	85	115	75	125	20
EPA 200.7/EPA 200.8	Strontium	7440-24-6	ug/L	50	9,300	22,000	--	--	9,300	NO	85	115	75	125	20
SW 6020A/EPA 200.8	Thallium	7440-28-0	ug/L	1	0.16	2.4	2	--	0.16	YES	85	115	75	125	20
SW 6020A/EPA 200.8	Uranium	7440-61-1	ug/L	5	230	--	30	--	30	NO	85	115	75	125	20
SW 6020A/EPA 200.8	Vanadium	7440-62-2	ug/L	5	--	2.6	--	--	2.6	YES	85	115	75	125	20

Table A-2
Reporting Limits, Accuracy, and Precession Limits for Groundwate
PG&E Program Quality Assurance Project Plan

Method	Constituent	CAS	Units	QAPP RL	EPA Regional Screening Levels May 2012	EPA Regional Screening Levels 2008	Federal Drinking Water Standards MCLs	California Drinking Water Standards MCLs	Most Stringent Screening Level[1]	Does RL Exceed Screening Level?	LCS Accuracy Control Limits (%R) Lower Limit	LCS Accuracy Control Limits (%R) Upper Limit	MS/MSD Accuracy Control Limits (%R) Lower Limit	MS/MSD Accuracy Control Limits (%R) Upper Limit	Precision Water % RPD
SW 6010B or C/SW 6020A/EPA 200.7/EPA 200.8	Zinc	7440-66-6	ug/L	20	4,700	11,000	5,000*	--	4,700	NO	85	115	75	125	20
SW 8015B or C or D	Motor Oil	TPH-motor oil	mg/L	1	--	--	--	--	--	NO	50	150	50	150	30
SW 8015B or C or D	TPH-Diesel	TPH-diesel	mg/L	0.5	--	--	--	--	--	NO	61	143	61	143	30
SW 8015B or C or D	TPH-Gasoline	TPH-gasoline	mg/L	0.1	--	--	--	--	--	NO	67	136	67	136	30
SW 8081A or B	4,4'-DDD	72-54-8	ug/L	0.1	0.28	0.28	--	--	0.28	NO	50	139	50	139	30
SW 8081A or B	4,4'-DDE	72-55-9	ug/L	0.1	0.2	0.2	--	--	0.2	NO	48	137	48	137	30
SW 8081A or B	4,4'-DDT	50-29-3	ug/L	0.1	0.2	0.2	--	--	0.2	NO	47	138	47	138	30
SW 8081A or B	Aldrin	309-00-2	ug/L	0.1	0.00021	0.004	--	--	0.00021	YES	42	138	42	138	30
SW 8081A or B	alpha-HCH	319-84-6	ug/L	0.1	0.0062	0.011	--	--	0.0062	YES	60	128	60	128	30
SW 8081A or B	alpha-Chlordane	5103-71-9	ug/L	0.1	--	--	2	--	2	NO	63	123	63	123	30
SW 8081A or B	beta-HCH	319-85-7	ug/L	0.1	0.022	0.037	--	--	0.022	YES	66	126	66	126	30
SW 8081A or B	delta-HCH	319-86-8	ug/L	0.1	--	--	--	--	--	NO	46	136	46	136	30
SW 8081A or B	Dieldrin	60-57-1	ug/L	0.1	0.0015	0.0042	--	--	0.0015	YES	62	129	62	129	30
SW 8081A or B	Endosulfan I	959-98-8	ug/L	0.1	--	--	--	--	--	NO	49	120	49	120	30
SW 8081A or B	Endosulfan II	33213-65-9	ug/L	0.1	--	--	--	--	--	NO	42	130	42	130	30
SW 8081A or B	Endosulfan sulfate	1031-07-8	ug/L	0.1	--	--	--	--	--	NO	54	137	54	137	30
SW 8081A or B	Endrin	72-20-8	ug/L	0.1	1.7	11	2	--	1.7	NO	56	134	56	134	30
SW 8081A or B	Endrin aldehyde	7421-93-4	ug/L	0.1	--	--	--	--	--	NO	56	137	56	137	30
SW 8081A or B	gamma-HCH (lindane)	58-89-9	ug/L	0.1	0.036	0.061	0.2	--	0.036	YES	30	146	30	146	30
SW 8081A or B	gamma-Chlordane	5103-74-2	ug/L	0.1	--	--	2	--	2	NO	67	120	67	120	30
SW 8081A or B	Heptachlor	76-44-8	ug/L	0.1	0.0018	0.015	0.4	--	0.0018	YES	51	128	51	128	30
SW 8081A or B	Heptachlor Epoxide	1024-57-3	ug/L	0.1	0.0033	0.0074	0.2	--	0.0033	YES	62	131	62	131	30
SW 8081A or B	Methoxychlor	72-43-5	ug/L	0.5	27	180	40	--	27	NO	56	150	56	150	30
SW 8081A or B	Toxaphene	8001-35-2	ug/L	1	0.013	0.061	3	--	0.013	YES	41	126	41	126	30
SW 8082 or A	Aroclor-1016	12674-11-2	ug/L	0.5	0.96	0.96	0.5	--	0.5	NO	40	144	40	144	30
SW 8082 or A	Aroclor-1221	11104-28-2	ug/L	0.5	0.0043	0.0068	0.5	--	0.0043	YES	41	136	41	136	30
SW 8082 or A	Aroclor-1232	11141-16-5	ug/L	0.5	0.0043	0.0068	0.5	--	0.0043	YES	41	136	41	136	30
SW 8082 or A	Aroclor-1242	53469-21-9	ug/L	0.5	0.034	0.034	0.5	--	0.034	YES	39	150	39	150	30
SW 8082 or A	Aroclor-1248	12672-29-6	ug/L	0.5	0.034	0.034	0.5	--	0.034	YES	41	136	41	136	30
SW 8082 or A	Aroclor-1254	11097-69-1	ug/L	0.5	0.034	0.034	0.5	--	0.034	YES	29	141	29	141	30
SW 8082 or A	Aroclor-1260	11096-82-5	ug/L	0.5	0.034	0.034	0.5	--	0.034	YES	45	145	45	145	30
SW 8151A	2,4-D	94-75-7	ug/L	10	130	370	70	--	70	NO	39	120	39	120	30
SW 8151A	2,4-DB	94-82-6	ug/L	20	91	290	--	--	91	NO	44	120	44	120	30
SW 8151A	2,4,5-T	93-76-5	ug/L	20	120	370	--	--	120	NO	44	122	44	122	30
SW 8151A	2,4,5-TP	93-72-1	ug/L	10	84	290	--	--	84	NO	49	126	49	126	30
SW 8151A	Dalapon	75-99-0	ug/L	30	470	1,100	200	--	200	NO	40	120	40	120	30
SW 8151A	Dicamba	1918-00-9	ug/L	30	440	1,100	--	--	440	NO	60	120	60	120	30
SW 8151A	Dichloroprop	120-36-5	ug/L	20	--	--	--	--	--	NO	68	122	68	122	30
SW 8151A	Dinoseb	88-85-7	ug/L	3	11	37	7	--	7	NO	28	115	28	115	30
SW 8151A	MCPA	94-74-6	ug/L	100	5.7	18	--	--	5.7	YES	62	144	62	144	30
SW 8151A	MCPP	7085-19-0	ug/L	100	--	37	--	--	37	YES	60	133	60	133	30
SW 8260B or C	1,1,1,2-Tetrachloroethane	630-20-6	ug/L	0.5	0.5	0.52	--	--	0.5	NO	81	129	81	129	20
SW 8260B or C	1,1,1-Trichloroethane (TCA)	71-55-6	ug/L	1	7,500	9,100	200	200	200	NO	67	132	67	132	20
SW 8260B or C	1,1,2,2-Tetrachloroethane	79-34-5	ug/L	0.5	0.066	0.067	--	1	0.066	YES	63	128	63	128	20
SW 8260B or C	1,1,2-Trichloroethane	79-00-5	ug/L	1	0.24	0.24	5	5	0.24	YES	75	125	75	125	20
SW 8260B or C	1,1,2-Trichlorotrifluoroethane (Freon 113)	76-13-1	ug/L	1	53,000	59,000	--	1,200	1,200	NO	75	125	75	125	20
SW 8260B or C	1,1-Dichloroethane	75-34-3	ug/L	1	2.4	2.4	--	5	2.4	NO	69	133	69	133	20
SW 8260B or C	1,1-Dichloroethene	75-35-4	ug/L	1	260	340	7	6	6	NO	68	130	68	130	20
SW 8260B or C	1,1-Dichloropropene	563-58-6	ug/L	1	--	--	--	--	--	NO	73	132	73	132	20
SW 8260B or C	1,2,3-Trichlorobenzene	87-61-6	ug/L	1	5.2	--	--	--	5.2	NO	67	137	67	137	20
SW 8260B or C	1,2,3-Trichloropropane	96-18-4	ug/L	1	0.00065	0.0096	--	--	0.00065	YES	73	124	73	124	20
SW 8260B or C	1,2,4-Trichlorobenzene	120-82-1	ug/L	1	0.99	8.2	70	5	0.99	YES	66	134	66	134	20
SW 8260B or C	1,2,4-Trimethylbenzene	95-63-6	ug/L	1	15	15	--	--	15	NO	74	132	74	132	20
SW 8260B or C	1,2-Dibromo-3-Chloropropane	96-12-8	ug/L	2	0.00032	0.00032	0.2	--	0.00032	YES	50	132	50	132	20
SW 8260B or C	1,2-Dibromoethane (EDB)	106-93-4	ug/L	1	0.0065	0.0065	0.05	--	0.0065	YES	80	121	80	121	20
SW 8260B or C	1,2-Dichlorobenzene	95-50-1	ug/L	1	280	370	600	600	280	NO	71	122	71	122	20
SW 8260B or C	1,2-Dichloroethane (EDC)	107-06-2	ug/L	0.5	0.15	0.15	5	0.5	0.15	YES	69	132	69	132	20
SW 8260B or C	1,2-Dichloropropane	78-87-5	ug/L	1	0.38	0.39	5	5	0.38	YES	75	125	75	125	20
SW 8260B or C	1,3,5-Trimethylbenzene	108-67-8	ug/L	1	87	12	--	--	12	NO	74	131	74	131	20
SW 8260B or C	1,3-Dichlorobenzene	541-73-1	ug/L	1	--	--	--	--	--	NO	75	124	75	124	20
SW 8260B or C	1,3-Dichloropropane	142-28-9	ug/L	1	290	730	--	--	290	NO	73	126	73	126	20
SW 8260B or C	1,4-Dichlorobenzene	106-46-7	ug/L	0.5	0.42	0.43	75	5	0.42	YES	74	123	74	123	20
SW 8260B or C	2,2-Dichloropropane	594-20-7	ug/L	1	--	--	--	--	--	NO	69	137	69	137	20
SW 8260B or C	2-Butanone (MEK)	78-93-3	ug/L	10	4,900	7,100	--	--	4,900	NO	49	136	49	136	20
SW 8260B or C	2-Chlorotoluene	95-49-8	ug/L	1	180	730	--	--	180	NO	73	126	73	126	20
SW 8260B or C	4-Chlorotoluene	106-43-4	ug/L	1	190	2,600	--	--	190	NO	74	128	74	128	20

Table A-2
Reporting Limits, Accuracy, and Precession Limits for Groundwate
PG&E Program Quality Assurance Project Plan

Method	Constituent	CAS	Units	QAPP RL	EPA Regional Screening Levels May 2012	EPA Regional Screening Levels 2008	Federal Drinking Water Standards MCLs	California Drinking Water Standards MCLs	Most Stringent Screening Level[1]	Does RL Exceed Screening Level?	LCS Accuracy Control Limits (%R) Lower Limit	LCS Accuracy Control Limits (%R) Upper Limit	MS/MSD Accuracy Control Limits (%R) Lower Limit	MS/MSD Accuracy Control Limits (%R) Upper Limit	Precision Water % RPD
SW 8260B or C	4-Isopropyltoluene	99-87-6	ug/L	1	--	--	--	--	--	NO	73	130	73	130	20
SW 8260B or C	4-Methyl-2-Pentanone	108-10-1	ug/L	10	1,000	2,000	--	--	1,000	NO	58	134	58	134	20
SW 8260B or C	Acetone	67-64-1	ug/L	10	12,000	22,000	--	--	12,000	NO	40	135	40	135	20
SW 8260B or C	Acrolein	107-02-8	ug/L	20	0.041	0.042	--	--	0.041	YES	75	125	75	125	20
SW 8260B or C	Acrylonitrile	107-13-1	ug/L	20	0.045	0.045	--	--	0.045	YES	75	125	75	125	20
SW 8260B or C	Benzene	71-43-2	ug/L	0.4	0.39	0.41	5	1	0.39	YES	81	122	81	122	20
SW 8260B or C	Bromobenzene	108-86-1	ug/L	1	54	20	--	--	20	NO	76	124	76	124	20
SW 8260B or C	Bromochloromethane	74-97-5	ug/L	1	83	--	--	--	83	NO	65	129	65	129	20
SW 8260B or C	Bromodichloromethane	75-27-4	ug/L	0.5	0.12	1.1	100	--	0.12	YES	76	121	76	121	20
SW 8260B or C	Bromoform	75-25-2	ug/L	1	7.9	8.5	100	--	7.9	NO	69	128	69	128	20
SW 8260B or C	Bromomethane	74-83-9	ug/L	3	7	8.7	--	--	7	NO	53	141	53	141	20
SW 8260B or C	Carbon Disulfide	75-15-0	ug/L	1	720	1,000	--	--	720	NO	75	125	75	125	20
SW 8260B or C	Carbon Tetrachloride	56-23-5	ug/L	1	0.39	0.2	5	0.5	0.2	YES	66	138	66	138	20
SW 8260B or C	Chlorobenzene	108-90-7	ug/L	0.5	72	91	100	--	72	NO	81	122	81	122	20
SW 8260B or C	Chloroethane	75-00-3	ug/L	1	21,000	21,000	--	--	21,000	NO	58	133	58	133	20
SW 8260B or C	Chloroform	67-66-3	ug/L	1	0.19	0.19	100	--	0.19	YES	69	128	69	128	20
SW 8260B or C	Chloromethane	74-87-3	ug/L	1	190	1.8	--	--	1.8	NO	56	131	56	131	20
SW 8260B or C	cis-1,2-Dichloroethene	156-59-2	ug/L	1	28	370	70	6	6	NO	72	126	72	126	20
SW 8260B or C	cis-1,3-Dichloropropene	10061-01-5	ug/L	0.5	--	--	--	--	--	NO	69	131	69	131	20
SW 8260B or C	Dibromochloromethane	124-48-1	ug/L	0.5	0.15	0.8	100	--	0.15	YES	66	133	66	133	20
SW 8260B or C	Dibromomethane	74-95-3	ug/L	1	7.9	370	--	--	7.9	NO	76	125	76	125	20
SW 8260B or C	Dichlorodifluoromethane (Freon 12)	75-71-8	ug/L	1	190	390	--	--	190	NO	53	153	53	153	20
SW 8260B or C	Ethylbenzene	100-41-4	ug/L	1	1.3	1.5	700	--	1.3	NO	73	127	73	127	20
SW 8260B or C	Hexachlorobutadiene	87-68-3	ug/L	0.6	0.26	0.86	--	--	0.26	YES	67	131	67	131	20
SW 8260B or C	Isopropylbenzene (Cumene)	98-82-8	ug/L	1	390	680	--	--	390	NO	75	127	75	127	20
SW 8260B or C	Methylene chloride	75-09-2	ug/L	1	9.9	4.8	5	5	4.8	NO	63	137	63	137	20
SW 8260B or C	Naphthalene	91-20-3	ug/L	1	0.14	0.14	--	--	0.14	YES	54	138	54	138	20
SW 8260B or C	n-Butylbenzene	104-51-8	ug/L	1	780	--	--	--	780	NO	69	137	69	137	20
SW 8260B or C	n-Propylbenzene	103-65-1	ug/L	1	530	--	--	--	530	NO	72	129	72	129	20
SW 8260B or C	sec-Butylbenzene	135-98-8	ug/L	1	--	--	--	--	--	NO	72	127	72	127	20
SW 8260B or C	Styrene	100-42-5	ug/L	1	1,100	1,600	100	100	100	NO	65	134	65	134	20
SW 8260B or C	tert-Butyl Methyl Ether (MTBE)	1634-04-4	ug/L	5	12	12	--	13	12	NO	65	123	65	123	20
SW 8260B or C	tert-Butylbenzene	98-06-6	ug/L	1	--	--	--	--	--	NO	70	129	70	129	20
SW 8260B or C	Tetrachloroethene	127-18-4	ug/L	1	9.7	0.11	5	5	0.11	YES	66	128	66	128	20
SW 8260B or C	Toluene	108-88-3	ug/L	1	860	2,300	1,000	150	150	NO	77	122	77	122	20
SW 8260B or C	trans-1,2-Dichloroethene	156-60-5	ug/L	1	86	110	100	10	10	NO	63	137	63	137	20
SW 8260B or C	trans-1,3-Dichloropropene	10061-02-6	ug/L	1	--	--	--	--	--	NO	59	135	59	135	20
SW 8260B or C	Trichloroethene	79-01-6	ug/L	1	0.44	1.7	5	5	0.44	YES	70	127	70	127	20
SW 8260B or C	Trichlorofluoromethane (Freon 11)	75-69-4	ug/L	1	1,100	1,300	--	150	150	NO	57	129	57	129	20
SW 8260B or C	Vinyl Chloride	75-01-4	ug/L	1	0.015	0.016	2	0.5	0.015	YES	50	134	50	134	20
SW 8260B or C	Xylenes, Total	1330-20-7	ug/L	2	190	200	10,000	1,750	190	NO	75	125	75	125	20
SW 8260B or C	m -Xylene	108-38-3	ug/L	2	190	1,400	--	--	190	NO	76	128	76	128	20
SW 8260B or C	o-Xylene	95-47-6	ug/L	1	190	1,400	--	--	190	NO	80	121	80	121	20
SW 8260B or C	p-Xylene	106-42-3	ug/L	1	190	1,500	--	--	190	NO	76	128	76	128	20
SW 8270C or D	1,2,4-Trichlorobenzene	120-82-1	ug/L	10	0.99	8.2	70	--	0.99	YES	37	120	37	120	20
SW 8270C or D	1,2-Dichlorobenzene	95-50-1	ug/L	10	280	370	600	--	280	NO	33	120	33	120	20
SW 8270C or D	1,3-Dichlorobenzene	541-73-1	ug/L	10	--	--	--	--	--	NO	32	120	32	120	20
SW 8270C or D	1,4-Dichlorobenzene	106-46-7	ug/L	10	0.42	0.43	75	--	0.42	YES	32	120	32	120	20
SW 8270C or D	2,4,5-Trichlorophenol	95-95-4	ug/L	50	890	3,700	--	--	890	NO	49	120	49	120	20
SW 8270C or D	2,4,6-Trichlorophenol	88-06-2	ug/L	10	3.5	6.1	--	--	3.5	YES	49	126	49	126	20
SW 8270C or D	2,4-Dichlorophenol	120-83-2	ug/L	10	35	110	--	--	35	NO	48	120	48	120	20
SW 8270C or D	2,4-Dimethylphenol	105-67-9	ug/L	10	270	730	--	--	270	NO	28	120	28	120	20
SW 8270C or D	2,4-Dinitrophenol	51-28-5	ug/L	10	30	73	--	--	30	NO	25	130	25	130	20
SW 8270C or D	2,4-Dinitrotoluene	121-14-2	ug/L	10	0.2	73	--	--	0.2	YES	51	120	51	120	20
SW 8270C or D	2,6-Dinitrotoluene	606-20-2	ug/L	10	15	37	--	--	15	NO	49	120	49	120	20
SW 8270C or D	2-Chloronaphthalene	91-58-7	ug/L	10	550	2,900	--	--	550	NO	49	120	49	120	20
SW 8270C or D	2-Chlorophenol	95-57-8	ug/L	10	71	180	--	--	71	NO	37	120	37	120	20
SW 8270C or D	2-Methylnaphthalene	91-57-6	ug/L	10	27	150	--	--	27	NO	46	120	46	120	20
SW 8270C or D	2-Methylphenol (o-Cresol)	95-48-7	ug/L	10	720	1,800	--	--	720	NO	38	120	38	120	20
SW 8270C or D	2-Nitroaniline	88-74-4	ug/L	50	150	--	--	--	150	NO	48	120	48	120	20
SW 8270C or D	2-Nitrophenol	88-75-5	ug/L	10	--	--	--	--	--	NO	39	123	39	123	20
SW 8270C or D	3,3'-Dichlorobenzidine	91-94-1	ug/L	20	0.11	0.15	--	--	0.11	YES	20	120	20	120	20
SW 8270C or D	3-Nitroaniline	99-09-2	ug/L	50	--	3.2	--	--	3.2	YES	20	126	20	126	20
SW 8270C or D	4,6-Dinitro-2-methylphenol	534-52-1	ug/L	50	1.2	3.7	--	--	1.2	YES	40	130	40	130	20
SW 8270C or D	4-Bromophenyl Phenyl Ether	101-55-3	ug/L	10	--	--	--	--	--	NO	52	120	52	120	20
SW 8270C or D	4-Chloro-3-methylphenol	59-50-7	ug/L	20	1,100	--	--	--	1,100	NO	47	120	47	120	20

Table A-2
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PG&E Program Quality Assurance Project Plan

Method	Constituent	CAS	Units	QAPP RL	EPA Regional Screening Levels May 2012	EPA Regional Screening Levels 2008	Federal Drinking Water Standards MCLs	California Drinking Water Standards MCLs	Most Stringent Screening Level[1]	Does RL Exceed Screening Level?	LCS Accuracy Control Limits (%R) Lower Limit	LCS Accuracy Control Limits (%R) Upper Limit	MS/MSD Accuracy Control Limits (%R) Lower Limit	MS/MSD Accuracy Control Limits (%R) Upper Limit	Precision Water % RPD
SW 8270C or D	4-Chloroaniline	106-47-8	ug/L	20	0.32	1.2	--	--	0.32	YES	20	120	20	120	20
SW 8270C or D	4-Chlorophenyl phenyl ether	7005-72-3	ug/L	10	--	--	--	--	--	NO	50	120	50	120	20
SW 8270C or D	4-Methylphenol (p-Cresol)	106-44-5	ug/L	50	1,400	180	--	--	180	NO	32	120	32	120	20
SW 8270C or D	4-Nitroaniline	100-01-6	ug/L	50	3.3	3.2	--	--	3.2	YES	36	120	36	120	20
SW 8270C or D	4-Nitrophenol	100-02-7	ug/L	50	--	--	--	--	--	NO	20	120	20	120	20
SW 8270C or D	Acenaphthene	83-32-9	ug/L	10	400	2,200	--	--	400	NO	47	120	47	120	20
SW 8270C or D	Acenaphthylene	208-96-8	ug/L	10	--	--	--	--	--	NO	50	120	50	120	20
SW 8270C or D	Anthracene	120-12-7	ug/L	10	1,300	11,000	--	--	1,300	NO	54	120	54	120	20
SW 8270C or D	Benzo (a) anthracene	56-55-3	ug/L	10	0.029	0.029	--	--	0.029	YES	56	100	56	100	20
SW 8270C or D	Benzo (a) pyrene	50-32-8	ug/L	10	0.0029	0.0029	0.2	--	0.0029	YES	53	120	53	120	20
SW 8270C or D	Benzo (b) fluoranthene	205-99-2	ug/L	10	0.029	0.029	--	--	0.029	YES	45	124	45	124	20
SW 8270C or D	Benzo (g,h,i) perylene	191-24-2	ug/L	10	--	--	--	--	--	NO	38	123	38	123	20
SW 8270C or D	Benzo (k) fluoranthene	207-08-9	ug/L	10	0.29	0.29	--	--	0.29	YES	45	124	45	124	20
SW 8270C or D	Benzoic acid	65-85-0	ug/L	100	58,000	150,000	--	--	58,000	NO	20	120	20	120	20
SW 8270C or D	Benzyl alcohol	100-51-6	ug/L	20	1,500	18,000	--	--	1,500	NO	30	120	30	120	20
SW 8270C or D	bis (2-chloroethoxy) methane	111-91-1	ug/L	10	47	110	--	--	47	NO	46	120	46	120	20
SW 8270C or D	bis (2-chloroethyl) ether	111-44-4	ug/L	10	0.012	0.012	--	--	0.012	YES	37	120	37	120	20
SW 8270C or D	bis (2-chloroisopropyl) ether	108-60-1	ug/L	10	0.31	0.32	--	--	0.31	YES	26	131	26	131	20
SW 8270C or D	bis (2-ethylhexyl) phthalate	117-81-7	ug/L	10	0.071	4.8	6	--	0.071	YES	42	126	42	126	20
SW 8270C or D	Butyl benzylphthalate	85-68-7	ug/L	10	14	35	--	--	14	NO	46	120	46	120	20
SW 8270C or D	Chrysene	218-01-9	ug/L	10	2.9	2.9	--	--	2.9	YES	55	120	55	120	20
SW 8270C or D	Dibenzo (a,h) anthracene	53-70-3	ug/L	10	0.0029	0.0029	--	--	0.0029	YES	42	127	42	127	20
SW 8270C or D	Dibenzofuran	132-64-9	ug/L	10	5.8	--	--	--	5.8	YES	54	120	54	120	20
SW 8270C or D	Diethyl phthalate	84-66-2	ug/L	10	11,000	29,000	--	--	11,000	NO	41	120	41	120	20
SW 8270C or D	Dimethyl phthalate	131-11-3	ug/L	10	--	--	--	--	--	NO	25	127	25	127	20
SW 8270C or D	Di-n-butylphthalate	84-74-2	ug/L	10	670	3,700	--	--	670	NO	54	120	54	120	20
SW 8270C or D	Di-n-octylphthalate	117-84-0	ug/L	10	--	--	--	--	--	NO	37	137	37	137	20
SW 8270C or D	Fluoranthene	206-44-0	ug/L	10	630	1,500	--	--	630	NO	54	120	54	120	20
SW 8270C or D	Fluorene	86-73-7	ug/L	10	220	1,500	--	--	220	NO	50	120	50	120	20
SW 8270C or D	Hexachlorobenzene	118-74-1	ug/L	10	0.042	0.042	1	--	0.042	YES	52	120	52	120	20
SW 8270C or D	Hexachlorobutadiene	87-68-3	ug/L	10	0.26	0.86	--	--	0.26	YES	27	120	27	120	20
SW 8270C or D	Hexachloroethane	67-72-1	ug/L	10	0.79	4.8	--	--	0.79	YES	28	120	28	120	20
SW 8270C or D	Indeno (1,2,3-c,d) pyrene	193-39-5	ug/L	10	0.029	0.029	--	--	0.029	YES	43	125	43	125	20
SW 8270C or D	Isophorone	78-59-1	ug/L	10	67	71	--	--	67	NO	50	120	50	120	20
SW 8270C or D	Naphthalene	91-20-3	ug/L	10	0.14	0.14	--	--	0.14	YES	39	120	39	120	20
SW 8270C or D	Nitrobenzene	98-95-3	ug/L	10	0.12	3.4	--	--	0.12	YES	44	120	44	120	20
SW 8270C or D	n-Nitrosodi-n-propylamine	621-64-7	ug/L	10	0.0093	0.0096	--	--	0.0093	YES	34	128	34	128	20
SW 8270C or D	n-Nitrosodiphenylamine	86-30-6	ug/L	10	10	14	--	--	10	NO	48	120	48	120	20
SW 8270C or D	Pentachlorophenol	87-86-5	ug/L	50	0.17	0.56	1	--	0.17	YES	38	120	38	120	20
SW 8270C or D	Phenanthrene	85-01-8	ug/L	10	--	--	--	--	--	NO	51	120	51	120	20
SW 8270C or D	Phenol	108-95-2	ug/L	10	4,500	11,000	--	--	4,500	NO	20	120	20	120	20
SW 8270C or D	Pyrene	129-00-0	ug/L	10	87	1,100	--	--	87	NO	49	128	49	128	20
SW 8270SIM	1-methylnaphthalene	90-12-0	ug/L	0.2	0.97	2.3	--	--	0.97	NO	35	131	35	131	30
SW 8270SIM	2-methylnaphthalene	91-57-6	ug/L	0.2	27	150	--	--	27	NO	36	121	36	121	30
SW 8270SIM	Acenaphthene	83-32-9	ug/L	0.2	400	2,200	--	--	400	NO	39	125	39	125	30
SW 8270SIM	Acenaphthylene	208-96-8	ug/L	0.2	--	--	--	--	--	NO	43	140	43	140	30
SW 8270SIM	Anthracene	120-12-7	ug/L	0.2	1,300	11,000	--	--	1,300	NO	41	132	41	132	30
SW 8270SIM	Benzo (a) anthracene	56-55-3	ug/L	0.2	0.029	0.029	--	--	0.029	YES	58	141	58	141	30
SW 8270SIM	Benzo (a) pyrene	50-32-8	ug/L	0.2	0.0029	0.0029	0.2	--	0.0029	YES	31	142	31	142	30
SW 8270SIM	Benzo (b) fluoranthene	205-99-2	ug/L	0.2	0.029	0.029	--	--	0.029	YES	42	156	42	156	30
SW 8270SIM	Benzo (g,h,i) perylene	191-24-2	ug/L	0.2	--	--	--	--	--	NO	12	171	12	171	30
SW 8270SIM	Benzo (k) fluoranthene	207-08-9	ug/L	0.2	0.29	0.29	--	--	0.29	NO	49	165	49	165	30
SW 8270SIM	Chrysene	218-01-9	ug/L	0.2	2.9	2.9	--	--	2.9	NO	51	155	51	155	30
SW 8270SIM	Dibenzo (a,h) anthracene	53-70-3	ug/L	0.2	0.0029	0.0029	--	--	0.0029	YES	28	153	28	153	30
SW 8270SIM	Fluoranthene	206-44-0	ug/L	0.2	630	1,500	--	--	630	NO	47	158	47	158	30
SW 8270SIM	Fluorene	86-73-7	ug/L	0.2	220	1,500	--	--	220	NO	40	140	40	140	30
SW 8270SIM	Indeno (1,2,3-c,d) pyrene	193-39-5	ug/L	0.2	0.029	0.029	--	--	0.029	YES	20	167	20	167	30
SW 8270SIM	Naphthalene	91-20-3	ug/L	0.2	0.14	0.14	--	--	0.14	YES	39	125	39	125	30
SW 8270SIM	Phenanthrene	85-01-8	ug/L	0.2	--	--	--	--	--	NO	46	144	46	144	30
SW 8270SIM	Pyrene	129-00-0	ug/L	0.2	87	1,100	--	--	87	NO	39	158	39	158	30
CF-IRMS	D18O	D18O	0/00	--	--	--	--	--	--	NO	--	--	--	--	20
CF-IRMS	DD	DD	0/00	--	--	--	--	--	--	NO	--	--	--	--	20
SM 7110 C	Gross alpha	Gross alpha	pCi/L	3	--	--	15	15	15	NO	--	--	--	--	20
EPA 900.0	Gross beta	Gross beta	pCi/L	4	--	--	--	4	4	NO	--	--	--	--	20
EPA 903.1	Radium-226	013982-63-3	pCi/L	1	--	--	5	--	5	NO	--	--	--	--	20
EPA 904.0	Radium-228	015262-20-1	pCi/L	1	--	--	5	--	5	NO	--	--	--	--	20

Table A-2
Reporting Limits, Accuracy, and Precession Limits for Groundwate
PG&E Program Quality Assurance Project Plan

Method	Constituent	CAS	Units	QAPP RL	EPA Regional Screening Levels May 2012	EPA Regional Screening Levels 2008	Federal Drinking Water Standards MCLs	California Drinking Water Standards MCLs	Most Stringent Screening Level[1]	Does RL Exceed Screening Level?	LCS Accuracy Control Limits (%R) Lower Limit	LCS Accuracy Control Limits (%R) Upper Limit	MS/MSD Accuracy Control Limits (%R) Lower Limit	MS/MSD Accuracy Control Limits (%R) Upper Limit	Precision Water % RPD
EPA 905.0	Strontium	7440-26-4	pCi/L	2	--	--	--	8	8	NO	--	--	--	--	20
EPA 906.0	Tritium	10028-17-8	pCi/L	1,000	--	--	--	20,000	20,000	NO	--	--	--	--	20
EPA 908.0	Uranium	7440-61-1	pCi/L	1	--	--	--	20	20	NO	--	--	--	--	20
RSK-175	Carbon Dioxide	124-38-9	ug/L	5	--	--	--	--	--	NO	80	120	80	120	20
RSK-175	Ethane	74-84-0	ug/L	5	--	--	--	--	--	NO	80	120	80	120	20
RSK-175	Ethene	74-85-1	ug/L	5	--	--	--	--	--	NO	80	120	80	120	20
RSK-175	Methane	74-82-8	ug/L	5	--	--	--	--	--	NO	80	120	80	120	20

Notes:

Please keep in mind, Screening Levels are constantly revised by the EPA. The appropriate Screening levels are specific to the project, the location, the agency providing oversight, and the overall Goals of the project.

mg/L = milligrams per liter
ug/L = micrograms per liter
µmhos/cm = micromhos per centimeter
pCi/L = picocuries per liter
PCB - LCS, MS, and MSD only require Aroclor-1016 and Aroclor-1260 spikes

[1] For groundwater, most stringent of:
EPA Regional Screening Levels - 2008 and May 2012
Federal Drinking Water Standards, MCLs
*Secondary Federal Drinking Water Standards, MCLs
California Drinking Water Standards, MCLs

Table A-3
Maximum Concentrations for Title 22
PG&E Program Quality Assurance Project Plan

					CA TTCL/STLC						LCS Accuracy Control Limits (%R)		MS/MSD Accuracy Control Limits (%R)		Precision Soil
Method	Constituent	CAS	Units	TCLP Regulatory Standards	Title 22 TTLC MCL (mg/kg)	If TTLC Concentration is ≥ this value STLC Analysis Must be performed	Title 22 STLC MCL	Most Stringent Screening Level	RL	Does RL Exceed Screening Level?	Lower Limit	Upper Limit	Lower Limit	Upper Limit	% RPD
SW6010B	Antimony	7440-36-0	mg/kg	--	500	150	15	15	5	NO	80	120	75	125	20
SW6010B	Arsenic	7440-38-2	mg/kg	5	500	50	5	5	5	NO	80	120	75	125	20
SW6010B	Barium	7440-39-3	mg/kg	100	10,000	1,000	100	100	10	NO	80	120	75	125	20
SW6010B	Beryllium	7440-41-7	mg/kg	--	75	7.5	0.75	0.75	1	YES	80	120	75	125	20
SW6010B	Cadmium	7440-43-9	mg/kg	1	100	10	1	1	1	NO	80	120	75	125	20
SW6010B	Chromium	7440-47-3	mg/kg	5	2,500	50	5	5	5	NO	80	120	75	125	20
SW3060A	Chromium, Hexavalent	18540-29-9	mg/kg	--	500	50	5	5	0.4	NO	80	120	75	125	20
SW6010B	Cobalt	7440-48-4	mg/kg	--	8,000	800	80	80	10	NO	80	120	75	125	20
SW6010B	Copper	7440-50-8	mg/kg	--	2,500	250	25	25	5	NO	80	120	75	125	20
SW6010B	Lead	7439-92-1	mg/kg	5	1,000	50	5	5	5	NO	80	120	75	125	20
SW7470A	Mercury	7439-97-6	mg/kg	0.2	20	2	0.2	0.2	0.1	NO	75	125	75	125	20
SW6010B	Molybdenum	7439-98-7	mg/kg	--	3,500	3,500	350	350	10	NO	80	120	75	125	20
SW6010B	Nickel	7440-02-0	mg/kg	--	2,000	200	20	20	5	NO	80	120	75	125	20
SW6010B	Selenium	7782-49-2	mg/kg	1	100	10	1	1	5	YES	80	120	75	125	20
SW6010B	Silver	7440-22-4	mg/kg	5	500	50	5	5	5	NO	80	120	75	125	20
SW6010B	Thallium	7440-28-0	mg/kg	--	700	70	7	7	5	NO	80	120	75	125	20
SW6010B	Vanadium	7440-62-2	mg/kg	--	2,400	240	24	24	5	NO	80	120	75	125	20
SW6010B	Zinc	7440-66-6	mg/kg	--	5,000	2,500	250	250	10	NO	80	120	75	125	20
SW8260B	Benzene	71-43-2	mg/L	0.5	--	--	--	0.5	--	YES	--	--	--	--	--
SW8260B	Carbon tetrachloride	56-23-5	mg/L	0.5	--	--	--	0.5	--	YES	--	--	--	--	--
SW8260B	Chlorobenzene	108-90-7	mg/L	100	--	--	--	100	--	YES	--	--	--	--	--
SW8260B	Chloroform	67-66-3	mg/L	6	--	--	--	6	--	YES	--	--	--	--	--
SW8260B	o-Cresol (2-Methylphenol)	95-48-7	mg/L	200	--	--	--	200	--	YES	--	--	--	--	--
SW8260B	m-Cresol	108-39-4	mg/L	200	--	--	--	200	--	YES	--	--	--	--	--
SW8260B	p-Cresol (4-Methylphenol)	106-44-5	mg/L	200	--	--	--	200	--	YES	--	--	--	--	--
SW8260B	Total Cresols		mg/L	200	--	--	--	200	--	YES	--	--	--	--	--
SW8260B	1,4-Dichlorobenzene	106-46-7	mg/L	7.5	--	--	--	7.5	--	YES	--	--	--	--	--
SW8260B	1,2-Dichloroethane (EDC)	107-06-2	mg/L	0.5	--	--	--	0.5	--	YES	--	--	--	--	--
SW8260B	1,1-Dichloroethylene	75-35-4	mg/L	0.7	--	--	--	0.7	--	YES	--	--	--	--	--
SW8260B	Hexachlorobutadiene	87-68-3	mg/L	0.5	--	--	--	0.5	--	YES	--	--	--	--	--
SW8260B	Tetrachloroethylene (PCE)	127-18-4	mg/L	0.7	2,040	--	204	0.7	--	YES	--	--	--	--	--
SW8260B	Vinyl chloride	75-01-4	mg/L	0.2	--	--	--	0.2	--	YES	--	--	--	--	--
SW8260B	Trichloroethylene (TCE)	79-01-6	mg/L	0.5	--	--	--	0.5	--	YES	--	--	--	--	--
SW8260B	2-Butanone (MEK)	78-93-3	mg/L	200	--	--	--	200	--	YES	--	--	--	--	--
SW8270C	2,4-Dinitrotoluene	121-14-2	mg/L	0.13	--	--	--	0.13	--	YES	--	--	--	--	--
SW8270C	Hexachlorobenzene	118-74-1	mg/L	0.13	--	--	--	0.13	--	YES	--	--	--	--	--
SW8270C	Hexachloroethane	67-72-1	mg/L	3	--	--	--	3	--	YES	--	--	--	--	--
SW8270C	Hexachlorobutadiene	87-68-3	mg/L	0.5	--	--	--	0.5	--	YES	--	--	--	--	--
SW8270C	Nitrobenzene	98-95-3	mg/L	2	--	--	--	2	--	YES	--	--	--	--	--
SW8270C	Pentachlorophenol	87-86-5	mg/L	100	17	--	1.7	1.7	--	YES	--	--	--	--	--
SW8270C	2,4,5-Trichlorophenol	95-95-4	mg/L	400	--	--	--	400	--	YES	--	--	--	--	--
SW8270C	2,4,6-Trichlorophenol	88-06-2	mg/L	2	--	--	--	2	--	YES	--	--	--	--	--
SW8270C	Pyridine	110-86-1	mg/L	5	--	--	--	5	--	YES	--	--	--	--	--
SW8270C	3,3-Dichlorobenzidine		mg/L	0.01	--	--	--	0.01	--	YES	--	--	--	--	--
SW8081A	Endrin	72-20-8	mg/L	0.02	0.2	--	0.02	0.02	--	YES	--	--	--	--	--
SW8081A	Heptachlor (and its epoxide)	76-44-8	mg/L	0.008	4.7	--	0.47	0.008	--	YES	--	--	--	--	--
SW8081A	Methoxychlor	72-43-5	mg/L	10	100	--	10	10	--	YES	--	--	--	--	--
SW8081A	Toxaphene	8001-35-2	mg/L	0.5	5	--	0.5	0.5	--	YES	--	--	--	--	--
SW8081A	Chlordane	57-74-9	mg/L	0.03	2.5	--	0.25	0.03	--	YES	--	--	--	--	--
SW8081A	Lindane	58-89-9	mg/L	0.4	4	--	0.4	0.4	--	YES	--	--	--	--	--
SW8081A	Aldrin	309-00-2	mg/L	--	1.4	--	0.14	0.14	--	YES	--	--	--	--	--

Table A-3
Maximum Concentrations for Title 22
PG&E Program Quality Assurance Project Plan

					CA TTCL/STLC						LCS Accuracy Control Limits (%R)		MS/MSD Accuracy Control Limits (%R)		Precision Soil
Method	**Constituent**	**CAS**	**Units**	**TCLP Regulatory Standards**	**Title 22 TTLC MCL (mg/kg)**	**If TTLC Concentration is ≥ this value STLC Analysis Must be performed**	**Title 22 STLC MCL**	**Most Stringent Screening Level**	**RL**	**Does RL Exceed Screening Level?**	**Lower Limit**	**Upper Limit**	**Lower Limit**	**Upper Limit**	**% RPD**
SW8081A	Kepone	143-50-0	mg/L	--	21	--	2.1	2.1	--	YES	--	--	--	--	--
SW8081A	4,4'-DDD	72-54-8	mg/L	--	1	--	0.1	0.1	--	YES	--	--	--	--	--
SW8081A	4,4'-DDE	72-55-9	mg/L	--	1	--	0.1	0.1	--	YES	--	--	--	--	--
SW8081A	4,4'-DDT	50-29-3	mg/L	--	1	--	0.1	0.1	--	YES	--	--	--	--	--
SW8081A	Dieldrin	60-57-1	mg/L	--	8	--	0.8	0.8	--	YES	--	--	--	--	--
SW8081A	Heptachlor	76-44-8	mg/L	--	4.7	--	0.47	0.47	--	YES	--	--	--	--	--
SW8151A	2,4-Dichlorophenoxyacetic acid (2,4-D)	94-75-7	mg/L	10	100	--	10	10	--	YES	--	--	--	--	--
SW8151A	2,4,5-Trichlorophenoxypropionic acid (2,4,5-TP) (Silvex)	93-72-1	mg/L	1	10	--	1	1	--	YES	--	--	--	--	--
SW8082	Polychlorinated biphenyls (PCB)		mg/L	--	50	--	5	5	--	YES	--	--	--	--	--
Dioxins	Dioxin (2,3,7,8-TCDD)	1746-01-6	mg/L	--	0.01	--	0.001	0.001	--	YES	--	--	--	--	--

Notes:

mg/L = milligrams per liter
mg/kg = milligrams per kilogram

TCLP = toxicity characteristic leaching procedure
STLC = soluble threshold limit concentration
TTLC = total threshold limit concentration

Appendix I
Response to Stakeholder Comments on *Draft Soil RCRA Facilities Investigation/ Remedial Investigation Work Plan, Pacific Gas and Electric Company Topock Compressor Station, Needles, California,* May 2011

Response to Comments on the

***Soil RCRA Facility Investigation/Remedial Investigation Work Plan, Pacific Gas and Electric Company (PG&E) Topock Compressor Station, Needles, California,* Issued May 2011**

From

Combined United States Department of the Interior (DOI), California Department of Toxic Substances Control (DTSC), Fort Mojave Indian Tribe (FMIT) and Hualapai Comments

Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
				Main Body of Work Plan		
1	General 1	N/A	FMIT	The Work Plan is quite voluminous with its many maps and appendices. As such it was difficult to review in its entirety and to efficiently coordinate the various sections and appendices. Some of the appendices had their own appendices, which were identified the same as the major appendices. For example, Appendix A has its own appendices A through F. It would have been helpful to have a better, more complete presentation of the contents.	Comment noted. Rather than restructure the entire Soil Part Data Summary Report, which had previously been released in draft form, PG&E retained the existing format (this document became Appendix A) and developed a parallel structure for the Soil Part B (Appendix B), Perimeter Area (Appendix C), and Storm Drain Investigations (Appendix D).	FMIT Response: The Tribe disagrees with the report organization and format that result in a non-integrated presentation of the proposed soil sampling. Please see FMIT letters dated July 23, 2012 and November 30, 2012, appended below
2	General 2	N/A	FMIT	The series of Technical Working Group (TWG) meetings held during the Work Plan's preparation, which focused on the implementation of the plan components based on Data Quality Objectives (DQOs), was helpful in understanding the general rationale underlying the sampling strategy. As stated in the Tribe's prior comment letters on these earlier work plan components, the Tribe notes that PG&E and the agencies believe there may be a tradeoff between sampling details (i.e., numbers, locations, methods, etc.) and the eventual extent of remedy implementation. Nevertheless, the Tribe remains concerned over various assumptions that have been made in this process that will result in unnecessary intrusion and damage to its sacred grounds. In particular, the Tribe disagrees with assuming future risk scenarios based on residential use. This is inconsistent with the Bureau of Land Management's (BLM) Lake Havasu Field Office's (LHFO) May 2007 document titled, ROD/Approved Resource Management Plan, Cultural Resource Management (see p. 26-30). This document assigns this area's land use as "Traditional Land Use." Under Cultural Resource Management the BLM LHFO must adhere to the specifications defined by the categories within the Land Use Allocation, Desired Future Condition and Management Actions.1 The assumption of future residential risk will potentially affect the level of information required to support decisions on the Corrective Measures Study/ Feasibility Study report. Embankment modifications, trenches, potholes, and drilling are all considered to be significant intrusions in addition to the incursions necessary to perform these activities. These concerns are further discussed in comments that follow.	<u>*DOI Response*</u>: As discussed in DOI's September 29, 2011 letter to Tribal leaders, for the purposes of the ongoing soil investigation and the baseline risk assessment, the future land use assumptions for United States Fish and Wildlife Service (USFWS)-managed refuge will be limited to recreational and tribal uses. The future land use assumptions for BLM-managed land should remain conservative and reflect a residential scenario. In the future, however, institutional controls will appropriately be considered in evaluating the remedial alternatives. As DOI has noted in previous discussions, the use of the residential land use assumption for BLM-managed land has not been a significant driver of sampling activities. <u>*DTSC Response*</u>: DTSC defers to DOI regarding the BLM-managed lands. See DOI's response above. The Draft Soil RCRA Facility Investigation/Remedial Investigation Work Plan (Draft Soil RFI/RI Work Plan) is intended to cover soils for the entire PG&E Topock Compressor Station project. The storm drain and perimeter area sampling are necessary to address the areas that may not be covered by the previously separated sampling programs (within the fence line and outside of the fence line). <u>*PG&E Response*</u>: At the direction of DOI, the BLM land will include a residential receptor in the human health risk assessment. As described in the Risk Assessment Work Plan (RAWP), the tribal use scenario will also be considered in the human health risk assessment for soil contact, using all the available data collected. The results of that risk evaluation will provide information to agency risk managers for their use in risk management decisions based on the findings of the corrective measures study/feasibility study (CMS/FS) documents. Please note that, in general, the current recommendations for additional sample collection are not being led by screening levels based on human health risk for potential future residents. Most often, the recommendation for additional sampling is being driven by background values or ecological screening levels.	FMIT Response: The Tribe believes that the cleanup of the site should be based on future Tribal land uses. Please see FMIT letters dated July 23, 2012 and November 30, 2012, appended below.
3	General 1	N/A	HUALAPAI	The Hualapai Tribe would like to offer comments regarding the report Soil RCRA Facility Investigation/Remedial Investigation Work Plan, Pacific Gas and Electric Topock Compressor Station, Needles, California, by CH2M HILL, released May 6, 2011. The draft Soil Work Plan from September 15, 2010, was reviewed by the Hualapai Department of Cultural Resources, and comments were submitted December 3, 2010. Comparing the September 2010 and May 2011 reports, a number of proposed soil borings have been deleted, especially along the west side of Bat Cave Wash. However, new elements of the program were added (e.g. the storm drain investigation), and new sample sites have been added to the list, which gives an appearance of project creep. We are concerned that other new objectives could be added in the future, and more samples could again be collected.	<u>*DOI Response*</u>: As DOI currently understand it, the Draft Soil RFI/RI Work Plan was developed to cover all aspects of the soil investigation. The addition of the perimeter and storm drain investigations was needed to address the potential offsite migration of contamination from these potential sources. The intent of the DQO process is to identify all data necessary to resolve the identified decisions. It is DOI's intent that the work plan address necessary sampling activities; however, it is possible that new information could arise in the future that would lead to a conclusion that more data are needed to resolve the project decisions. DOI will continue to inform the Tribes of new information that could affect the sampling plan. <u>*DTSC Response*</u>: The Draft Soil RFI/RI Work Plan is intended to cover soils for the entire PG&E Topock Compressor Station project. The storm drain and perimeter area	

Response to Comments on the
***Soil RCRA Facility Investigation/Remedial Investigation Work Plan, Pacific Gas and Electric Company (PG&E) Topock Compressor Station, Needles, California,* Issued May 2011**
From
Combined United States Department of the Interior (DOI), California Department of Toxic Substances Control (DTSC), Fort Mojave Indian Tribe (FMIT) and Hualapai Comments

Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
					sampling are necessary to address the areas that may not be covered by the previously separated sampling programs (within the fence line and outside of the fence line).	
4	General 2	N/A	HUALAPAI	Following the soil characterization studies, contaminated soils could be remediated by soil flushing. As described in the Soil Work Plan, Appendix A, page 6-1, soil flushing must be combined with groundwater remediation. In order to simultaneously accomplish multiple objectives, the groundwater and soil programs should be combined.	The soil and groundwater programs at Topock Compressor Station are in different phases of the corrective action process. The soil program is still in the RFI/RI phase, and the groundwater program is in the remedial design phase. Given that these programs are at different phases of the process, it is not appropriate to combine these two programs at this time. Remedial options for soil and possible connections to the groundwater remedy will be considered as part of the soil CMS/FS.	
5	General 3	N/A	HUALAPAI	Mitigation measures for cultural features should be part of the discussion (the sooner the better). However, mitigation measures are already being discussed regarding the impacts of the groundwater remediation. Mitigation measures should be combined to include the total cumulative impacts; therefore, the groundwater and soil programs should be combined.	*DOI Response:* It is anticipated that the Cultural Historic Properties Management Plan (CHPMP) will, at some point, address mitigation measures for both soil and groundwater. *DTSC Response*: Currently, the soil and groundwater portions of the project are on separate tracks and separate schedules. The soil portion is still in the site characterization (RFI/RI) phase while the groundwater portion is in the remedial design phase. Combining the two would result in significantly delaying the groundwater portion for several years in order for the soil portion to complete the site characterization, CMS/FS, and catch up to the remedial design phase. DTSC is currently preparing a California Environmental Quality Act (CEQA) initial study to evaluate if there are new or significant impacts from the proposed soil investigation activities that have not yet been evaluated in the Final Environmental Impact Report (FEIR), dated January 2011. Ultimately, all applicable mitigation measures, including those for cultural resources, will be implemented prior to and/or during the soil investigation work plan field implementation.	Comment not resolved. Please see FMIT letter dated July 23, 2012, appended below.
6	General 4	N/A	HUALAPAI	In the HDCR December 3, 2010, review of the draft Soil Work Plan, suggestions were made to perform additional soil leaching tests (e.g. SPLP, which uses deionized water as the leachate). Leaching tests can help describe the threat to groundwater from contaminated soils; however, additional SPLP analyses were not described in the May 2011 Soil Work Plan.	Synthetic precipitation leaching procedure (SPLP) analyses are included as part of the analytical program to address DQO Decision 4 for the Soil Part A Investigation and DQO Decision 5 for the Soil Part B investigation.	Comment not resolved. Please see FMIT letter dated July 23, 2012. appended below.
7	General 5	N/A	HUALAPAI	As suggested in Appendix A, page 6-2, treatability studies should be included. Treatability studies would describe not only the potential for chromium-6 leaching from soils, but also whether flushing and/or carbon amendments would be helpful for soil remediation. These studies would include laboratory core tests of soil samples; however, if laboratory core tests are proposed later in the future, then more sampling will occur. These core samples need to be collected as part of the current Soil Work Plan, and treatability studies need to be performed.	Treatability studies will be performed during the CMS/FS. The nature and extent of contamination has not fully defined, and the baseline risk assessment has not been conducted. Until it has been determined where soil remediation may be required to protect human and the environment, it is premature to begin treatability studies. While the types of potential remedial technologies that are applicable to the constituents at the Topock Compressor Station can be generally defined at this time, the specific technology applicable to any given area would depend on various factors, including the volume of soil affected, specific location, potential receptors, and access constraints.	
8	1	1.1 History of the Soil Investigation Program Page 1-2, Paragraph 2	DTSC	Modify the cited sentence as indicated for accuracy, "Similarly, UA-2, the Former 300B Pipeline Liquids Tank, was ~~also~~ previously closed by the county, and…"	The text was modified as requested.	DOI and DTSC Response: Resolved
9	2	1.1 History of the Soil Investigation Program Page 1-2, Paragraph 3	DTSC	Modify the highlighted number in the following sentence, "*An addendum to the Revised Final RFI/FI Volume 1 will be prepared to document the new units (SWMU 11 and AOCs 21 through 26) that…*" so that the number of additional AOCs are accurately accounted for (see comments below regarding additional AOCs).	The sentence was modified to read: The Volume 3 RFI/RI Report will document the new units (SWMU] 11, AOCs 21 through 33 and any other units that may be identified as a result of this soil investigation) that have or will have been added to the investigation program since the Revised Final RFI/RI Volume 1 was prepared.	DOI and DTSC Response: Resolved DTSC Response: See DTSC letter to PG&E dated November 28, 2011 for reference. PG&E Response: The number of AOCs was revised based on DTSC's direction to

Response to Comments on the

***Soil RCRA Facility Investigation/Remedial Investigation Work Plan, Pacific Gas and Electric Company (PG&E) Topock Compressor Station, Needles, California,* Issued May 2011**

From

Combined United States Department of the Interior (DOI), California Department of Toxic Substances Control (DTSC), Fort Mojave Indian Tribe (FMIT) and Hualapai Comments

Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
						identify several new AOCs.
10	Specific 1	Section 1 - p. 1-2, para. 3 (History of the Soil Investigation Program)	FMIT	As stated in the middle of this paragraph, the Tribe supports the concept of "… minimize[ing] the number of samples and disturbances to sensitive resources." At the same time, it is pointed out that there have been prior phases to this soils investigation as evidenced by the great amount of data that has been presented in this current Work Plan. Thus, the claim of a two-phase approach without further context or qualification is rather confusing and misleading. What assurance is there that further sampling "phases" will not be deemed a requirement? How can the Tribe be assured that the environmental impacts will be collectively, and timely, considered? The document, including Appendix E, does not reference the California Environmental Quality Act (CEQA). What CEQA documents have been prepared for the soils studies to date and what CEQA documents are anticipated in the future for soils?	*DTSC Response*: The iterative nature of the environmental investigation process can sometimes lead to follow-up investigations to answer questions that were not completely answered during the previous phase. DTSC's goal is to have a comprehensive data collection effort to minimize the number of investigation phases. DTSC is currently preparing a CEQA initial study to evaluate if there are new or significant impacts from the proposed soil investigation activities that have not yet been evaluated in the FEIR, dated January 2011. DTSC will prepare the appropriate CEQA document based on results of the initial study prior to approval of the Final Soil RFI/RI Work Plan. *PG&E Response*: An effort has been made to both optimize the number of samples collected and minimize the number of samples that may have to be collected in the future. The Soil RFI/RI Work Plan is designed to collect an appropriate number of samples for each area or group of areas. DOI, DTSC, and PG&E hope that further soil sampling will not be required following this round of data collection; however, particularly in areas that have not been previously investigated, it is not feasible to define a sampling program that ensures that no further sample collection will be required based on the new information obtained.	
11	3	1.1 History of the Soil Investigation Program Page 1-2, Paragraph 4	DTSC	Modify the cited sentence as indicated for accuracy as no soils data have been collected at some AOCs, "The objective of Phase 1 is to collect new or supplemental soil data,…"	The text was modified as requested.	DOI and DTSC Response: Resolved
12	Specific 2	Section 1 – p. 1-3, bullets (Soil Part A Investigation History and Appendix C8)	FMIT	The mention of the sampling at the Undesignated Area (UA) UA-1 (Potential Pipe Disposal Area) does not disclose the profound objections issued by the Tribe in letters dated October 31, 2008, November 22, 2010, and December 15, 2010. As you are aware, the Tribe reluctantly consented to exploration of this area via selected geophysical methods (GP) in the December 15, 2010 letter. While the Pacific Gas and Electric Company (PG&E) refers to these methods as "non-intrusive," the Tribe does not regard them as such because GP still creates a physical disturbance to the sacred grounds, albeit of a somewhat different nature. Nevertheless, in light of the DTSC's insistence of the need for further characterization as stated in its December 23, 2010, response letter to the Tribe, the Tribe acceded to the use of GP methods. At that time the Tribe also agreed with DTSC's plan to re-interview the former PG&E employee, who initially reported pipe disposal in the vicinity, and the review of historic aerial photographs of this area. The review of this follow-up work as presented in Appendix C8 of the Work Plan appears to have done little to resolve the "mystery of the buried pipes," except once again to expand the search into another area (UA-1B). The aerial photographs are inconclusive in regard to a disposal area within the vicinity, and the 2011 follow-up interview with the former employee exposed a great deal of uncertainty as the location and the timing of the alleged pipe burial, leading to PG&E's conclusion that it would be necessary to yet again expand the proposed area of exploration. Ultimately, this poses concern as to how the DTSC will decide to act on information resulting from these next GP surveys. What if the survey indicates the presence of an anomaly at one of these new sites? Will PG&E then be directed to perform intrusive investigations? In the event that pipe disposal is confirmed, will the area be dug up so that the pipes can be removed only to be buried elsewhere? On the other hand, what	*DTSC Response*: DTSC acknowledges the FMIT's objections to intrusive sampling at the Undesignated Area (UA-1) area. If the geophysical surveys do not indicate the presence of buried pipes and no new information is received indicating the need for further evaluation, DTSC will not recommend any further intrusive activities at this area. As indicated in DTSC's correspondence regarding UA-1, dated December 13, 2010 and December 23, 2010, if the nonintrusive activities proposed at UA-1 suggest that additional investigations are warranted, DTSC will meet with the concerned Tribes, agencies, stakeholders, and PG&E to discuss how to best proceed. As indicated in DTSC's December 23, 2010 letter to the FMIT, DTSC welcomes tribal monitoring during the implementation of the proposed nonintrusive activities and at all other soil investigation activities related to the PG&E compressor station. Consistent with previous activities at the site, tribal monitors will be able to recommend work stoppage to the site supervisor. *PG&E Response:* PG&E is aware of the conditions surrounding the Tribes agreement to conduct geophysical surveys and welcomes a Tribal expert to oversee the surveys. Consistent with previous activities at the site, tribal experts will be able to recommend work stoppage to the site supervisor.	As discussed in the June 15, 2012 Technical Working Group Meeting, DTSC recognizes that if the pipes are found during the additional geophysical survey, the FMIT prefers that the pipes be left in place.

Response to Comments on the

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Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
				if the GP survey does not register a finding? Will the investigation then be expanded indefinitely until something is found? We do not seem to be converging on a reasonable resolution to this perceived "problem." Again, how can the Tribe be assured that the environmental impacts will be collectively, and timely, considered? Finally, PG&E is reminded that conditions of the Tribes agreeing to the conduct of the GP surveys included the full-time involvement of a Tribal monitor(s) and Tribal cultural expert(s) and the authority of the monitor(s) to call for a work stoppage in the event of a determination that the level of disturbance is unacceptable. But ultimately, the Tribe is opposed to any intrusions beyond the performance of the GP survey, regardless of the outcome. The Tribe maintains that if there is an indication of the likelihood of buried, asbestos-wrapped pipes, they should be noted, but left in place.		
13	4	1.1.1 Soil Part A Investigation History Page 1-3, Paragraph 3	DTSC	Revise the following sentence for accuracy: "A meeting was held on December 7, 2010 between DOI, DTSC, and Tribes to discuss UA-1/UA-1 Alternate, combining the soil investigation into one document, and sampling at the mouth of Bat Cave Wash."	The text was modified as requested.	DTSC Response: Resolved
14	5	1.1.1 Soil Part A Investigation History Page 1-3, Paragraph 4	DTSC	The paragraph states, "Based on the Part A data gaps evaluation, no further investigations are needed at two areas (AOC 12, Fill Areas and UA-2 – Former 300B Pipeline Liquids Tank). The rationale for no additional investigation should be summarized in this document.	The detailed data gaps evaluation for both units is provided in Subappendices C6 and C9, respectively. A detailed summary of the results at these units is not appropriate in this section of the text; however, the following text was added to the referenced paragraph: Based on the Part A data gaps evaluation (Subappendices C6 and C9, respectively), sufficient data are available for both units to address Decisions 1 through 3 of the DQOs. Any remaining data required to satisfy Decision 4 will be collected either at other units (soil physical parameters) or following the risk assessment.	DTSC Response: Resolved
15	6	1.1.1 Soil Part A Investigation History Page 1-4, Paragraph 1	DTSC	The MW-24 Bench should be identified as a separate area of concern with a unique AOC number.	As discussed at the September 22, 2011 comment resolution meeting, PG&E does not believe that it is appropriate to designate new areas as new AOCs at this phase of the investigation process, particularly while the Soil RFI/RI Work Plan is being finalized. However, at the direction of DTSC, the MW-24 bench was added as a new AOC (AOC 27, MW-24 Bench). It should be noted that sampling is already being proposed at the MW-24 bench.	DTSC Response: Resolved See DTSC letter to PG&E dated November 28, 2011 for reference. PG&E Response: See revised response.
16	7	1.1.1 Soil Part A Investigation History Page 1-4, Paragraph 1	DTSC	DTSC previously requested that the soils around drip legs be sampled. The additional drip legs within the project boundary need to be identified and assigned a unique AOC number.	The term "drip leg" requires clarification. A drip leg is simply a separate section of pipe located below the main gas pipeline. This separate section of pipeline collects pipeline liquids. It is connected to a valve used to drain pipeline liquids to a fixed or portable tank. There are no pipeline drip legs within the fence line of the compressor station. There are four drip legs in the vicinity of the compressor station. There are three drip legs associated with the 300A and 300B pipelines to the east of the compressor station; a dog-leg drip on the 300B pipeline, an offset drip on the 300A pipeline, and a drip associated with a raised section of pipe on the 300A pipeline. The 300B drip leg was formerly connected to the 300B Pipeline Liquids Tank. There is also a drip leg for the 300B pipeline downstream of the compressor station in Bat Cave Wash. All drip legs are currently drained to portable tanks. As stated in response to Comment 15 (DTSC Comment 6) above, PG&E does not believe that it is appropriate to designate new AOCs at this stage of the Work Plan preparation. Furthermore, there is no historical information or any visual indication suggesting that a release may have occurred at these drip legs. Nonetheless, at the direction of DTSC, PG&E is designating these drip legs as new AOCs (AOCs 28a through 28d). These AOCs are as follows:	DTSC Response: See DTSC letter to PG&E dated November 28, 2011 for reference. Sampling should be proposed for the drip legs in the revised Work Plan. PG&E Response: See revised response. DTSC Response: Resolved.

Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
					• AOC 28a: 300A Pipeline Drip 1 (Offset Drip East of Compressor Station) • AOC 28b: 300A Pipeline Drip 2 (East of Compressor Station) • AOC 28c: 300B Pipeline Drip East of Compressor Station • AOC 28d: 300B Pipeline Drip in Bat Cave Wash The following information was used to draft the text for the Final Soil RFI/RI Work Plan, Appendix A, Subappendix C12: At the request of DTSC, four drip legs (two each on the 300A and 300B main gas pipelines) have been added as a new AOC (AOC 28). A drip leg is typically a separate section of pipe located below the main gas pipeline. This separate section of pipeline collects pipeline liquids by gravity. It is connected to a valve used to drain the pipeline liquids to a fixed or portable tank. There are no pipeline drip legs within the fence line of the compressor station. There are four drip legs in the Area of Potential Effect (APE) of the compressor station: three drip legs associated with the 300A and 300B pipelines to the east of the compressor station and a drip leg for the 300B pipeline downstream of the compressor station in Bat Cave Wash (see Figure C11-2). The drip legs on the east side of the compressor station consist of a dog-leg drip on the 300B pipeline, an offset drip on the 300A pipeline, and a bottom drip associated with a raised section of pipe on the 300A pipeline. The 300B dog-leg drip was formerly connected to the 300B Pipeline Liquids Tank, which was investigated separately as UA-2. The drip leg on the 300B pipeline in Bat Cave Wash is also a bottom tap. All drip legs are currently drained to portable tanks. The gas pressure in the pipeline provides the driving force to empty the drip legs. It is possible that some spillage could occur or may have historically occurred during the transfer process, for example, if the hose from the valve is not connected properly to the portable tank. All potential releases at the drip legs would be surface releases, and they would be confined to a very small area in the immediate vicinity of the drip legs. One sample location is proposed in the vicinity of each drip leg for a total of four sample locations. On the east side of the station, the sample location would be on the east side of the drip legs (that is, between the drip leg and the pipeline road) because the pipeline road would have served as the access road for the truck carrying the portable tank. Samples would be collected at 0.5 and 3 feet below ground surface (bgs) because potential incidental spills would have be minor and limited to surface soil and because the proximity of the main gas pipeline poses a significant subsurface hazard. At the drip leg in Bat Cave Wash, the sample will also be collected on the east side of the drip (the drip is located on the west side of Bat Cave Wash) because personnel are most likely to have accessed the drip from Bat Cave Wash. Samples will be collected at 0.5 and 3 feet bgs and, to allow for scour considerations, also at 5 feet bgs. All samples from this AOC will be analyzed for total petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAHs), and polychlorinated biphenyls (PCBs). Four borings previously have been advanced in the vicinity of the drip leg in Bat Cave Wash: AOC1-T2a to the south, AOC1-T2b to the southeast, AOC1-T2e to the north, and SBB-6 to the east. Soil samples were collected at 0 to 0.5, 2 to 3, 5 to 6, and 9 to 10 feet bgs from AOC1-T2a, AOC1-T2b and at AOC1-T2e at 1, 3, 6, and 10 feet bgs from SSB-6. AOC1-T2a, AOC1-T2b, and AOC1-T2e were analyzed for TPH and PAHs TPH-motor-oil was the only TPH constituent detected, with a maximum concentration of 40.9 milligrams per kilogram (mg/kg) compared to the interim screening level of 1,800 mg/kg. Fluorene was the only detected PAH, with a concentration of	

Response to Comments on the

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Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
					5.8 micrograms per kilogram (µg/kg) in AOC1-T2a compared to the interim screening level of 2,300,000 µg/kg. AOC1-T2b was also analyzed for PCBs and pesticides; no PCBs or pesticides were detected.	
17	8	1.1.1 Soil Part A Investigation History Page 1-4, Paragraph 1	DTSC	PG&E needs to add the IM-3 Treatment Plant and MW-20 Bench as AOCs due to the potential for spills and leaks of contaminated materials at these areas. This issue has been previously requested by DTSC.	As stated in response to Comment 15 (DTSC Comment 6) above, PG&E does not believe that it is appropriate to designate new AOCs at this stage of the Soil RFI/RF Work Plan preparation. Furthermore, sampling is not required and not appropriate at the Interim Measure No. 3 (IM-3) treatment plant or MW-20 bench. They are operating facilities and will be investigated and closed following decommissioning. These facilities have been established and operated under modern waste management laws and have been under agency supervision the entire time. Nonetheless, at the direction of DTSC, PG&E is designating these areas as new AOCs (AOC 29, IM-3 Treatment Plant, and AOC 30, MW-20 Bench).	DTSC Response: Resolved See DTSC letter to PG&E dated November 28, 2011 for reference. PG&E Response: See revised response. Note: Change AOC numbers if drip legs are designated one AOC number with sub-units.
18	9	1.1.2 Soil Part B Investigation History Page 1-4, Paragraph 3	DTSC	Revise the following sentence for accuracy: "DTSC and DOI provided clarification and direction on March 10, 2010 (DTSC and DOI, 2010b) after a hiatus related to PG&E's request to defer the Part B investigation (PG&E, August 14, 2008)."	The text was modified as requested.	DTSC Response: Comment resolved.
19	10	1.1.2 Soil Part B Investigation History Page 1-4, Paragraphs 5 and 6	DTSC	The paragraphs need to be revised to accurately account for additional AOCs. Please include the following AOCs: Tank Farm and Waste Oil Sump; Burn Area adjacent to AOC 17; and the Teapot Dome Oil Pit. Please list all the new AOCs identified in this comment table and assign them unique AOC identification numbers.	As stated in response to Comment 15 (DTSC Comment 6) above, PG&E does not believe that it is appropriate to designate new AOCs at this stage of the Soil RFI/RF Work Plan preparation. DTSC has previously requested that the Tank Farm and Waste Oil Sump be investigated. This area is an operating facility and will be investigated and remediated as appropriate following decommissioning of the area. Also, as previously discussed, this area is within concrete secondary containment, and there is extensive pavement around the perimeter of this area; therefore, there can be no current releases or migration from this area. In addition, it should be noted that sampling is already being proposed at the Teapot Dome Oil Pit and Burn Area adjacent to AOC 17. Nonetheless, at the direction of DTSC, PG&E is designating these areas as new AOCs (AOC 31, Former Teapot Dome Oil Pit; AOC 32, Oil Storage Tanks and Waste Oil Sump; and AOC 33, Burn Area Near AOC 17).	DTSC Response: Resolved See DTSC letter to PG&E dated November 28, 2011 for reference. PG&E Response: See revised response. During the April 10, 2012 meeting, sample location AOC13-17 was moved closer to the waste oil sump in AOC 32, and a soil gas sample will be collected from this location. Note: Change AOC numbers if drip legs are designated one AOC number with sub-units.
20	Specific 3	Section 1 – p. 1-4 through 1-9 including Table 1-1	FMIT	At this point, the overall explanation of how and why the soils RCRA Facility Investigation/ Remedial Investigation is organized the way it is and will be implemented is unnecessarily confusing. It is understood that, originally, PG&E had petitioned to defer the Part B investigation arguing that there are ongoing Compressor Station operations in that area and it would be a more appropriate topic for eventual site closure, this petition was denied by DTSC. The artificial division of what is or was done inside the Compressor Station fence line vs. the area outside the fence line seems rather arbitrary to the question of the remedial investigation anyway. However, the Work Plan now has devised a new distinction as to what was done in areas peripherally outside the fence line ("Perimeter Area Investigation") and what originated within the fence line, but was discharged from point sources (pipes) into the area outside the fence line (i.e., "Storm Drain System Investigation"). This was not a distinction that was made clear during the series of TWG meetings. What is the distinction between the so-called "perimeter area" and such areas as Area of Concern (AOC) AOC-1 and AOC-9? Why has a new area, not a Solid Waste Management Unit (SWMU), AOC, or UA been defined? Does this imply that the investigation is ever-expanding? Further justification of the need for these new investigations as well as the rationale as to why they are different from the previous area designations should be provided. Most certainly, it appears that there is now	*DTSC Response*: DTSC defers to PG&E regarding all the items in this comment, with the exception of the following: Regarding the question whether the investigation is ever-expanding, the Draft Soil RFI/RI Work Plan is intended to cover soil for the entire PG&E Topock Compressor Station project. DTSC's goal is to have a comprehensive data collection effort to minimize the potential for future phases of investigation. Regarding the statement regarding environmental impacts, DTSC is currently preparing a CEQA initial study to evaluate if there are new or significant impacts from the proposed soil investigation activities that have not yet been evaluated in the FEIR, dated January 2011. DTSC will prepare the appropriate CEQA document based on results of the initial study prior to approval of the Soil RFI/RF Work Plan. *PG&E Response*: The perimeter area is defined as the area extending from the facility fence line to the toe of the slope outside of the fence line. Several AOCs overlap (for example, AOC 1, AOC 9, AOC 10, and AOC 11) with the perimeter area but are differentiated because these AOCs have different sources and release mechanisms and extend outside of the boundaries from the perimeter area. Sampling is proposed along the perimeter of the station to evaluate whether historical contaminant releases	Comment not resolved, please see FMIT letter dated July 23, 2012, appended below.

Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
				some redundancy in proposed sample locations. The Tribe needs assurances that the environmental impacts will be collectively, and timely, considered.	within the compressor station have migrated to the edge of the facility where they may pose a concern to areas and receptors outside the fence line. The goal is to combine data from the perimeter area with logical nearby investigation areas, specifically those areas that show contamination above interim screening levels designated for areas outside the fence line. Designating the perimeter area an AOC or SWMU is not proposed because the potential sources and extents of any releases are likely to differ from location to location. Please see response to Absolute Comment 64 for more details on how perimeter and storm drain data were incorporated into existing SWMUs/AOCs. PG&E is currently reviewed all proposed sample locations to eliminate redundant sample locations and incorporated an X-ray fluorescence (XRF) screening protocol into the perimeter area sampling approach to optimize sample locations (see response to Absolute Comment 240 for details concerning the perimeter area XRF approach).	
21	11	1.1.4 Perimeter Area Investigation, Page 1-8	DTSC	The section should indicate that the site perimeter walk in 2007 focused on then current site features (e.g., offsite drainage). Additional investigation and evaluation is also needed to locate monitoring points at areas of historic concern (e.g., former drainages, releases).	The following text was added to this section: "The 2007 Perimeter Area site walk focused on potential concerns (such as drainages) apparent at the time of the site walk, locations were subsequently modified during meetings with DTSC, DOI, and the Tribes. Sampling will be conducted in a phased manner, as directed by DTSC and DOI, and consistent with the phased sampling approach for the investigation within the fence line. To focus sampling at areas with the highest potential for contamination and to minimize the total number of samples, XRF screening will be performed every 50 feet in all areas along the perimeter except the following areas: • Between PA01 and Storm Drain Line 12 (because the spacing of sample locations PA01and PA02, in combination with sample locations AOC 13-20, AOC13-21 and AOC 13-23 adequately addresses that perimeter segment); • Between XRF-17 and XRF-18 because sample locations AOC16-1 and AOC 16-2 adequately address that perimeter segment); • Between PA03 and PA04 (because the spacing of these sample locations adequately addresses that perimeter segment); • Along the northern, eastern, and southern boundaries near the main office because compressor station operations have not historically occurred and are not currently occurring in this area; and, Along the southern boundary of the site except the soil (orange) berm pictured in Figure C-1 (because the topography slopes upward from the station at this location). XRF screening and evaluation of XRF data (comparison to offsite screening levels) will be conducted as described in Section 2.2 of this Work Plan. If the XRF results exceed screening levels for the area outside the fence line (Part A screening levels), then a conventional soil sample will be collected for laboratory analysis. If screening levels are not exceeded, a sample will still be collected at least every 100 feet along the perimeter, except as outlined above. The locations for soil samples required as a result of XRF screening will be determined in conjunction with the agencies."	DTSC Response: Comment needs to be modified to adopt perimeter sampling along the perimeter of the station (50 and 100 foot spacing) that was discussed between PG&E and agencies. PG&E Response: See revised comment response. DTSC Response: Resolved
22	DOI #1	Section 1.1.4 Perimeter Area Investigation third paragraph, first sentence Page 1-8	DOI	The Perimeter Area investigation should address potential exposure of both humans and ecological receptors.	The text in Section 1.1.4 was revised to state: "The Perimeter Area investigation data will be used to help evaluate whether human and ecological receptors outside the fence line could be exposed to surface soil impacted by chemicals originating within the fence line of the compressor station through the offsite migration pathway."	DOI Response: Resolved

Response to Comments on the

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Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
23	DOI #2	Section 1.1.5 Storm Drain System Investigation last paragraph, first sentence Page 1-8/1-9	DOI	These data are also needed to address assessment of Part A human and ecological risk decisions.	The text in Section 1.1.5 was revised to state: "In addition, to satisfy Part A and Part B DQO Decision 1, data are needed to characterize potential discharges from storm drains to soil. These data are also required to address assessment of Part A human and ecological risk decisions (Decision 2)."	DOI Response: Resolved
24	Specific 2	Table 1-1, Main Text	HUALAPAI	The area of AOC-10 is shown as 1,400 ft2 (0.032 acres), and the area of AOC-11 is shown as 14,000 ft2 (0.33 acres). AOC-10 and -11 should be about 50 or 60 acres.	AOC 10 is approximately 0.48 acre or 20,910 square feet, and AOC 11 is approximately 1.3 acres or 56,628 square feet. The table was revised with these new values. The acreage is based on the areas currently defined as being within the boundaries of the unit.	
25	14	Figures 1-2 and 1-3	DTSC	The "Other Areas" label identified in the legend should be deleted. The orange areas on the figures are part of AOCs and, therefore, should be colored green. The section of Bat Cave wash north of the railroad, including the mouth of the wash, should be indicated as part of AOC1. Environmental investigations have previously been conducted along this section and additional sampling is also proposed for the Phase 2 investigation. The Work Plan should explicitly state that the existing AOCs/SWMUs boundaries (e.g., green shaded areas) are approximate only and that soil data will ultimately dictate the extent of environmental impact.	At the direction of DTSC, PG&E changed the orange areas on the figure and adjusted the borders of existing AOCs (for example, AOCs 1 and 11). The requested language was added to the text	DTSC Response: Resolved See DTSC letter to PG&E dated November 28, 2011 for reference. PG&E Response: See revised response.
26	DOI #3	Section 2.1.2, Surveys	DOI	In accordance with the PBA, a qualified biologist will conduct a pre-construction survey of all work areas prior to ground-disturbing activities. How will the biologist conduct pre-construction surveys in the tamarisk at the mouth of BCW? Some disturbance, even if bushwhacking a small trail for one person, may have to be done to gain access into this area. Please propose a pre-construction survey method for this area.	Other than bird species, no special-status wildlife species are anticipated to inhabit the dense tamarisk in the project area. PG&E proposes to schedule the vegetation removal activity for the project to occur outside of nesting season (March 15 to September 30). Consistent with programmatic biological assessment (PBA) Measure 3, a biologist will conduct a preconstruction survey for special status birds immediately ahead of the vegetation removal activity. Any observations of special-status birds will be reported per Measures 4 and 27.	DOI Response: Resolved
27	Specific 4	Section 2 – p. 2-1 (2.1.2 Surveys)	FMIT	The Tribe has repeatedly insisted that participation of a Tribal Monitor(s)/Tribal Cultural Expert(s) is required during the conduct of any archaeological or cultural surveys. This is necessary because the focus of an archaeological surveyor is quite different from the Tribal Monitor/Tribal Cultural Expert, who is additionally concerned with the spiritual integrity of the land. The Tribal Monitors/Tribal Cultural Experts also have an interest in the conduct and results of the vegetation survey as presented. It is noted that these surveys will be performed post-clearing of the land. What has been done to document what is present prior to clearing?	*DOI/BLM Response:* The original archeological survey for the APE was completed by CH2M HILL (2004), and a second survey was performed by A&E in 2004/2005. The report was finalized in 2007. After 2007, A&E was required to do an annual monitoring of 18 sites around IM-3. Around 2007 or 2008, FMIT requested that they be informed of any surveys generated by work plans. Since that time, they have been notified by PG&E. BLM will require PG&E to include prework notification to all nine Tribes prior to any cultural or archeological reviews or formal surveys. The work plan specifies that a "qualified biologist will conduct a pre-construction biological survey of all work areas prior to ground-disturbing activities."	
28	Specific 5	Section 2 – p. 2.2 (2.1.3 Site Access and Demarcation)	FMIT	This paragraph references Appendices A and B for further information on site access, and indicates that the access routes are shown on the sampling figures. This is not easily seen on these figures. A separate figure should be included in this section.	A separate figure has been provided as requested.	
29	Specific 6	Section 2 – p. 2-2 (2.1.4 Staging Areas and Figure 2-1)	FMIT	The pattern shown in the legend for staging and waste management areas is ambiguous within the fence line. Is the entire Compressor Station intended as both a staging area and waste management area?	Yes, the entire station is intended as a possible staging and/or waste management area.	

Response to Comments on the

***Soil RCRA Facility Investigation/Remedial Investigation Work Plan, Pacific Gas and Electric Company (PG&E) Topock Compressor Station, Needles, California,* Issued May 2011**

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Combined United States Department of the Interior (DOI), California Department of Toxic Substances Control (DTSC), Fort Mojave Indian Tribe (FMIT) and Hualapai Comments

Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
30	Specific 7	Section 2 – p. 2-3 to 2-5 (Installation of Boreholes and Soil Sample Collection)	FMIT	This section discusses various methods for the intrusion into the soil horizon. The methods described range from shallow and surficial samples collected with hand tools to sonic coring to potholing/trenching and HydroVac potholing. Procedures for the performance of these field methods are presented in Appendix G. There are several concerns with the proposed assemblage of field methods. First, these are all intrusions and it would appear that PG&E is suggesting that considerable discretion would be permitted in the performance of these activities in terms of depths, methods, and extent of the intrusion. Accordingly, specifics must be made available prior to initiating of work and/or the Tribal Monitor/Tribal Cultural Experts must participate in these field activities in order to assure that field personnel are exercising every effort to minimize the level of disturbance. Second, this activity will result in volumes of investigation-derived wastes (IDW) that must be properly handled. In the past, such materials, if tested as non-hazardous, were stored for possible future repatriation at the Site, and, as indicated in Section 2.2.7.2, PG&E intends to make "every effort" to repatriate these materials. On January 12, 2011, the DTSC held a meeting with the Tribes to discuss alternative methods for well decommissioning. One option discussed involved the use of such IDW materials. Unfortunately, this was not discussed in the context of soil boring abandonment within Appendix G (SOP-B4). Instead, the procedure calls for grouting with bentonite-cement grout to the surface. Would it be possible to revise or obtain a variance to this procedure to allow for backfilling with native materials? The Tribe notes that this is exactly the method proposed for abandonment of potholes. Third, the method for soil handling with the intent of repatriation needs to be proceduralized and documented for review by the Tribe. This is not addressed in Appendix A, SOP-B7. A recent visit to the location where drill cuttings are presently being stored indicated that there is considerable commingling of materials taken from different locations on the Site. This may not be an optimal way of handling such materials. The Tribe offers to assist PG&E in writing an acceptable procedure. Fourth, how will the sample cores be stored? Do these eventually become IDW? These, like drill cuttings, may be considered for repatriation. Finally, in general, the Tribe would favor a borehole to a pothole because it seems that there would be less intrusion and disturbance, however, if the above-described method of abandonment is necessary for boreholes, the permanent damage from such potholes may be less.	<u>*DOI and DTSC Response*</u>: A task group has been set up to address the development of a plan for handling and deposition of investigation-derived soil and encourages tribal participation in this group.	DOI Response: Deferred to subgroup DTSC Response: Per the December 9, 2011 subgroup meeting, PG&E will prepare a draft document incorporating FMIT's draft document (9/21/2011) for handling of disturbed site soils. FMIT Response: The Tribe requires that the Procedure to address displaced site soils must be referenced as an authoritative procedure in any work plan where site soil may be disturbed. Please see FMIT letter dated November 30, 2012, appended below.
31	Specific 1	Page 2-4, Main Text	HUALAPAI	"…the boreholes will be filled." This doesn't describe the fill material. The topic of well decommissioning and borehole filling has been discussed at Topock meetings. The conclusions of these meetings should be compiled, and the different methods for borehole filling should be included in the Soil Work Plan, with emphasis on the preferred method.	A task group has been set up to address the development of a plan for handling and deposition of investigation-derived soil and encourages tribal participation in this group.	DOI Response: Deferred to subgroup DTSC Response: Per the December 9, 2011 subgroup meeting, PG&E will prepare a draft document incorporating FMIT's draft document (9/21/2011) for handling of disturbed site soils.
32	Specific 8	Section 2 – p. 2-5 (2.2.2 X-Ray Fluorescence Field Sampling)	FMIT	The Tribe agrees that X-ray fluorescence can be a useful tool for screening samples as suggested in its February 9. 2007, comment letter on PG&E's 2006 soils work plan.	Comment noted. A detailed procedure for using XRF to prescreen potential soil sample locations has been developed and was incorporated into the Soil RFI/RI Work Plan.	
33	12	2.2.2 X-Ray Fluorescence Field Screening and SOP-B16 Field-portable X-Ray Fluorescence Soil	DTSC	XRF screening should also be used on non-soil materials such as debris, concrete, etc., to assist in evaluating areas for further investigation. Include a description of the capabilities of the XRF for non-soil materials and describe the XRF SOPs for such	XRF instruments are often employed to analyze samples of a non-soil-type material. Programming specific to lead paint, alloy, electronics, mining, plastics, precious alloys, soils, and thin sample analysis are available. However, for the purpose of the Topock	DTSC Response: The revised Work Plan and XRF SOP should be updated to describe all methods/techniques that will be employed

Response to Comments on the

***Soil RCRA Facility Investigation/Remedial Investigation Work Plan, Pacific Gas and Electric Company (PG&E) Topock Compressor Station, Needles, California,* Issued May 2011**

From

Combined United States Department of the Interior (DOI), California Department of Toxic Substances Control (DTSC), Fort Mojave Indian Tribe (FMIT) and Hualapai Comments

Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
		Sampling		materials.	soil Investigation, debris such as concrete, wood, etc. will be analyzed like soil, with two exceptions: • First, because of the difficulty with trying to homogenize the sample, the sample should be analyzed in place, from multiple locations if applicable (if the debris is large enough to warrant). • Second, readings will be taken from a minimum of three locations (see above). Each reading should be at least 180 seconds (equivalent to the triplicate 180-second readings performed on soil). The results will then be averaged and run through the least square equations to correct for site variations.	during this phase of the investigation. The revision should include a description of the capabilities of the XRF for non-soil materials. PG&E Response: The XRF SOP was updated to describe all methods/techniques that will be used during this phase of the investigations, and will include the capabilities of the XRF for non-soil materials. This updated SOP is included in the revised work plan. DTSC Response: Resolved
34	Specific 9	Section 2 – p. 2-6 (2.2.4 Geophysical Surveying)	FMIT	Refer to earlier comments concerning the use of GP methods at UA-1 (Comment #2). Will any of the methods described require land clearing or leave a "footprint?"	No clearing of land is anticipated to perform the geophysical surveys. Magnetometer and conductivity surveys will only leave minor footprints/tracks because these instruments are carried above the ground. The ground-penetrating radar (GPR) instrument is pulled across the ground; therefore, if the instrument is pulled across exposed soil, it will leave minor tracks in the soil that will be hand-graded, if necessary.	DOI and DTSC: It is suggested that any GPR "tracks" be hand-graded after the investigation is complete to remove marks and that PG&E employ an appropriate unit that leaves the least amount of "track" as possible. PG&E Response: The Soil RFI/RI Work Plan was revised to state that GPR will be used at all areas at UA-1. Response revised.
35	DOI #4	Section 2.2.4, pages 2-6 and 2-7	DOI	A survey grid for each site should be proposed in the work plan based on the overall objectives of locating geophysical anomalies. It should be noted that GPR results in very high density data and is best used to verify and refine the location of targets in a small area. The 6th paragraph implies that only GPR and magnetometry are being considered while the 2nd paragraph states that EM will also be used. A time-domain EM, such as the EM-61, may help reduce the noise created by the surface metal. Please clarify which methods will be used. Additionally, it should be noted that the orientation of the boom to the buried object during an EM survey can be important. A finer grid and/or different boom orientation may be needed after initial survey. A station-by-station GPS survey is proposed. It is not clear why streaming GPS data using a base station and rover unit (e.g., RTK unit) yielding a point by point survey is not being considered. Section 2.2.4/Geophysical Surveying/third paragraph/second sentence - Typographic errors	As stated in the Soil RFI/RI Work Plan: "The grid size will be determined based on the size of the area being surveyed, presence of surface obstructions, and expected density of all subsurface utilities." For UA-1, AOC 27, and AOC 17, magnetic and conductivity surveys will be performed along parallel traverses spaced 5 to 10 feet apart as access and site conditions allow, and measurements will be taken along the traverses at approximately 5-foot spacing. Based on the results of the magnetic and conductivity surveys, GPR will be used in localized areas as necessary. Text was revised to clarify that geophysical surveys will include magnetic and conductivity surveys in all areas, and GPR will be used in localized areas as necessary, with the exception of the UA-1 area, where GPR will be used throughout the area. The geophysical contractor chosen to perform the geophysical surveys will prescribe the conductivity measuring devices and instruments that are appropriate for the specific area and objectives of the survey. The comment regarding the station-by-station GPS survey is assumed related to Section 2.2.5. Station-by-station GPS (resource-grade) is proposed for surveying in soil sample locations because the accuracy provided by the resource-grade GPS system will provide adequate resolution of horizontal coordinates and elevations (that is, within 3 to 4 feet) when coupled with the recently developed topographic map (with 1-foot contours). These points can be obtained by the onsite sample team and will be verified on the aerial photo map of the site. Sample locations within the compressor station will also be located by measuring from nearby structures, curbs, or other reference	DOI Response: Resolved PG&E Response: As noted in DOI's original comment, use of GPR results in very high density data and is best use to verify and refine locations of targets in a small area. The approach to first use magnetic and conductivity surveys and follow up with GPR to survey potential targets identified by the magnetic and conductivity surveys was confirmed and strongly recommended by NorCal Geophysical Consultants Inc., the geophysical company who did the initial surveys at UA-1.

Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
					points and will be verified on the aerial photo. For the purposes and objectives of the soil investigation and future remedial planning, the level of accuracy provided by a resource-grade GPS is adequate to meet project goals. The sentence should read: Vertical magnetic gradients provide better resolution of near-surface objects and are less affected by surface objects than total field magnetometers that measure only total magnetic intensity.	
36	Specific 10	Section 2 – p. 2-7 (2.2.6 Vegetation Removal)	FMIT	The Tribal monitor(s)/Tribal Cultural Expert(s) must participate in the decision as to which vegetation is acceptable for removal as provided for in the last sentence and the most appropriate methods for such removals.	As discussed during the December 15, 2011 meeting and as directed by DOI response to Comment 37, the Soil RFI/RI Work Plan was revised to state that vegetation will be left in place (most likely after being chipped).	FMIT Response: The Tribe requires that Tribal Monitors be present during any activity that would disturb soil, vegetation or might uncover artifacts or any site surveys designed to identify such activities. Please see FMIT letter dated November 30, 2012, appended below.
37	DOI #5	Section 2.2.6	DOI	Options for handling/disposal of vegetation should be included for consideration by the agencies/stakeholders.	The Soil RFI/RI Work Plan was revised to include a discussion of vegetation handling/disposal options. Vegetation could either be left in place (most likely after being chipped) or removed and disposed of or composted offsite. It should be noted, however, that this area is under the jurisdiction of the Bureau of Reclamation (managed by BLM), and PG&E will therefore handle and/or dispose of removed vegetation in accordance with direction from Bureau of Reclamation Land or BLM and other stakeholders, as appropriate.	DOI Response: DOI's expectation is that the material would be left in place. The vegetation can be chipped and used for bedding for the sampling routes. This will minimize impacts to remaining vegetation/ root balls and the soil/sediment bed. Consideration should be given for retaining some of the larger logs for use as weirs to minimize impacts during the period when vegetation is reestablished. Resolved pending review of revised work plan.
38	DOI #6	Section 2.2.7.1, page 2-8	DOI	Decontamination of all equipment should also be done prior to demobilization. The first paragraph also notes that drilling equipment will be "cleaned between investigation areas …" It is not clear if this is referencing AOCs/SWMUs or boring locations. Visual inspections should be done between each boring location to determine if decontamination is needed.	The following sentence was added to the first paragraph of this section: "The backs of the drilling rigs and down-hole drilling tools will be decontaminated before arrival at the site." The referenced sentence was revised to state that visual inspection will be performed between each boring location to determine if decontamination is necessary. The following sentence was added to the end of the first paragraph: "Drilling equipment will be decontaminated prior to removal from the Topock Compressor Site."	DOI Response: The text should also note that equipment will be decontaminated <u>prior to removal from the Topock site</u>. PG&E Response: Response revised DOI Response: Resolved
39	13	2.2.7 Waste Management and Decontamination, and SOP-B6 Disposal of Waste Fluids and Solids	DTSC	Please provide a list of state authorized permitted facilities that PG&E intends to utilize in the proper disposal of contaminated materials.	The following are the permitted facilities PG&E intends to use for disposal of contaminated material: • Clean Harbors, Buttonwillow, CA • Waste Management, Kettleman City , CA • US Ecology, Beatty NV.	DOI and DTSC: Resolved
40	Specific 11	Section 2 – p. 2-8 (2.2.7.2 Investigation-Derived Waste Management)	FMIT	Refer to earlier comments concerning the handling of IDW and repatriation (Comment #7).	Please see response to Comment 31 (HUALAPAI Specific 1).	DOI Response: Deferred to subgroup

Response to Comments on the

***Soil RCRA Facility Investigation/Remedial Investigation Work Plan, Pacific Gas and Electric Company (PG&E) Topock Compressor Station, Needles, California,* Issued May 2011**

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Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
41	DOI #7	Section 2.2.7.2 Investigation Derived Waste Management second paragraph fifth sentence Page 2-8	DOI	Please specify what is meant by soil being "free from contaminants." Also, please explain how soil cuttings be "repatriated".	Waste characterization samples will be collected from soil generated and stored during investigation activities. Inorganic waste characterization sample results will be compared to the Topock background soil concentrations. Soil will be deemed free of contaminants if inorganic waste characterization sample results are at or below Topock background soil concentrations, and organic waste characterization sample results are at or below laboratory reporting limits. Methods of repatriation of soil cuttings are being determined and agreed upon in current discussions with agencies and stakeholders.	DOI Response: Resolved pending finalization of Displaced Material Memorandum and review of revised work plan.
42	DOI #8	Section 2.3, Post-construction activities	DOI	With the exception of the proposed sampling near the mouth of Bat Cave Wash, others areas contain limited to no vegetation. We agree with your plan to let the mouth of BCW reestablish itself after the sampling. Although the proposed sampling locations contain limited to no vegetation, in the event a mature, native tree or other vegetation is destroyed because of crushing, trampling, cutting or killed because of damage to its root system on the Havasu NWR, you must work with the Refuge Manager to replace them and guarantee successful reestablishment.	In the event of significant damage or loss of native trees and/or vegetation on the Havasu National Wildlife Refuge (HNWR), PG&E will work with the manager on restoration of these native trees and vegetation.	DOI Response: Resolved
43	Specific 12	Section 2 – p. 2-9 (2.3 Post-Construction Activities)	FMIT	This section seems to apply the concept of the acceptability of new disturbances in "previously disturbed" areas. The Tribe, in response to PG&E's draft map for Mitigation Measure Cultural 1a-9 (Aerial Map of Disturbed Areas),[2] cautioned that: *"While as a general rule it may be worse to disturb undisturbed land than land that is already disturbed, it must be understood that tribal spiritual practitioners understand "disturbance" in ways that are different from an archaeologist's or a field technician's understanding. For example, to an archaeologist, the land is "disturbed" if it has been turned over in such a way as to break up the spatial relationships among artifacts and other things that archaeologists study. To a tribal practitioner, this kind of "disturbance" is not necessarily relevant. What matters instead is the degree to which the spiritual integrity of the land has been compromised.* *Bulldozing, drilling, and pipe laying (among other things) can compromise the land's spiritual integrity, and are distressing activities to the Tribe, but it does not follow that any location that has been 'disturbed' has thereby fully lost its spiritual integrity. As a result, the Tribe is uncomfortable with a blanket assumption that priority should always or necessarily be assigned to 'previously disturbed areas.' At the very least, the Tribe insists that it be consulted about activities proposed on any lands within the Tribe's valued landscape, whether they have been "disturbed" or not.* *Most times, with reluctance, the Tribe will probably agree that further disturbing a previously 'disturbed' parcel is the lesser of two (or more) evils, but there may be times when the Tribe must and will object strongly to further desecration of a 'disturbed area' because in the Tribe's eyes it still has spiritual integrity and importance. Thus a requirement merely to focus new disturbance on previously 'disturbed' areas as they are understood by archaeologists, engineers, and other non-Native American technicians does not by itself mitigate impacts on cultural resources."* This concept needs to be explained to and understood by all parties involved in field investigations and planning.	All intrusive work will go through consultation with the Tribes and obtain approval by agencies prior to implementation regardless if the area has been previously disturbed areas or in an undisturbed area. No more than two acres of vegetation is proposed to be removed in the tamarisk area at the mouth of Bat Cave Wash. This area is predominantly tamarisk, which is an invasive species that quickly recovers when cut or burned. Every effort will be made to preserve larger tree species during the vegetation removal. The vegetation will be cut above the roots as close to the ground surface as possible to establish a path for the drilling equipment and crew and allow for vegetation regrowth.	FMIT Response: The Tribe requires that any person entering the area for the purpose of the cleanup project be appropriately trained in relation to minimizing site disturbances while performing their responsibilities. Please see FMIT letter dated November 30, 2012, appended below.

Response to Comments on the

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Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
				Additionally, the conclusion that no post-sampling restoration is required for the two acres where vegetation removal is proposed requires further explanation. ___________________ [2] Letter from Dr. Leo S. Leonhart, Hargis + Associates, Inc. to Dr. Yvonne Meeks, PG&E, dated July 5, 2011		
44	Specific 3	Table 4-1, Main Text	HUALAPAI	Soil physical parameters will be determined; however, it does not mention permeability testing. If soil flushing is an option for remediation, then soil permeability is an important parameter to determine.	More detailed data collection if needed specifically for the CMS/FS will be conducted during the CMS/FS phase.	
45	DOI #9	Table 4-1 Title Row Page 4-2	DOI	The data gaps for each area were previously numbered and were associated with specific sample locations. The approved sampling table sent to PG&E and included in Appendix A provided this information in detail. The data gaps should be numbered and be consistent with the previously agreed-upon list for each area.	Table 4-1 was revised to number the data gaps and be consistent with the data gaps presented in the subppendix for each area.	DOI Response: Resolved pending review of Table 4-1.
46	Specific 13	Section 4 – p. 4-2 (Table 4-1)	FMIT	The Tribe believes that a strategy involving the use of confirmation sampling to address data gaps should be considered and discussed in the Work Plan. The table does not present information on the extent of sampling (i.e., numbers, depths, types, etc.) in each area. In regard to Decision 3 (Potential Impacts to Groundwater) – The Tribe has previously commented about the simplicity/conservativeness of the modeling performed on soil concentrations and the need to perform additional sampling to further understand these potential impacts. The Tribe's position is that this additional sampling should only be based on both: 1) more advanced/less conservative modeling, and 2) evaluation of site data where soil contamination exists but groundwater contamination has not been detected. It seems that this Data Quality Objective (DQO) criterion is based on the same modeling that was presented in the prior draft/proposed sampling.	*DOI and DTSC Response*: The DQO-based approach is intended to develop data to support four specific decisions, as discussed in Table 4-1. The approach was developed by PG&E, DOI, DTSC, with input from the Tribes and includes a prominent confirmation sampling component. Most of the samples identified later in Appendix C of the Part A Data Gaps report were driven by the need to obtain confirmation data on whether the nature and extent of contamination indicated by the Phase 1 data had been satisfactorily identified. If the nature and extent of contamination indicated by the Phase 1 data was not satisfactorily identified, a Decision 1 data gap (nature and extent) was identified. Identification of a Decision 1 data gap often resulted in the need for confirmation sampling data. The predominance of Decision 1 nature and extent rationale is evidenced in Table 4-1. Section 4.0, and specifically Table 4-1, is a summary of data gaps in the Part A, Phase 1 data. It is intended to familiarize the reader with how the existing Phase 1 and pending Phase 2 data are related. Information on the extent of sampling (that is, numbers, depths, types, etc.) in the Phase 1 database, as well as proposed for Phase 2, is provided in the various sub sections of Appendix C of the Part A Data Gaps report. DOI and DTSC have carefully considered the Tribe's comments on the application of the models used to evaluate Decision 3 (Potential Soil Impacts to Groundwater) and respectfully disagree with the Tribe's position. As has been explained on several occasions, DOI and DTSC believe the use of conservative screening tools as a first-tier assessment for the potential for impacts to groundwater from soil contamination is appropriate and necessary. As has also been explained on several occasions, the use of the conservative screening tool has not been a significant driver of sampling activities. Use of the planned tiered approach for assessment of potential impacts to groundwater, as laid out in the DQOs for the project, allows for more site-specific assessment tools in the event that potential impacts to groundwater are identified with the conservative first-tier screening approach.	FMIT Response: The Tribe does not agree with the manner in which the DQOs are driving the extent of soil sampling. The level of needed resolution of DQO questions is not specified and much of the proposed sampling and the associated disturbance will be determined to be unnecessary in the Corrective Measures Study for soils. Please see FMIT letters dated July 23, 2012 and November 30, 2012, appended below.
47	DOI #10	Table 4-1 SWMU 1 Decision 3 – Potential Impacts to Groundwater	DOI	Revise text to say "Vertical extent of contamination information …"	Typographical error – text was revised as requested.	DOI Response: Resolved

Response to Comments on the

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Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
		Page 4-2				
48	DOI #11	Table 4-1 AOC 1 Decision 1 – Nature and Extent Bullet 3 Page 4-2	DOI	Revise text to say "Chemical concentration in soil and sediment …"	Typographical error – text was revised as requested.	DOI Response: Resolved
49	DOI #12	Table 4-1 "AOC 4" Page 4-2	DOI	Data gaps were not previously defined nor agreed upon for AOC 4.	Discussion of the AOC 4 data with the agencies and stakeholders, coupled with a site walk to assess and agree upon data gaps, is welcomed.	DOI Response: Resolved
50	DOI #13	Table 4-1 AOC 4 Decision 1 – Nature and Extent Bullet 3 Page 4-2	DOI	This is addressed by the second AOC 4 data gap.	The second bullet identifies the undefined vertical extent across the AOC as a data gap, and the third bullet identifies the undefined lateral and vertical extents at the mouth of the ravine near and in Bat Cave Wash as data gaps, which is located outside of the AOC.	DOI Response: Resolved pending review of Table 4-1.
51	DOI #14	Table 4-1 "AOC 9" Page 4-3	DOI	Three data gaps were previously defined and agreed upon for AOC 9.	Please see response to Comment 45 (DOI Comment #9).	DOI Response: Resolved
52	DOI #15	Table 4-1 AOC 9 Decision 4 – Data Sufficiency for CMS/FS Page 4-3	DOI	A second data gap was identified for this decision (Data Gap #6 - Total chromium, hexavalent chromium, and lead leachability data (for waste handling and disposal considerations).	Please see response to Comment 45 (DOI Comment #9).	DOI Response: Resolved
53	DOI #16	Table 4-1 "AOC 10" Page 4-3	DOI	Eight data gaps were previously defined and agreed upon for AOC 10. Data gap #5 - Location of potential additional storm drains adjacent to the employee parking lot was presumably moved to the storm drain investigation. It appears some data gaps have been grouped together. It would be better to keep the data gaps separate and numbered as previously agreed upon.	Please see response to Comment 45 (DOI Comment #9).	DOI Response: Resolved
54	DOI #17	Table 4-1 "AOC 11" Page 4-3	DOI	Eight data gaps were defined for this AOC, but data gap #1 was made irrelevant by DOI/DTSC final revisions to sampling table.	Correct. The initial data gap #1 that was made irrelevant by DOI/DTSC final revision to the sampling table was deleted as a data gap, and the data gaps for this AOC were renumbered in Appendix A, Subappendix C5. Table 4-1 was corrected to show the seven data gaps.	DOI Response: Resolved
55	DOI #18	Table 4-1 "AOC 14" Page 4-3	DOI	Five data gaps were defined for this AOC, but Data Gap #4 – refining the vadose zone leaching model, was made irrelevant by DOI/DTSC final revisions to the sampling table.	Correct. The initial data gap #4 that was made irrelevant by DOI/DTSC final revision to sampling table was deleted as a data gap, and the data gaps for this AOC were renumbered in Appendix A, Subappendix C7. Table 4-1 is also correct.	DOI Response: Resolved
56	DOI #19	Table 4-1	DOI	Please explain why is UA-1 is not applicable.	Since analytical data have not been collected at UA-1, the DQO Decisions 1 through 4 are not applicable. However, if analytical data are collected in this area in the future,	DOI Response: This response is not consistent with Appendix A, which clearly

Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
		UA-1 Page 4-3			DQO decisions will be used to evaluate the data.	associates UA-1 with at least the nature and extent of contamination decision. For UA-1, the first step in the assessment is to determine whether or not the suspect pipes are in fact buried at UA-1. Therefore, for Decision 1, DQOs can and should be specified. Whether or not the other decisions apply will be determined by the presence or absence of the pipes. PG&E Response: The following was added to Table 4-1 under Decision 1 for UA-1: "Assess whether or not the suspected pipes are buried in UA-1 or UA-1 alternate." DOI Response: Resolved
57	DOI #20	Section 4.2 Soil Part B Data Evaluation Process first paragraph last sentence Page 4-4	DOI	Please clarify why Category 1 and 2 data are appropriate for Decision 1 – nature and extent of contamination, but not Decision 4 – potential off-site migration.	The data analysis for the decision requires evaluating whether the chemicals of potential concern (COPCs) detected pose a potential risk to human and/or ecological receptors outside the fence line. Risk determinations can only be made using Category 1 data. However, non-Category 1 data (that is, XRF screening) will be used to help evaluate potential offsite migration pathways from the compressor station to offsite areas. Text was added to this section stating the use of non-Category 1 data.	DOI Response: Although the decision is framed in terms of risk, the decision also incorporates a potential surface migration pathway assessment component that would benefit from consideration of non-Category 1 data. For example, PG&E is currently developing a plan to use XRF screening to evaluate potential offsite migration pathways from the compressor station to offsite areas. The section should distinguish between the use of only Category 1 data to assess risk and use of other data types to support assessment of migration pathways. PG&E Response: Response revised DOI Response: Resolved
58	DOI #21	Section 4.2 Soil Part B Data Evaluation Process "Decision 2" Page 4-4	DOI	Delete typo "data exist <u>for</u> within the…"	Typographical error – text was revised as requested.	DOI Response: Resolved
59	DOI #22	Section 4.2 Soil Part B Data Evaluation Process "Decision 4" Page 4-4	DOI	It is understood that Category 1 data would be needed for any risk evaluation, but it is not clear why the assessment of off-site migration potential would be limited to Category 1 data. Please clarify.	See response to Comment 57 (DOI Comment #20).	DOI Response: See comment resolution notes for Comment 57 above. PG&E Response: Response for Comment 57 has been revised.
60	Specific 14	Section 4 – p. 4.4 (Decision 3)	FMIT	This Decision Rule is titled Soil SSL but really is an evaluation of potential impacts to groundwater. See above comment (Comment # 13) in regard to potential impacts to	The referenced text provides a description of the evaluations to be conducted pursuant to Decision 3; it does not provide a name for Decision 3. Decision 3 is	

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From

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Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
				groundwater.	correctly identified in the first paragraph of this section as addressing potential threat to groundwater from residual contamination in soil.	
61	DOI #23	Section 4.2, page 4-4, Decision 5	DOI	The intent of referencing the Part A Investigation Areas is unclear. To be consistent with the Soil Part B DQO document, the data sufficiency evaluation should support the Part B CMS/FS, remedial design, and /or Interim Measures, if required.	The reference to the Part A investigation areas is a typographical error. The reference was revised to the Part B investigation areas.	DOI Response: Resolved
62	Specific 15	Section 4 – p. 4.4 (Decision 5)	FMIT	The criteria for sufficient information to plan the CMS/FS should be specified in general so the reader (without having to read the entire appendices) can understand the level of certainty needed for this criterion. For example, is an estimate of soil volume within 10-fold (an order of magnitude) sufficient? More detail is needed here.	As presented in the Part B DQO Technical Memorandum, the purpose of Decision 5 is to determine the site-specific soil property, contaminant distribution, and transport pathway information required to support development of the CMS/FS, remedial design, and Interim Measures, if required. If full determination of site-specific soil property, contaminant distribution, and transport pathway information based on sample data is not feasible, the impediments will be documented, and uncertainties will be addressed in the risk assessment and/or CMS/FS or Interim Measures. This detail was added to Section 4.2 for clarity. Specific guidance dictating accuracy for soil volume estimates in the CMS/FS does not exist. Engineers rely on best judgment to assess whether or not sufficient data have been collected to calculate soil volume estimates to be used in assessing the various remedial alternatives in the CMS/FS. The Topock Soil RFI/RI Program has accounted for limiting uncertainties by following the Part A and Part B DQO Technical Memoranda. Uncertainties in soil volume estimates will be reduced if Part A and Part B DQO Decision 1 – Nature and Extent are satisfied.	<u>FMIT Response: The Tribe does not agree with the manner in which the DQOs are driving the extent of soil sampling. The level of needed resolution of DQO questions is not specified and much of the proposed sampling and the associated disturbance will be determined to be unnecessary in the Corrective Measures Study for soils.</u> Please see FMIT letters dated July 23, 2012 and November 30, 2012, appended below.
63	Specific 16	Section 4 – p. 4-5	FMIT	Will the same criteria/requirements be applied to samples collected the perimeter and storm drain areas as Part A?	The same interim screening levels applied to areas outside the fence line (Part A screening levels) will be used for the perimeter area and storm drain investigation programs.	
64	DOI #24	Section 4.2, page 4-5	DOI	The discussion notes that perimeter and storm drain investigation areas that exceed background/screening levels will be "assigned to the applicable Part A or Part B unit(s)". It is not clear if this referring to specific AOCs and SWMUs or how the "assignment" will occur. It may be more appropriate to address these separately depending on the contaminant or level of contamination (such as "hot spots").	The goal is to combine data from the perimeter and storm drain investigation areas with logical nearby investigation areas in those areas where perimeter and/or storm drain investigation areas show contamination above interim screening levels for areas outside the fence line. Designating a perimeter area unit is not proposed because the potential sources and extents of any releases are likely to differ from location to location. This is similar for the storm drain investigation. Storm drain outfall locations are generally located close to an existing Part A unit. The text in this section was revised to read as follows: "Once these investigations efforts have been completed, data collected for the Perimeter Area and storm drain investigation programs will be assessed in the same manner as data from new units to evaluate whether contamination is present and, if so, the nature and extent of contamination have been adequately delineated. Once data collection has been completed pursuant to this Work Plan, data generated from the Perimeter Area and storm drain system investigation programs will first be reviewed to determine whether any constituents exceed background or applicable screening levels for organic compounds. Areas with exceedances of background concentrations and/or applicable screening levels for organic compounds will be assigned to the applicable Part A or Part B unit(s), if appropriate, or to a new individual unit/hotspot if detected contamination does not appear to be related to nearby existing units. Assignment of data to existing units would occur only after all data collection is complete (i.e., at the time that the boundaries of established units may be adjusted and/or the need for additional units may be identified). A description of the data evaluation process for the Perimeter Area and the storm drain system	

Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
					investigation is provided in Appendices C and D, respectively." In addition, the following revisions were made Section 2.2 (Evaluation of Perimeter Area Investigation Data) of Appendix C: "The data evaluation for the Perimeter Area will follow the general process established for soil samples collected at the compressor station. Soil sampling will be phased as described Section 1.4, above and in Section 2.2 of the main body of the work plan. All data will be validated as it is collected. After each phase of soil data collection, the validated data will first be compared to the interim screening levels (SLs) previously developed for areas outside the fence line, i.e., the same screening levels used for the Soil Part A Phase 1 investigation program (see Soil Part B DQO Tech Memo). PG&E will consult with the agencies after each phase of soil sampling to determine if additional soil samples are required. The need for additional samples will be determined in conjunction with any other pertinent data from samples within the compressor station fence line and/or downslope of the given Perimeter Area sample. Following soil sampling, if elevated levels of constituents are detected, a given Perimeter Area sample location or group of sample locations may be assigned to an existing RCRA unit (SWMU or AOC). This may occur following any of the potential phases of soil sampling, provided sufficient data are available. The following steps will be followed for assigning the data to an existing unit: 1) Assess data on a point-by-point basis and identify constituents detected at concentrations above SLs. 2) Identify nearest upslope and downslope units, and compare data to assess if they are similar (i.e., have similar types of constituents). 3) Determine, based on the site conceptual model for the Perimeter Area and the unit(s) in question if it is logically reasonable that detected constituents could have migrated to or from the Perimeter Area to or from the unit in question. (This step will consider factors such as topography/flow paths, distance to closest unit and possible earthmoving activities.) For example, any contamination found "upslope of" AOCs 1, 9, 10, and 11 and/or SWMU 1 is likely to have reached that unit. If the site conceptual model supports a connection between the Perimeter Area and an existing unit, the sample location(s) will be assigned to the unit to which it is most similar, and consequently also evaluated as part of the risk assessment for that unit. If constituents detected in the Perimeter Area appear to be unrelated to any near-by units, the area may be treated as a hot spot. If a hot spot is identified, the same data quality objectives applicable to the area outside the fence line will apply; that is, Decisions 1 through 4 will be evaluated for the hot spot. In the case of Decision 2, hot spots will be evaluated as discussed in the RAWP Addendum (ARCADIS 2008). That is, chemical-specific descriptive statistics for the exposure unit will be inspected, as well as well as the spatial distribution of the detected concentrations to identify hot spots. Spatial weighting techniques may then be employed to estimate an area-weighted exposure point concentration for the exposure unit. It should be noted that Perimeter Area data may be grouped differently in support of Decision 2, if appropriate based on the risk assessment work plan. The data collected during the Perimeter Area investigation will be evaluated to determine the most appropriate exposure assessment process. It is likely that potential exposures to receptors outside the fence line will drive the risk assessment for the Perimeter Area.	

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Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
					The Perimeter Area data will be further evaluated for the need for migration control based on the concentrations and types of constituents detected, the accessibility of the affected portion of the Perimeter Area, and the specific downslope area that may receive runoff from the affected portion of the Perimeter Area. Additionally, locations from within the fence line will be evaluated to assess if detected constituents around perimeter are likely to have originated from runoff within the fence line. If the detected constituents appear to have originated within the fence line of the compressor station, the apparent source will also be evaluated to assess any necessary steps to minimize the potential for further migration."Appendix D, Section 2.1 (Samples at Outfalls and Associated Lateral/Downslope Samples) was revised as follows: "If chemical constituents above interim screening levels are detected in samples from the outfalls and/or associated lateral/downslope samples, the sample data will be combined with the data from the closest downslope AOC (i.e., the AOC that would have received the discharge from the outfall). As shown in Figure D-1, Storm Drain Outfall 9, for example, is located above AOC 11. As for the Perimeter Area data, storm drain investigation data will be assigned to the appropriate unit following data evaluation and in consultation with the stakeholders." The potential sources for constituents to the outfall will be assessed by determining the types of activities that have occurred in the vicinity of the catch basins associated with the specific storm drain line.	
65	DOI #25	Section 5.1, page 5-1, Table 5-1	DOI	Although FWS/HNWR personnel have been involved in the review of the soil work plan, a specific HNWR approval is not anticipated. The DOI approval of the work plan will be on the behalf BOR, BLM and FWS. The SHPO text references approval by USFWS HNWR. This should be modified to reference DOI approval.	The text was revised as suggested.	DOI Response: Resolved
66	DOI #26	Section 5.1, page 5-1, 2nd paragraph	DOI	Portions of the proposed activities also occur on Bureau of Reclamation Land managed by the Bureau of Land Management.	The following sentence was added to the second paragraph on Page 5-1: "Portions of the proposed activities also occur on Bureau of Reclamation land managed by the BLM."	DOI Response: Resolved
67	Specific 17	Section 5 – p. 5-2 (Environmental Impact Report Mitigation Measures)	FMIT	PG&E's reference to the Final Environmental Impact Report (FEIR) for the groundwater remedy in terms of its relevance to the soils investigation is inappropriate as the FEIR was for groundwater final remedy actions only. Separate impact analysis and mitigation measures will be required for soils impacts. When will DTSC perform this required analysis? This determination must be made by DTSC as indicated on p. 5-2 in paragraph 2.	*DTSC Response*: DTSC is currently preparing a CEQA initial study to evaluate if there are new or significant impacts from the proposed soil investigation activities that have not yet been evaluated in the FEIR, dated January 2011. DTSC will prepare the appropriate CEQA document based on results of the initial study prior to approval of the Soil RFI/RI Work Plan.	FMIT Response: The Tribe believes that the disturbances to site soil from the sampling activities described in this Work Plan have not been comprehensively evaluated in terms of how they will be minimized and corrected. A complete evaluation, which includes Tribal participation, must be completed prior to the approval and implementation of any additional soil sampling. Please see FMIT letter November 30, 2012, appended below.
68	DOI #27	Section 5.3.2, Project Timing	DOI	The first paragraph states that the goal is to finish soil investigation activities by the end of January 2012. This should be updated to reflect the current schedule. The text should note that DOI and FWS are to be notified as soon as project delays are known in areas of species' habitat so we can determine if we need to evaluate the	The schedule was updated following completion of comment resolution, and the then-current schedule is reflected in the work plan. The following sentence was added to the text: "DOI and USFWS will be notified if any investigation delays occur in areas designated	DOI Response: Resolved

Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
				potential effects of the disturbance. Also, for clarification, DOI/FWS expect PG&E to implement the conservation measures for **all** migratory or nesting birds season (i.e., not just upland birds).	as sensitive species habitat." The last sentence of this section was modified as follows: "Should activities be delayed and take place within the avian migration or nesting season, the required measures outlined in the PBA will be implemented for any ~~upland~~ migratory or nesting birds <u>that may be affected</u>."	
69	DOI #28	Section 5.3.3, Project Location and Habitat Sensitivity	DOI	Several typographic errors are noted and should be corrected. The text in the last paragraph of this section discusses how the activities in the work plan will not take place in areas where Yuma clapper rails potentially occur or are known to occur. If additional sediment, pore water, or other types of sample are collected from the marsh habitat where the East Ravine meets the lower Colorado River, you will have to update this section.	Typographical errors in this section were corrected. The sampling approach near the mouth of East Ravine area was developed and presented to the agencies for approval. This section was updated to reflect the proposed approach. The proposed approach is presented in Appendix A, Subappendix C4 as Attachment 1.	DOI Response: The agencies have directed PG&E to perform sampling in this area. Please update the text. Pending review of approach. PG&E Response: Response revised. DOI Response: Resolved.
70	DOI #29	Section 5.3.4, Habitat Loss	DOI	It would be helpful to add one more sentence summarizing how much of the 2.5 acres of floodplain vegetation and of the 3.0 upland acres have been disturbed. One item to note is that no destruction of wetland habitat was covered in the PBA or concurrence letter. If you sample in the wetland downstream of the East Ravine (where it meets the river), you might need to contact the FWS/CFGD to evaluate the potential effects of sampling sediment or pore water in the wetland to the Yuma clapper rail. The Bureau of Reclamation does not survey for nesting Yuma clapper rails in the wetland below the East Ravine; therefore, you may need to conduct surveys.	Soil sampling is proposed in floodplain and upland areas, at existing areas of concerns/solid waste management units (AOCs/SWMUs), new AOCs, mouth of Bat Cave Wash in the upland, and mouth of East Ravine on the floodplain. Sample collection is anticipated to be accomplished by manual and mechanical means. Samples of submerged soils may be collected from a water craft in the mouth of East Ravine. These activities may disturb up to 1.5 acres in the floodplain and 2 acres in the upland areas. Current cumulative acreages[1] disturbed are 0.082 acres in the floodplain and 1.6 acres in the upland area. PG&E will contact USFWS/California Department of Fish and Game and will conduct surveys as necessary, depending on the final sampling approach for the mouth of the East Ravine (see response to Comment 304, DOI #113). ------------- [1] Per the "Cumulative Project Footprint Update (2007-2009) for Field Work Performed Under PBA" dated February 2010 and the "Biological Resources Completion Report for AOC4 Removal Action" dated February 2011.	DOI Response: Please update response PG&E Response: Response revised DOI/USFWS requested a summary of the amount of land disturbed per the PBA. PG&E has not responded or added any text to address that comment. PG&E Response: Response revised DOI Response: Resolved
	DOI #30			Note: This Comment Number was omitted in the DOI Comment letter	<u>*DOI Response:*</u> Noted. Comment numbering was incorrect on the original DOI submittal.	
71	DOI #31	Section 5.3.6, Listed Species Determinations	DOI	Please include a sentence or two summarizing the results from previous years' biological surveys for the southwestern willow flycatcher and Yuma clapper rail. For example, no nesting southwestern willow flycatchers have been detected in California. However, birds have been detected at Sites 4 (tamarisk thicket) and 5 (under the bridges). Have you ever detected any Yuma clapper rails at Sites 4 or 5 during the flycatcher surveys?	The following was added to the work plan: "In 2005, 2007, 2008, and 2009, transient southwestern willow flycatchers were occasionally been detected, especially at the Arizona survey sites. No nesting pairs of the southwestern flycatchers have been detected during the surveys at any of the survey sites, including California survey sites. Notable observations during the surveys were western yellow-billed cuckoo, Yuma clapper rail, Arizona Bell's vireo, and brown-headed cowbird that were at call points located in the Arizona survey area. A single western yellow-billed cuckoo has been observed 3 years in a row, indicating they may be breeding in the area. As of the 2010 biological survey, a Yuma clapper rail was also observed for the third straight year.	DOI Response: Resolved
72	Specific 18	Section 5 – p. 5-5 (5.4 Archaeological Surveys and Reviews)	FMIT	The Tribe has previously commented on the limitations of archaeological surveys in regard to Tribal cultural interests. Additionally, there have been a number of archaeological surveys performed without Tribal participation. Based on the perennial omission of this consideration from PG&E work plans, it is evident that Tribal interests are either being ignored or are misunderstood. The position and basis for concern of the Tribe cannot be stated more clearly than in the citation presented in Comment #12. A section presenting this Tribal perspective must be included in all Work Plans	<u>*DOI Response:*</u> In accordance with the Programmatic Agreement (PA), tribal and archaeological monitors will be invited to monitor the field work, including the cultural and archeological surveys. <u>*DTSC Response*</u>: Tribal interests are not being ignored, and DTSC has and will continue to coordinate with the Tribes to further understanding of the Tribe's concerns and interests.	<u>FMIT Response</u>**:** <u>The Tribe requires that Tribal Monitors be present during any activity that would disturb soil, vegetation or might uncover artifacts or any site surveys designed to identify such activities.</u> Please see FMIT letter November 30, 2012,

Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
				involving intrusions and disturbance to the sacred grounds.	PG&E attempted to capture the Tribe's perspective in the concluding paragraph to Section 5.0. If the Tribe feels that further clarification is needed, DTSC welcomes the additional clarification.	appended below.
73	Specific 19	Section 5 – p. 5-6	FMIT	The concluding paragraph on p. 5-6 does not capture the distinction between physical vs. spiritual impacts. The need for awareness and sensitivity extends beyond orientation of field workers and conduct of work in a "respectful manner" also requires deference to the Tribal monitor(s)/Tribal Cultural Experts overseeing the work.	*DOI Response*: In the previous work plans, biological and archeological surveys were performed prior to and following work at a site. Currently, each of the work plans requires a formal walk-through to verify that there is no impact to archeological sites. BLM will require PG&E to make it clear in each work plan that tribal monitors are welcome to come along during these reviews. DOI recognizes that the Tribes hold special value to the area and believe that impacts go beyond the physical realm. If the Tribes would like to provide specific language to further clarify this distinction, it would be helpful. In accordance with the PA, tribal and archaeological monitors will be invited to monitor the field work, including the cultural and archeological surveys. BLM will acknowledge the role of tribal monitor guidelines in a manner that is consistent with the PA; however, the additional requirement of deference to tribes is not consistent with the PA. BLM believes that it is the responsibility of tribal monitors to speak up immediately when they are concerned during work on the site. *DTSC Response*: Please see related comment and response above.	
				Appendix A		
74	DOI #32	Appendix A, Main Text, General Comment 1, Data Usability For Human Health and Ecological Risk Assessment	DOI	In general, the RFI/RI Work Plan (RFI/RI WP) used point by point comparisons to benchmark concentrations to assess data gaps. Much of the future use of the data will involve looking at the data in combined grouping. The WP does not specifically address the current data, or future use of the data from a human and ecological risk assessment perspective. According to the Risk Assessment Work Plan (RAWP) (Arcadis August 2008), data aggregation for human health (HH) risk assessment will produce two data sets: Bat Cave Wash (SWMU 1 and AOC 1) and all other AOCs (outside the fence) combined. For ecological risk (ECO) assessment, data will be aggregated by AOC. These groupings may pose some analysis dilemmas including:	The work plan addresses current data, including data from the Phase 1 sampling, in the data usability matrix format previously requested by DOI (Table A-1 in Subappendix A). For example, see Table A-1 for AOC 1 and SWMU 1. Columns for "Horizontal Coverage" and "Vertical Coverage" indicate the sample count from previous sampling events and also from Phase 1 sampling. Also see Table C2-13 for AOC 1 and SWMU 1 in Subappendix C2 of Appendix A, where data from previous sampling events and Phase 1 sampling were included in the sample counts. In addition, Subappendices C1 through C10 of Appendix A include text specifically describing all current data, per exposure interval/AOC/constituent for each SWMU/AOC to assess whether a representative EPC could be calculated for each AOC. The text in Section 3.0 of Subappendices C1 through C10 acknowledges that representativeness is dependent on satisfactory resolution of Decision 1. The assumption is that if representative EPCs can be calculated for each AOC, then a representative EPC can be calculated for combined AOCs.	DOI Response: Resolved
				a) Unbalanced Data Sets. It is likely that when the existing data and Phase 2 data sets are combined, there may be unbalanced data sets that may complicate the nature and extent of contamination assessment and the risk assessment (i.e., comparability may be compromised, representativeness may not be uniform). An unbalanced data set is one where the analytical suites are not uniformly reported across all samples in the aggregation (see below). Sample A / Sample B / Sample C Title 22 metals / Title 22 metals / - PAH's / - / PAH's PCB's / - / PCB's Dioxins/furans / Dioxins/furans / -	**a)** A biased sampling approach is being used for site characterization and, therefore, unbalanced datasets are inevitable and the data will likely be biased toward an overestimate of risk for the entire exposure unit. If required, PG&E can provide a discussion of uncertainties and direction of bias in the uncertainty analysis section of the risk assessment. The spatial coverage of the sampling over the entire exposure unit can be reviewed, and any biases (for example, more intensive sampling of certain AOCs) can be noted. The risk assessment can provide an explanation of why that is the case and the implications it has for the risk estimates. The use of frequency of detection can also be applied to rule very judiciously in the COPCs/ chemicals of potential ecological concern (COPECs) selection process with an understanding of the lack of uniformity in analytes and spatial coverage. Comparability and representativeness of data by exposure area was presented in the data usability matrix (Table A-1 in Subappendix A of Appendix A), which incorporates all current data (that is, from previous sampling	DOI Response: Please acknowledge that PG&E, DOI, DTSC, and stakeholders will need to work through a process on the grouping of data, data comparability, and representativeness. The process will also address different analytical profiles, spatial interpretation, and computing EPCs. The process may include working groups, demonstrations, and technical memoranda. PG&E Response: See revised response to Absolute Comment 74e.

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<tr><th>Absolute Comment No.</th><th>Agency/Tribe Comment No.</th><th>Comment Location (Section/Page)</th><th>Commenter</th><th>Comment</th><th>Response [a]</th><th>Comment Resolution</th></tr>
<tr><td></td><td></td><td></td><td></td><td><table><tr><td>Cr VI</td><td>Cr VI</td><td>Cr VI</td></tr><tr><td>Cr Total</td><td>Cr Total</td><td>-</td></tr><tr><td></td><td></td><td></td></tr></table>Considering the spatial aggregation over large areas and the intention of combining of data sets (existing data and Phase 2) collected under different DQO’s, please provide a preliminary approach describing how data comparability and representativeness will be considered in the nature and extent of contamination assessment and the HH and ECO risk assessment (e.g., how will spatial relationship integration, Chemical Of Potential Concern [COPC] identification, and Exposure Point Concentration [EPC] calculation be affected and the influences addressed). This discussion should incorporate appropriate elements from the RAWP as well as suitable regulatory guidance (e.g., EPA’s Data Quality Assessment: A Reviewer’s Guide, Data Quality Indicators /Assessment Guidance) as well as data quality indicator discussed in Appendix H dealing with representativeness and comparability.</td><td>events and Phase 1). A similar comparability and representativeness evaluation will be conducted using proposed Phase 2 samples and will be presented in the revised Soil RFI/RI Work Plan. The data usability matrix will be updated again in the risk assessment after the completion of Phase 2 sampling and analysis. The RAWP Addendum discusses use of spatial weighting to estimate EPCs.</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td>b) Identification of Hot Spots. According to the RAWP (Arcadis 2008), small exposure areas may be identified for evaluation (i.e., hot spots or clusters). The RAWP indicates that hot spots will be identified by evaluating the site data for outliers. There are references to hot spot identification in the RFI/RI WP using qualitative and quantitative outlier techniques, (e.g., the March 2010 Revised, Data Quality Objectives Steps 1 through 5 – Part A Soil Investigation Tech Memo). The RFI/RI WP should present an up to date approach to how Hot Spots will be identified for risk assessment and source identification, and how the Phase 1 data, in conjunction with the existing data, will support the approach.</td><td>b) The RAWP and RAWP Addendum mention examples of how hot spot evaluations can be conducted for the site. A thorough description of the Thiessen polygon spatial weighting technique, along with literature references, was provided to the agencies as an attachment to the November 6, 2008 meeting notes and is included, along with discussion of other spatial assessment techniques, as an attachment to the revised Soil RFI/RI Work Plan.</td><td>DOI Response: Please include the “thorough description of the Thiessen polygon spatial weighting technique, along with literature references” as an attachment in the work plan or as a separate technical memorandum rather than referencing notes from a previous meeting. Additionally, please provide a discussion of other spatial assessment techniques (for example, kriging) that could reasonably be used in the assessment.

PG&E Response: see revised response to Absolute Comment 74b.

DOI Response: Resolved</td></tr>
<tr><td></td><td></td><td></td><td></td><td>c) Data Usability Matrix Table A-1, Data Usability Matrix for Soil Risk Assessment (see RCRA Facility Investigation/Remedial Investigation Soil Investigation Work Plan, Part A, Data Quality Objectives Steps 1 through 5 Technical Memorandum (March 2010)) has not been updated to reflect the proposed Phase 2 sampling plans. This table was originally developed as a tool to permit risk assessors and other data users to gauge data adequacy, representativeness, completeness, and comparability as the soil sampling planning evolved. Please update with the proposed Phase 2 data and interpret the matrix in light of risk assessment needs. This activity could shed light on the unbalanced data sets comment and others in this general comment.</td><td>c) The data usability matrix (Table A-1 of Subappendix A of Appendix A) was prepared during the DQO meetings and discussions that occurred during the end of 2009 and the beginning of 2010. It is part of the record of submittals and approvals for the DQO process and, therefore, submitted as part of this Soil RFI/RI Work Plan. The data usability matrix was updated in the revised Soil RFI/RI Work Plan incorporating the proposed Phase 2 samples. The data that are available at this time, as represented by the sample counts presented in the data usability matrix, are the analytic data that were specifically used in the data gaps evaluation process to assess Decision 2. And, as discussed above and in response to other comments, this assessment concludes that the existing data are sufficient and adequate to calculate EPCs. Thus, the additional data to be collected during Phase 2 will only help bolster the estimation of EPCs. The data usability matrix will be updated again in the risk assessment after the completion of Phase 2 sampling and analysis.</td><td>DOI Response: Needs to be updated in accordance with October 27, 2011 discussions.

PG&E Response: See revised response to Absolute Comment 74c.

DOI Response: Resolved</td></tr>
<tr><td></td><td></td><td></td><td></td><td>d) Spatial Averaging Data and Interpretation. According to the RAWP (Arcadis, 2008), much of the soil data will be averaged over relatively large areas for exposure assessment and EPC computation. In simple numeric averaging the spatial relationships can be lost. Additionally, when averaging data over large areas, hot spots and clusters can be blended with other areas less impacted (and</td><td>d) See response to Comment 74 (b) (DOI Specific Comment 32b [above]). PG&E provided methods for performing spatial analysis in detail as an attachment to the notes from the meeting on November 6, 2008 with DTSC and DOI. The attachment included methods for use of Thiessen polygons to estimate spatial EPCs, including examples. The revised Soil RFI/RI Work Plan was revised to include an attachment</td><td>DOI Response: Please include the “thorough description of the Thiessen polygon spatial weighting technique, along with literature references” as an attachment in the work plan or as a</td></tr>
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From

Combined United States Department of the Interior (DOI), California Department of Toxic Substances Control (DTSC), Fort Mojave Indian Tribe (FMIT) and Hualapai Comments

Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
				vice versa). Previously PG&E had mentioned using spatial statistics (e.g., kriging), Thiesson polygons, or other methods to evaluate data over large areas. There is no reference to these spatial evaluation techniques (or others foreseen) in the RFI/RI WP. Please provide a discussion of how spatial relationships will be evaluated, the type methods that will be used in the data evaluation phase, and how the data specified in the RFI/RI WP, in conjunction with the existing data will support these methods.	presenting the use of Thiessen polygons to estimate spatial EPCs including examples, along with discussions of other spatial assessment techniques that could reasonably be used in the risk assessment.	separate technical memorandum rather than referencing notes from a previous meeting. Additionally, please provide a discussion of other spatial assessment techniques (for example, kriging) that could reasonably be used in the assessment. PG&E Response: See revised response to Absolute Comment 74d. DOI Response: Resolved
				e) Data Sufficient to Calculate EPCs. Section 4.2 of Appendix A assumes that the **existing** nature and extent of contamination evaluation is adequately representative as a basis for the ensuing evaluation of sufficiency to estimate representative EPCs and that this assumption will be verified after the Phase 2 data have been collected. This seems like circular logic. Please discuss plans for computing representative EPCs in the event that Phase 2 data is not determined to be adequately representative of the nature and extent of contamination. Section 4.2 also discusses how PROUCL sample size guidance and an evaluation of maximum concentration data was used to evaluate Data Gap 2. DOI does not agree with the conclusion at the bottom of page 4-2 that the soil and sediment data are adequate to support calculation of representative EPCs for HH and/or ECO risk assessment. There has been no assessment of the level of uncertainty that will be acceptable in the calculated EPCs. Please discuss how the conclusion is justified in light of circular logic noted above and the fact that acceptable bounds on the level of uncertainty in the EPCs have not been established. Considering the items above (e.g., spatial averaging, aggregation over large areas, hot spots, unbalanced data sets, un defined uncertainty limits), it unlikely that representative EPC's can be computed without extensive reliance on the use of maximum concentrations. Reliance on the use of maximums then goes back to adequacy of the nature and extent of contamination and the circular logic. Looking ahead to data quality assessment, data adequacy and its' use for risk assessment, please provide preliminary discussion of the assessment using data quality indicators, integration of individual AOC conceptual site models, and handling of identification and assessment of uncertainties will be handled and how underlying assumptions such as unbiased samples will be addressed in computing EPCs.	**e)** If nature and extent are not defined with an acceptable degree of uncertainty, the risk assessment will not proceed. Large uncertainties in the definition of nature and extent (high concentrations that are not bounded laterally) would mean large uncertainties in the risk assessment. As stated above, if sample collection efforts are not sufficient to conclude that there are data that can adequately define the nature and extent of the impacts, additional data would likely need to be collected before proceeding to the risk assessment step. The question posed by Decision 2 is whether the data are adequate to calculate a representative EPC; thus, as set forth in the DQO Tech Memo (Subappendix A of Appendix A), the determination about the adequacy of the data to calculate a representative EPC was based on the number of available samples, per each exposure interval, for each constituent that could be a risk driver (that is, those that exceed screening values). PG&E does not follow DOI's conclusion that the EPCs will likely be heavily reliant on maximum concentrations. However, even if that were the case, reliance on the maximum detected concentrations for some compounds does not necessarily mean that the nature and extent of impacts have not been adequately defined. That is a separate decision, which is based on a different set of analyses, than Decision 2. The qualitative approach to Step 6 (acceptable limits on decision error), described in detail on pages 7-1 and 7-2 of Appendix A, Soil Investigation Part A Phase 1 Data Gaps Evaluation Report, was previously discussed and agreed to with the agencies. As indicated in Subappendix C of Appendix A, there are not very many situations where relying on the maximum detected concentration to estimate an EPC is anticipated. And where EPC is based on the maximum detected concentration, PG&E does not believe that there are very many situations where additional data collection efforts will change the estimated EPC or the corresponding conclusions. Such situations are described for each chemical for each AOC in Section 3.0 of Subappendices C2 through C10 of Appendix A. Based on the discussions at the meeting with DTSC and DOI on October 27, 2011, going forward, PG&E, DOI, DTSC, and stakeholders will work through a process on the grouping of data and assessing data comparability and representativeness. The process will also address different analytical profiles, spatial interpretation, and computing EPCs. The process may include working groups, demonstrations, and technical memoranda.	DOI Response: Resolved PG&E Response: See revised response to Absolute Comment 74e.
75	15	Appendix A Part A Data Gaps Investigation Program	DTSC	Inconsistencies are present throughout the Part A data gaps investigation program with regards to information between the DOI-DTSC joint-letter dated February 25, 2011, the "crosswalk" table provided to the agencies via email from PG&E on June 1,	The inconsistencies were corrected.	DTSC Response: Resolved

Response to Comments on the

***Soil RCRA Facility Investigation/Remedial Investigation Work Plan, Pacific Gas and Electric Company (PG&E) Topock Compressor Station, Needles, California,* Issued May 2011**

From

Combined United States Department of the Interior (DOI), California Department of Toxic Substances Control (DTSC), Fort Mojave Indian Tribe (FMIT) and Hualapai Comments

Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
				2011, and the draft soil RFI/RI Work Plan. For example, the list of analytes in the Work Plan does not contain all the previously identified analytes as indicated in the DOI-DTSC letter. Such as AOC11c-3 where PAHs are not proposed in the Work Plan but is identified in the crosswalk table and; AOC11-2 and AOC11-3 where PCBs are not listed in the Work Plan but are identified in the DOI-DTSC letter and crosswalk table. DTSC recommends that PG&E carefully review the information proposed in the Work Plan to ensure that they accurately reflect all agency directions and previously agreed upon items. Any deviations should be presented and discussed with the agencies.		
76	Specific 20	APPENDIX A – Part A Data Gaps Investigation Program – p. 1-1, para. 3 (Introduction)	FMIT	The report gives the purpose of the 2-phase approach to soil sampling as “to minimize the number of samples and disturbance.” This is an interesting claim as the original November 2006 Part A Work Plan does not claim such a goal and neither does the implementation of the sampling suggest adherence to such a goal. The Tribes have, since the beginning, requested that minimal sampling be performed and only that which is necessary to characterize the Site for the remedial investigation.	*<u>DTSC Response</u>*: Please refer to response to Absolute Comment 10. As discussed in previous Technical Working Group/Cooperative Working Group (TWG/CWG) meetings and as reflected in the DTSC-DOI letter to PG&E dated February 25, 2011, the agencies carefully evaluated previously proposed sample locations to minimize sampling and disturbances but still be able to collect the data required to satisfy the DQOs for the investigation. DTSC recognizes the importance of reaching a balance between properly optimizing data collection and the risk of reaching an improper remedy decision that may lead to additional impacts in the future.	
77	Specific 21	APPENDIX A – Part A Data Gaps Investigation Program – p. 1-2, para. 3 (Introduction)	FMIT	Please state the number of samples removed as a result of input received from the tribe(s).	The text was revised to state the number of samples removed as a results of input received from the Tribes. The DOI/DTSC direction letter will also be referenced.	
78	DOI #33	Appendix A, Main Text, Section 1.3 Purpose of Soil Part A Phase 1 Data Gaps Evaluation Report second paragraph last sentence Page 1-4	DOI	A sentence or footnote needs to be added discussing the renumbering of the sample locations in comparison to previous versions and providing reference to the crosswalk table (provided to agencies) that should be included in the document.	The crosswalk table provided to the agencies was included in the document as Table 1-1 of Appendix A. The following sentence was added to the end of the eighth paragraph of Section 1.0: “The proposed Phase 2 sample locations presented in the September 2010 Draft Topock Part A Phase 1 Data Gaps Evaluation Report (CH2M HILL, 2010) were renumbered to reflect the changes made by DOI and DTSC. Table 1-1 is a crosswalk table showing how the proposed Phase 2 sample location numbering has changed since the 2010 Draft Report.”	DOI Response: Resolved
79	Specific 22	APPENDIX A – Part A Data Gaps Investigation Program – p. 2-2, 3rd bullet (Overview of Data Gaps Evaluation Process)	FMIT	The DQO regarding potential impact to groundwater has to date been based on a conservative methodology (i.e., one that over predicts impacts). This results in additional and unneeded samples and site disturbance. Less conservative modeling, in addition to consideration of current groundwater quality conditions at the location under consideration should be the criteria for additional samples to address this DQO issue.	Please see response to Absolute Comment 46/FMIT Specific Comment 13.	
80	Specific 23	APPENDIX A – Part A Data Gaps Investigation Program – p. 3-2 (Comparison Values)	FMIT	This section lists multiple comparison criteria that are used to determine if additional sampling is needed. With the exception of ecologically-based screening criteria, none of the other risk-based criteria are relevant to the areas of this project. Many areas of the site are drainages and will not be developed into residential areas (the underlying basis for these criteria). In addition, upland areas are sacred Tribal land and should be left undeveloped and available for Tribal use. Therefore, the only appropriate human health-based comparison criteria are related to Tribal land uses. A preferred approach would be to calculate these values and use them as comparison criteria. This would reduce the number of needed samples. An alternative approach would be to acknowledge that these Tribal-based land use criteria are more relevant than the listed comparison values and consider this when deciding on the need to collect additional samples.	*<u>DOI Response:</u>* DOI Response: As discussed in DOI’s September 29, 2011 letter to Tribe leaders, for the purposes of the ongoing soil investigation and the baseline risk assessment, the future land use assumptions for USFWS-managed refuge will be limited to recreational and tribal uses. The future land use assumptions for BLM-managed land should remain conservative and reflect a residential scenario. In the future, however, institutional controls will appropriately be considered in evaluating the remedial alternatives. The agencies respectfully disagree with this position. Appropriate soil screening levels to be used in the assessment were selected based on discussions among the agencies, PG&E, the Tribes, and stakeholders that occurred over many months. There are other land use considerations beyond tribal use such as residential use of limited areas, ecological use, and industrial use that apply for the site. As discussed above, the	<u>FMIT Response: The Tribe believes that the cleanup of the site should be based on future Tribal land uses.</u> Please see FMIT letters dated July 23, 2012 and November 30, 2012, appended below.

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Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
					agencies welcome further discussions with the Tribes about the details of anticipated tribal uses; however, we continue to believe that the current screening criteria proposed in the work plan best reflect the range of potential uses and impacts for the site. *PG&E Response:* This discussion of comparison values is presented as part of Decision 1 for nature and extent. Sample collection needs are based not only on land use considerations (that is, tribal vs. potential residential) but also on adequate lateral and vertical characterization of the nature and extent of contamination. Nature and extent adequacy has been determined by the agencies to be at or near background when background is below human health-based criteria. Background threshold values are the first comparison value listed in this section. Background levels for most metals (the driving compounds for the locations outside the fence line subject to traditional tribal use in Part A areas) are typically below human health-based criteria, making background the most frequent driver for additional soil sample collection. A notable exception to this general rule is arsenic. See also response to Comment 2 (FMIT General Comment 2).	
81	DOI #44	Appendix A, Main Text, Tables Table 3-1	DOI	Comments related to Table 3-1 • Table 3-1 and the document, in general, sites Chromium VI soil screening values that are not current with EPA's toxicity model. The current RSL residential (RRSL) for Chromium VI is 0.29 mg/kg (vs. 230 mg/kg used in Table 3-1 [i.e., the former RRSL] and the CHHSL [17 mg/kg]). According to the various tables throughout, the background value (BGV) [0.83 mg/kg] was usually used in the screening rationale and the lower RRSL should not affect the human health risk screening results. Nonetheless the RRSL's (Residential and Commercial) cited the in various tables are incorrect and should be corrected. Please respond by acknowledging this change in the Cr VI toxicity constant and make the appropriate changes in the tables in affected appendices. As tables are corrected throughout the document, please verify that use of the correct RRSLs for Chromium VI does not affect any of the screening results. This change in the Cr VI toxicity could have significant effects on future risk assessments. Please consider and discuss, if appropriate, how this change could affect human health soil risk assessment. • The Mercury Residential RSL 23 mg/kg is for Mercuric Chloride (and other Mercury salts). EPA lists an RSL of Residential RSL of 5.6 mg/kg for mercury (elemental). Unless PG&E has information supporting the Mercuric Chloride RSL, the elemental mercury RSL (5.6 mg/kg) should be used. Please make the change and determine whether it impacts any of the analysis. • A thallium Residential RSL of 5.1 mg/kg is listed. The November 2010 version of EPA's RSL's does not list a value for thallium. Please clarify.	Use of the new regional screening level (RSL) for hexavalent chromium (Cr[VI]) (0.29 mg/kg) will not impact the selected screening level, as the background (0.83 mg/kg) will be selected because it is greater than the lowest California human health screening level (CHHSL) (now 0.29 mg/kg). Therefore, the data gaps evaluation will not change based on the revision of the RSL. This was acknowledged in the revised Soil RFI/RI Work Plan. The new RSL for Cr(VI) will be incorporated into the next round of data gaps evaluations after the implementation of the Soil RFI/RI Work Plan. Table 3-1 and other tables were updated in the revised work plan with the current RSL of 0.29 mg/kg for Cr(VI) because it will not impact the selected screening level. Mercury can exist in the mercuric Hg+2 or mercurous Hg2+2 state naturally in soils containing ores. Thus, mercury measured in soils is assumed primarily to be from the salt form and not the elemental (Hg0) form. Accordingly, the residential RSL for mercuric chloride (and other mercury salts) was selected as the appropriate value for screening mercury concentrations measured in soils. Note to date, that mercury concentrations in soils are all below 1 mg/kg. Thus, the use of the residential RSL for elemental mercury, as recommended by DTSC (and DOI) would not change the conclusions of the data gaps analysis nor the selection of proposed sampling locations. Accordingly, as recommended by DTSC and DOI, the residential RSL for elemental mercury was used in the Soil RFI/RI Work Plan. The current residential CHHSL for thallium is 5.1 mg/kg, which is equivalent to the previous residential RSL. This value is the best regulatory toxicity information available for thallium for use in the soil risk assessment. This was acknowledged in the Soil RFI/RI Work Plan. This appears to be a conservative approach, based on some of the reasons the value is being reevaluated by the United States Environmental Protection Agency (USEPA). The following is a brief synopsis: "The oral reference dose (RfD) used in the derivation of the previous residential RSL for thallium of 5.1 mg/kg has been withdrawn by USEPA from the IRIS database as of September 30, 2009. Previously, the IRIS database contained separate IRIS summaries for each of the five soluble thallium salts [thallium (I) acetate, thallium (I) carbonate, thallium (I) chloride, thallium (I) nitrate, and thallium (I) sulfate] that were posted in	DOI Response: Resolved PG&E Response: See revised response to Absolute Comment 81. DTSC Response: DTSC recommends updating the table to reflect the current RSL for Cr(VI). PG&E Response: Table 3-1 has been updated with the current Cr(VI) RSL. DTSC understands that potential releases of mercury at the PG&E site would have included elemental mercury. DTSC concurs that the RSL for elemental mercury should be used. DTSC Response: Resolved

Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
					1988. The previous RfD values for these soluble salts, ranging from 8×10^{-5} to 9×10^{-5} mg/kg-day, were based on the same principal study (Midwest Research Institute [MRI], 1988). The available toxicity database for thallium contains studies that are generally of poor quality. The MRI study (MRI, 1988) that was selected as a candidate principal study suffers from certain critical limitations (for example, high background incidence of alopecia, lack of histopathological examination of skin tissue in low- and mid-dose groups, and inadequate examination of objective measures of neurotoxicity), and there are particular difficulties in the selection of appropriate endpoints and uncertainty factors".	
82	DOI #69	Appendix A, Main Text Tables Table 3-2	DOI	Please add a note identifying the basis of the consensus-based concentrations (the MacDonald, et al., 2000 article).	The following note was added to Table 3-2 in Appendix A: "The empirically based threshold effects concentrations and probable effects concentrations (TECs and PEC)s were developed as 'consensus-based' screening concentrations (MacDonald et al., 2000). Consensus-based SQGs were developed to provide a unifying synthesis of existing sediment guidelines and to account for chemical mixtures (MacDonald et al., 2000). The two sets of consensus-based SQGs developed are the TEC (below which adverse effects are not expected to occur) and the PEC (above which adverse effects are expected to occur)."	DOI Response: Resolved
83	DOI #70	Appendix A, Main Text Tables Table 3-2	DOI	Why doesn't Table 3-2 include organic constituents (e.g., PAHs and PCBs) from MacDonald (et al., 2000) article?	Table 3-2 was updated to include available TECs and PECs from MacDonald et al. (2000) for organics that were detected in sediment.	DOI Response: Resolved
84	DOI #71	Appendix A, Main Text Tables Tables 3-3 to 3-7	DOI	As indicated, EPA Regional SLs were updated in November 2010. Please update these tables and any consequent analysis, as necessary.	Please see response to Comment 81. For those constituents not mentioned in the comment, the updated USEPA RSLs will not change the screening levels used in the Part A, Phase 1 data gaps evaluation, which were either the Topock-specific background value or the ecological comparison value. Therefore, incorporating the updated November 2010 RSL into the Draft Final Part A, Phase 1 Data Gaps Evaluation Report will not change the identified data gaps. This is acknowledged in the revised Soil RFI/RI Work Plan. The most current, applicable USEPA RSL will be used to conduct the next data gaps evaluation after the collection of the Part A Phase 2 samples. Table 3-1 and other tables were updated in the revised work plan with the current RSL of 0.29 mg/kg for Cr(VI).	DOI Response: As discussed in the October 27, PG&E does not need to update the tables. Rather PG&E will add introductory language that, while USEPA's RSLs changed, the change did not affect the evaluation because the screening was performed using a background statistic. PG&E Response: See revised response to Absolute Comment 84. Introductory language was added to this section discussing the various updates made to the RSLs. DTSC Response: See comment 81. DTSC recommends using the current RSL values. It appears that this revision can easily be performed. PG&E Response: See revised response to Absolute Comment 84. Introductory language was added to this section discussing the various updates made to the RSLs. The most current, applicable USEPA RSL will be used to conduct the next data gaps evaluation after the collection of the Part A Phase 2 samples. DOI and DTSC Responses: Resolved.
85	DOI #34	Appendix A, Main Text, Section 4.2, page 4-2	DOI	As indicated in our August 4, 2010 comment on the Draft Soil Investigation Part A Phase I Data Summary Report, EPC Estimation must be kept in the context of the	Please see response to Comment 74 (DOI Specific Comment 32) regarding Decision 2.	DOI Response: Resolved

Response to Comments on the

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Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
				limitations of the current representativeness of nature and extent. As indicated, the purpose of assessing Decision 2 is to determine whether additional data collection is necessary beyond that necessary to resolve Decision 1.		
				This section describes a process used to determine data adequacy for computing risk assessment exposure point concentrations (EPCs) based on detection frequency and minimum parameters for ProUCL computations. The section also discussed the use of maximum concentrations. The discussion is brief and does not convey all the rationale that apparently goes into determining sufficiency to estimate representative EPCs. For example, review of the process for AOC 1 reveals several process points that do not seem to correlate with the discussion in Section 4.2.	**b)** Based on the discussions at the meeting with DTSC and DOI on October 27, 2011 and subsequent discussion with DOI on August 15, 2012, and as discussed above in response to comment 74e, PG&E, DOI, DTSC, and stakeholders will work through a process on the grouping of data and assessing data comparability and representativeness. The process will also address different analytical profiles, spatial interpretation, and computing EPCs. The process may include working groups, demonstrations, and technical memoranda. As discussed, the goal is to initiate a meeting sooner rather than later, using the existing data for one or two chemicals, for one AOC, as a beta-test for how the data evaluation/grouping and quantitative EPC estimation process will work. A goal would be to initiate these meetings prior to the submittal of the RAWP Addendum 2, if practicable.	DOI Response: Pending further response PG&E Response: See revised response to Absolute Comment 85b. DOI Response: Resolved
				Table C2-14 (North of Railroad) is completed only for arsenic. Does this mean that no other constituent were detected above screening values in this reach? Figure C2-13 shows detections of lead in this reach exceeding background. Please clarify.	**c)** It is correct that Table C2-14 was completed only for constituents that exceeded the human health comparison value (HHCV) or background as appropriate (that is, higher of either the HHCV or background was selected as the screening level). For arsenic, the background (11 mg/kg) is higher than the HHCV (0.07 mg/kg). Lead concentrations in this area did not exceed the HHCV (150 mg/kg), which is higher than the background (8.39 mg/kg) and therefore not reported in Table C2-14.	DOI Response: In the October 27, 2011 RTC meeting, PG&E agreed to provide more detail in Section 4.2, including an example of this process. PG&E Response: See revised response to Absolute Comment 85b.
				Table C2-14 (and companion figures) indicates a comparatively small sample size for this reach (actually only 6 locations). Is Decision 1 for this reach satisfactory? Additionally, it seems that this small a data set may not be sufficient for computing EPC's without a high variance suggesting significant uncertainty in the EPC. Was uncertainty due to sample size and spatial coverage considered in the assessment?	**d)** The data usability matrix (Table A-1 of Subappendix A of Appendix A) indicates 13 sample locations (eight locations completed previously [SS-2, SS-7, SS-8, SSB-8, SSB-9, DS-3, DS-4, and MW-13] and five locations completed during Phase 1 sampling [BCW-1 through BCW-5]). Table C2-14 only shows six samples for arsenic at surface. Data are insufficient to estimate an EPC based on the 95% upper concentration limit (UCL) only at 0 to 0.5 foot bgs but are sufficient for the other exposure depths. In this case, the surface soil EPC may be based on the maximum detected concentration, if additional data are not collected or are nondetect at the surface. Details of data sufficiency/spatial boundaries are discussed in the Soil Part A DQO TM (Appendix A to the Soil Part A Work Plan).	DOI Response: Resolved
				These examples illustrate how the brief discussion in Section 4.2 does not convey all that apparently occurs in the Decision 2 actual data gap analysis. Please consider our August 4, 2010 comments and provide additional description (in Section 4.2) of the thinking process on how Decision 2 was actually accomplished. Please then revisit portions of Appendix A and consider whether the results address the additional description in Section 4.2).	**e)** PG&E reviewed the DOI Comments received on August 4, 2010 regarding estimating EPCs. It is possible that the data currently available, although sufficient to estimate EPCs based on 95% UCLs, may not account for all the data required to complete the nature and extent of the impacts. However, as sampling is biased (that is, capturing most likely impacted areas and stepping out), resulting EPCs would overestimate, rather than underestimate, risks. The data usability matrix will be updated in the revised Soil RFI/RI Work Plan where the comparability and representativeness evaluation will be conducted again using proposed Phase 2 samples. The matrix will be updated again after completion of Phase 2 sampling and analysis and will be presented in the risk assessment. Also see response to Comment 74 (DOI Specific Comment 32).	DOI Response: Resolved based on pending response to Comment 85 (DOI #34).and Comment 74 (DOI # 32) PG&E Response: see revised response to Absolute Comment 85e. DOI Response: Resolved
				Please see also General Comment 1 on Data Usability for Risk Assessment. Overall, DOI does not believe that the rationale presented in Section 4.2, as presented, permits PG&E to conclude that data is sufficient to estimate representative EPC, in many cases.	**f)** Please see response above and to Comment 74 (DOI Specific Comment 32). Based on the discussions at the meeting on October 27, 2011 with DOI and subsequent discussion on August 15, 2012 with DOI, and as discussed above in response to comment 74e, PG&E, DOI, DTSC, and stakeholders will work through a process on the grouping of data and assessing data comparability and	DOI Response: Resolved pending response to Comment 74 (DOI # 32) PG&E Response: See revised response to Absolute Comment 85f.

Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
					representativeness. The process will also address different analytical profiles, spatial interpretation, and computing EPCs. The process may include working groups, demonstrations, and technical memoranda. As discussed, the goal is to initiate a meeting sooner rather than later, using the existing data for one or two chemicals, for one AOC, as a beta-test for how the data evaluation/grouping and quantitative EPC estimation process will work. A goal would be to initiate these meetings prior to the submittal of the RAWP Addendum 2, if practicable.	
86	Specific 24	APPENDIX A – Part A Data Gaps Investigation Program – p. 4-2, para. 4 (Data Sufficiency to Estimate Representative Exposure Point Concentrations Evaluation)	FMIT	The ability to calculate an Exposure Point Concentration (EPC) for use in risk assessment is an important consideration in the chain of DQO questions. If the answer to this question is yes, and assuming that source areas (i.e., highest residual concentrations) have been sampled, then calculated EPCs could be compared to the respective comparison criteria to determine if additional sampling is needed. Additional step-out concentrations, while giving information on extent, will not likely substantially change EPCs. If these EPCs are already near or below comparison criteria, then the area poses little risk. Additional sampling will not change this conclusion, however additional sampling will cause further land disturbance.	*DOI and DTSC Response*: The commenter is generally correct in the case where data is sufficient to compute EPCs. The RAWP provides additional information on calculating EPCs. If the Phase 1 data were determined insufficient to compute EPCs, additional sample data were specified to address the data gap. Inspection of Table 4-1 (pages 4-2 and 4-3) indicates that the Phase 1 data were sufficient to compute EPCs at all investigations sites. The need to compute EPCs, as indicated in the Draft Soil RFI/RI Work Plan, did not drive additional sample locations. *PG&E Response:* Decision 2 in the DQO process evaluates the adequacy of data to calculate an EPC and define concentrations compared to health-based criteria independent of the adequacy of data for characterization of nature and extent (Decision 1). The process described in the comment is one aspect of the Decision 2 process used to determine whether additional samples are needed to satisfy Decision 2. However, adequacy of the characterization of nature and extent under Decision 1 must also be met to satisfy the DQO process. For most compounds, data adequacy for nature and extent has been determined by the agencies to be characterization at or near background. Background values for metals are typically below human health-based values and tend to drive step-out sampling that may be required over and above what is needed for Decision 2. See also response to Comment 80 (FMIT Specific Comment 23).	
87	Specific 25	APPENDIX A – Part A Data Gaps Investigation Program – p. 5-1 (Threat to Groundwater from Residual Soil Concentrations Evaluation)	FMIT	The evaluation of the threat to groundwater is overly conservative and results in additional unneeded samples. As discussed earlier, a less conservative model coupled with site observations should be used.	Please see response to Absolute Comment 46/FMIT Specific Comment 13.	
88	DOI #35	Appendix A, Main Text, Section 5, Decision Rule 3, Threat to Groundwater from Residual Soil Concentrations	DOI	This Section describes a three step procedure: **Step 1** is a Background Comparison. **Step 2** Soil screening levels for groundwater SSLs discussed in the second bullet page 5-2 are not presented in this section and are not displayed in the individual AOC/SWMU assessment table. The *Calculation of Screening Levels or Protection of Groundwater at the PG&E Compressor Station* (CH2MHILL August 2008) document cited in this section presents a leaching calculation approach with information for five metals only (Cr VI, Cr-III, Cu-II, Ni-II, and Zn-II). **Step 3** Soil screening levels that appear in the individual SWMU/ AOC screening tabled (e.g., C2-17 for AOC 1) are not documented but are apparently derived as discussed in Section C.4 using the Hydrus1-D model. However, the analysis using Step 3 (Hydrus 1-D) screening values is not clear or is inconsistent with the description in Section C.4. Examples include: • SMWU 1 eliminates Cr VI as a source of contamination to groundwater. Many values in Table C1-12 exceed the 0.22 of mg/kg SSL and the default BGV of 0.83	Step 2: Site-specific soil screening levels (SSLs) are tabulated for each AOC in their respective sections of Subappendix C in Appendix A. Step 3: As described in *Calculation of Screening Levels for Protection of Groundwater at the PG&E Compressor Station* (CH2MHILL, 2008) and Appendix A Part A Section 5.0 of the Data Gaps Investigation Program Report, the SSLs were calculated per USEPA guidance (USEPA, 1996). The comparison of calculated SSLs to sample concentrations was defined as Step 2 of the three-tiered evaluation approach. The metals that exceeded the SSLs were elevated to a final Tier 3 evaluation. A Tier 3 evaluation consisted of a HYDRUS model analysis. In this analysis, site-specific concentration data were used to simulate the transport of metals through the vadose zone. It was this analysis that was used to determine the potential for a threat to groundwater for those compounds that exceeded the SSLs. Step 3 of the three-tiered approach is described in detail in Section C.4 of Appendix C. While some uncertainties exist regarding the extent of contamination at some AOCs, conclusions were drawn based on available data. As new data become available that would necessitate reevaluation of the current analyses, updates will be made. Text	DOI Response: In previous discussions, DOI has stated that any conclusions regarding the absence of a threat to groundwater based on current data are premature pending the completion of the RFI/RI. Please ensure the new text reflects that the Soil RFI/RI Work Plan conclusions are preliminary and will be revisited in the RFI/RI. PG&E Response: see revised response to Absolute Comment 88. DOI Response: Resolved

Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
				mg/kg. Note since the location specific SSL derived using Hydrus 1D is less than the BGV, shouldn't any concentration above the BGV indicate potential for leaching to groundwater? See Table C1-12 SWMU 1-8 for example. • AOC 1 eliminates Cr VI as a source of contamination to groundwater. Again, soils values in Table C2-17 exceed the 0.36 mg/kg SSL and the default to BGV 0.83 mg/kg value. Similar inconsistencies occur in AOC 9 (Molybdenum), AOC 10C (chromium), and AOC 11a (Molybdenum), and possibly other Appendix A locations. Please provide additional discussion and description of how the 3 Step process was performed. Notwithstanding the additional discussion and description. DOI disagrees that conclusions such as those drawn in Table C1-11 that Step 3 can eliminate the potential for leaching to groundwater can be reached at this stage. As indicated in our August 4, 2010 comment on the Draft Soil Investigation Part A Phase I Data Summary Report, SSL comparisons and modeling cannot be used at the Data Gap evaluation stage to conclude that no threat to groundwater exists, because uncertainties remain regarding the magnitude and extent of contamination. The data gap evaluation is intended to assess whether additional data are necessary to evaluate soil impacts to groundwater, not to reach conclusions that cannot be determined at this time. Please correct all tables citing no impact to groundwater conclusions and the attendant text(s) (e.g., last sentence on page C1-13).	was changed to reflect the fact that conclusions were based on available data, are preliminary, and conclusions regarding the threat to groundwater was revisited in the RFI/RI.	
89	DOI #36	Appendix A, Main Text, Section 5, Decision Rule 3, Threat to Groundwater from Residual Soil Concentrations	DOI	As has been discussed with PG&E previously, DOI does not concur with statements in the work plan (e.g., Section 4.0 of Appendix C-1) that draw conclusions about the absence of a potential threat to groundwater for any site. In this work plan, DOI accepts the use of the tiered screening model approach only as a tool in assessing data gaps to resolve the threat to groundwater decision. It is not appropriate at this stage of the RI to draw conclusions about whether any site has the potential to affect groundwater. All such conclusions must be deferred pending the completion of the RI. Please remove all such statements from the work plan and all appendices	While some uncertainties exist regarding the extent of contamination at some AOCs, conclusions were drawn based on available data. As new data become available that would necessitate reevaluation of the current analyses, updates will be made. Text was changed to reflect the fact that conclusions were based on available data. The text was modified to indicate that the Soil RFI/RI Work Plan conclusions are preliminary and will be reassessed in the RFI/RI.	DOI Response: See comment resolution response to Comment 88 above. Please ensure the new text reflects that the Soil RFI/RI Work Plan conclusions are preliminary and will be revisited in the RFI/RI. PG&E Response: A statement was added stating that the Soil RFI/RI Work Plan conclusions are preliminary and will be reassessed in the RFI/RI. DOI Response: Resolved per Comment 88.
90	Specific 26	APPENDIX A – Part A Data Gaps Investigation Program – p. 6-1 & 6-2 (Data Sufficiency to Support Corrective Measures/ Feasibility Study Evaluation)	FMIT	This section lists 12 remedial alternatives under consideration for evaluation in the CMS/FS for soils. Following this list, the conduct of treatability studies is mentioned. Will pilot testing also be required for certain technologies? If so, which technologies will require pilot testing and what level of impact might be expected from such testing?	The CMS/FS will determine whether pilot testing of any technologies is required. The potential impacts associated with any proposed pilot testing will be discussed with the stakeholders, and pilot testing will be performed as directed by DTSC and DOI.	
91	Specific 27	APPENDIX A – Part A Data Gaps Investigation Program – p. 6-3, 1st bullet (Data Sufficiency to Support Corrective Measures/ Feasibility Study Evaluation)	FMIT	No criteria are given for the level of accuracy required for soil volume estimation in support of the CMS/FS planning. There is likely a factor (5X? 10X?) that could be applied to determine whether additional data collection would change the currently-estimated soil volume more than the factor. If not, then remedial planning can move forward with sufficient certainty and additional samples to calculate soil volume are not needed.	Please see response to Absolute Comment 62.	FMIT Response: The [Tribe] does not agree with the manner in which the DQOs are driving the extent of soil sampling. The level of needed resolution of DQO questions is not specified and much of the proposed sampling and the associated disturbance will be determined to be unnecessary in the Corrective Measures

Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
						Study for soils. Please see FMIT letter November 30, 2012, appended below.
92	Specific 28	APPENDIX A – Part A Data Gaps Investigation Program – p. 6-3 (general)	FMIT	Many of the listed information needs in this section could be determined from either a single sample at this time in the project or be determined during the remediation activities (if required). It is possible that some samples are collected to get CMS/FS information from areas that ultimately will not require remedial action. Therefore, these additional samples would not be needed. Limit the proposed sampling for CMS/FS data to areas where remediation is most likely to be required. For other areas that may not be subject to remediation wait to collect the additional CMS/FS information until such time that it is clear that the data is needed.	No samples are being collected solely to satisfy data needs for the CMS/FS. However, data on soil physical parameters and leachability will be collected using soil samples collected from borings required to evaluate the nature and extent of contamination (that is, to support Decision 1). More detailed data collection specifically for the CMS/FS would be conducted during the CMS/FS phase (that is, they will deferred until the risk assessment has been completed). As the comment correctly notes, it cannot be determined with certainty at this stage which areas may require remediation.	
93	DOI #38	Appendix A, Main Text, Section 8.0 Data Gaps Evaluation Summary Decision 2 Page 8-1	DOI	Although the data gap analysis did not identify specific additional sampling needs for this purpose, new data collected to address data gaps for nature and extent may need to be incorporated in the calculation of EPCs.	Phase 2 data will be incorporated into the calculation of EPCs. Following the collection of the Phase 2 samples, once the risk assessment stage of the project begins, EPCs will be calculated using all available Category 1 data, including the new Phase 2 data.	DOI Response: Resolved
94	DOI #39	Appendix A, Main Text, Section 8.0 Data Gaps Evaluation Summary Decision 3 Page 8-1	DOI	A sentence similar to this one may be appropriate for Decision 2.	This comment refers to using the following sentence in Decision 3: *Additional vertical extent data collected in the remaining areas (SWMU 1, AOCs 1, 4, and AOC 11) for Decision 1 will also be used in further development of EPCs.* PG&E agrees that additional data collected in the remaining areas (SWMU 1, AOCs 1, 4, and AOC 11) for Decision 1 will be incorporated into the calculation of EPCs. Following the collection of the Phase 2 samples, once the risk assessment stage of the project begins, EPCs will be calculated using all available Category 1 data, including the new Phase 2 data. The following sentence was added to the Decision 2 Bullet: "Additional vertical extent data collected in the remaining areas (SWMU 1, AOCs 1, 4, and AOC 11) for Decision 1 will also be used in further development of EPCs."	DOI Response: Resolved
95	DOI #40	Appendix A, Main Text, Section 8.0, Table 8-1 AOC 4 Page 8-2	DOI	The crosswalk table specifies 18 LOCATIONS to be sampled. The total number of samples is much greater.	The crosswalk table provided to the agencies on June 1, 2011, Appendix A, Table 8-1, was corrected to read that 18 additional locations (rather than samples) are proposed for the AOC. Appendix C, Sub-Appendix C10, Table C10-15 correctly specifies 18 proposed sample locations.	DOI Response: Resolved
96	DOI #41	Appendix A, Main Text, Section 8.0 Table 8-1 AOC 10 Page 8-2	DOI	The table revised by DOI/DTSC specifies 14 locations plus debris areas for AOC 10.	The following sentence was added to Table 8-1: "Up to 20 XRF samples will be collected in the debris area on the slope to assist with identifying possible sample locations. The need for specific soil sample locations required to evaluate potential contamination associated with debris will be determined in collaboration with the stakeholders, and samples will be collected as directed by the agencies."	DOI Response: Resolved pending review of revised work plan.
97	DOI #42	Appendix A, Main Text, Section 8.0 Table 8-1 AOC 14	DOI	The MW-24 Bench is an area containing observed burn-like material exposed by erosion, surface debris, and identified and potentially unidentified buried debris of unknown origin and content. Given the presence of hazardous constituents in burn material and debris identified elsewhere at the TCS site (e.g., AOC 4), comprehensive assessment of this area is appropriate. DOI concurs with the recommended sampling	As stated in DOI's October 6, 2011 letter, the investigation of the AOC 27, MW-24 bench will be performed in a phased manner, first using planned, less intrusive survey tools (XRF and surface geophysical tools), prior to making determinations about the need for and locations of more intrusive activities such as trenching. PG&E, agencies, and Tribes will meet to review the results of the less intrusive surveys prior to the	DOI Response: The locations of intrusive sampling should be determined based on the results of the geophysical and XRF screening surveys and may or may not be associated with grid points (for example, a

Response to Comments on the
***Soil RCRA Facility Investigation/Remedial Investigation Work Plan, Pacific Gas and Electric Company (PG&E) Topock Compressor Station, Needles, California,* Issued May 2011**
From
Combined United States Department of the Interior (DOI), California Department of Toxic Substances Control (DTSC), Fort Mojave Indian Tribe (FMIT) and Hualapai Comments

Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
		Page 8-2		and analysis of the exposed burn-like material, and requires analysis for the full suite of potential site-related contaminants, including dioxins-furans. Further assessment of the nature and extent of this material would be warranted if hazardous constituents are identified in the samples. DOI also concurs with the recommendation to perform XRF screening of the ground surface to assess whether surface contamination is present that would warrant further characterization through sampling and analysis. With respect to buried debris, DOI concurs with the proposal to conduct surface geophysical surveying across the AOC to identify potential buried debris locations. However, DOI does not believe borehole sampling is an effective method for characterizing the nature of buried debris and conclusively determining whether or not hazardous substances are present at levels of concern. Visual inspection of the debris through potholing or excavation provides the most direct and reliable method for characterizing the nature of the buried debris and selecting samples for the assessment of the presence of hazardous constituents. DOI is also aware of the proximity of this area to important cultural resources. DOI requests further discussion of this topic with PG&E, DTSC and stakeholders at the August TWG meeting.	agencies directing PG&E to implement more intrusive activities. Bullet number 5 in Section 7.0, AOC 27 Evaluation, was revised as follows: "PG&E, agencies, and Tribes will meet to review the results of the geophysical survey and XRF results prior to making determinations about the need for and locations of intrusive activities such as trenching within AOC 27. If these intrusive activities are required, soil samples will be collected at 0 to 0.5, 2 to 3, 5 to 6, and 9 to 10 feet bgs at each area of interest and will be submitted to the laboratory for analysis for pesticides, PAHs, [volatile organic compounds] VOCs, [semivolatile organic compounds] SVOCs, Title 22 metals, Cr(VI), PCBs, TPH, and pH. No more than 20 trenches/potholes will be conducted in this area." PG&E does not believe that every soil sample requires analysis for dioxins and furans. PG&E proposes that apparent burn-like material and 10% of other soil samples be analyzed for dioxins and furans.	geophysical anomaly may lie between grid points). Remove the phrase "at each grid point" from the revised text. As stated during our comment resolution meeting, DOI does not support the concept of drilling to evaluate subsurface anomalies identified by geophysical surveying. Visual inspection of the debris through potholing or excavation provides the most direct and reliable method for characterizing the nature of the buried debris and selecting samples for the assessment of the presence of hazardous constituents. Please remove the reference to drilling in this context. DOI agrees with the proposal that all apparent burn-like material shall be analyzed for dioxins and furans and that 10% of other soil samples shall be analyzed for dioxins and furans. DTSC Response: Please ensure that the revised work plan includes a maximum number of locations for trenches/ potholes so that a reasonable schedule is maintained. PG&E Response: Response revised DOI Response: Resolved
		Appendix A Attachment A		**APPENDIX A, ATTACHMENT A**		
98	DOI #43	Appendix A, Main Text, Attachment 1, DOI Direction Letter. Topock Soil Investigation Part A Phase 1 Data Gap Evaluation - Proposed Sample Locations and Individual SWMU/AOC Specifications.	DOI	There are deviations between the sample Description/Rationale, Analytes, and Rationale/Comments called out in the February 25, 2011 Directive (Attachment A in Appendix A) and the analogous information found in the individual AOC/SWMU Tables. Some of the deviations are significant. In cases where the analytical suites in the AOC/SWMU Proposed Sample Location Tables deviate from the February 25, 2011 Directive, the conflicting specifications are carried over to Appendix F (Summary of Proposed Sampling Program).	The sample Description/Rational, Analytes, and Rationale/Comments in the individual AOC/SWMU tables in Appendix A and analytes in Appendix F was revised to match the February 25, 2011 agency directive.	DOI Response: Resolved pending review of revised work plan.
		Appendix A Subappendix B		**APPENDIX A, SUBAPPENDIX B**		
99	Specific 29	APPENDIX A, SUBAPPENDIX B – (Investigation Procedures and Field Methodology) - (Investigation Procedures, Field Methodology and White Powder/Debris Mapping Results (on CD only))	FMIT	Are any parts of these procedures intended for the performance of the activities proposed for this Work Plan?	This subappendix describes the field methodologies used to implement the Soil Part A, Phase 1 investigation program, the results of which are documented in Appendix A. Some of the field methodologies described in this subappendix will also be used during the implementation of this work plan. This includes geophysical surveys, XRF soil screening, soil sample collection, and potentially pot-holing and trenching. Further screening/mapping of debris may also occur. No embankment modifications are anticipated.	
100	Specific 30	APPENDIX A, SUBAPPENDIX B – (Investigation Procedures and Field Methodology) - p. B.1	FMIT	Further precautions about how these field activities will be performed need to be included in the text. Activities other than sampling (e.g., embankment modification) need to be performed with the same consideration of minimizing site disturbance.	PG&E will discuss any potential grading areas with Tribal representatives prior to starting grading activities. As noted in response to the comment above, no embankment modifications are anticipated. In addition, with the exception of cutting	

Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
		(Embankment Modification)		Areas to be graded should be reviewed with Tribal representatives prior to earth moving. During grading, Tribal representatives must also be present in the event that artifacts are unearthed or particularly spiritual areas or phenomenon encountered. If this happens, grading should stop until further evaluation of the area is performed. (See comment on "Standards of Performance")	of vegetation at the mouth of Bat Cave Wash and limited cutting of vegetation near the mouth of East Ravine, investigation activities are expected to be limited to geophysical surveys, XRF soil screening, soil sample collection, and potentially pot-holing and trenching. Should any grading be required, PG&E will invite Tribal representatives to be present during the grading activities.	
101	Specific 31	APPENDIX A, SUBAPPENDIX B – (Investigation Procedures and Field Methodology) - p. B-5, Section B.2.5.2 (Management of Investigation-Derived Waste)	FMIT	The discussion of IDW must include the provisions for storing soils found acceptable for repatriation and the procedures to be followed for repatriation.	A task group has been set up to address the development of a plan for handling and deposition of investigation-derived soil and DOI encourages Tribal participation in this group. Displaced Soil and Hazardous Waste Management Procedures have been developed from the draft document for handling of disturbed site soil and included as Appendix J.	DOI Response: Deferred to subgroup DTSC Response: Per the December 9, 2011 subgroup meeting, PG&E will prepare a draft document incorporating FMIT's draft document (September 21, 2011) for handling of disturbed site soils. FMIT Response: The Tribe requires that the Procedure to address displaced site soils must be referenced as an authoritative procedure in any work plan where site soil may be disturbed. Please see FMIT letter November 30, 2012, appended below.
		Appendix A Subappendix C		**Appendix A, SUBAPPENDIX C Main Text**		
102	Specific 32	APPENDIX A, SUBAPPENDIX C (Part A Phase 1 Soil Investigation Data Gaps Evaluation Results) – p. C-2 and Section C.2	FMIT	The paragraph suggests that all detected Tentatively Identified Chemicals (TICs) will be evaluated in the risk assessment. In Section C.2, the reference to a table cites a statistical evaluation. The purpose of Table C-1 is unclear when in addition to the listing of detections; there are comparisons to various criteria.	The comment refers to a section of Appendix C that discusses target analyte list (TAL) and target compound list (TCL) compounds. TAL/TCL analyses are not the same as tentatively identified chemicals (TICs) (see response to Comment 103 [FMIT Specific Comment 33]). Expanded analyses to include TAL/TCL compounds were added to the analyte list for approximately 10% of the Part A Phase 1 soil samples. The purpose of Table C-1 is to summarize the TAL/TCL compounds detected, to show their frequency of detection, and to provide a perspective on how the concentrations detected relate to the various comparison values used to evaluate all other data presented for Part A, Phase 1. Compounds actually detected will be considered for inclusion in the risk assessment consistent with the RAWP.	
103	Specific 33	APPENDIX A, SUBAPPENDIX C (Part A Phase 1 Soil Investigation Data Gaps Evaluation Results) – p. C-3	FMIT	The text here, which describes the procedure for the inclusion of TICs in this project, is contrary to the text on page C-2, which states that simply the detection of a chemical is sufficient for inclusion. These passages of text need to be consistent.	Review of the Soil RFI/RI Work Plan (Combined Soil Work Plan) prepared by CH2M HILL in May 2011, including Appendix C of the Combined Soil Work Plan (Part A, Phase 1 Soil Investigation Data Gaps Evaluation Results), indicates there is no mention of TICs; therefore, this comment is unclear. Generally, TICs are not evaluated quantitatively in risk assessments because TICs are compounds reported by the analytical laboratory, but their concentrations and specific identity cannot be confirmed without further analytical investigation. In addition, there is rarely sufficient toxicity information to evaluate these compounds in a quantitative risk assessment. According to the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (USEPA, 1999), "Tentatively Identified Compounds (TICs) are chromatographic peaks in an analysis that are not clearly matched to the TAL/TCL lists. After a library search, the analytical laboratory reports the possible identity for appropriate peaks that are NOT (emphasis added) system monitoring compounds, internal standards, or TCL compounds." Identification is performed by the data reviewer. Therefore, by definition, these TIC compounds are tentatively identified. Compounds such as TICs that are not definitely detected by a clear match to the TAL/TCL list (that is, TICs) will not be included in the risk assessment	

Response to Comments on the

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Combined United States Department of the Interior (DOI), California Department of Toxic Substances Control (DTSC), Fort Mojave Indian Tribe (FMIT) and Hualapai Comments

Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
					process. Compounds that are clearly identified as a TAL/TCL compound and have reported detections will be considered for inclusion in the risk assessment.	
104	Specific 34	APPENDIX A, SUBAPPENDIX C (Part A Phase 1 Soil Investigation Data Gaps Evaluation Results) – p. C-5, para. 2	FMIT	APPENDIX C – (Part A Phase 1 Soil Investigation Data Gaps Evaluation Results) –This paragraph recommends that the detected inorganic chemicals discussed on the previous page not be selected as chemicals of potential concern/ chemicals of potential environmental concern (COPCs/COPECs). The Work Plan indicates that the COPC/COPEC selection will be performed again in the risk assessment. What is the purpose of this evaluation when it will be performed again? The recommendation that all these inorganics be eliminated from further evaluation results in both no further characterization and no evaluation in the risk assessments. For some of the essential nutrients (e.g., sodium, potassium, and calcium) the recommendation is appropriate as these chemicals likely do not have sufficient toxicological criteria for evaluation/inclusion in the risk assessment. However, some of the heavy metals can contribute to total non-cancer hazards and should be carried through the characterization and risk assessment.	The text indicating that inorganics are not COPCs/COPECs was intended to indicate that these compounds are not being pursued as COPCs/COPECs for the purpose of additional sampling. The selection of COPCs/COPECs for risk assessment will follow the procedures outlined in the RAWP and will consider all Category 1 available data, including inorganics. The language in Appendix C was modified to clarify this distinction. Essential nutrients may be excluded from risk estimates. That determination will be presented in the risk assessment, along with a discussion of naturally occurring metals, their relationship to background, and how they will be handled in the risk estimates.	
105	Specific 35	APPENDIX A, SUBAPPENDIX C (Part A Phase 1 Soil Investigation Data Gaps Evaluation Results) – p. C-6	FMIT	The evaluation of semi-volatile organic compounds (SVOCs) detected in various soil samples uses a process that is neither fully explained nor tested using sample results from other areas at the site. Specifically, if a negative test shows no correlation and supports rejection, it would be expected that the test would have positive results in samples where known releases have occurred. Because there can be different patterns of contaminants in different solid waste management units/ areas of concern (SWMUs/AOCs), then the data from these SWMUs/AOCs should each be independently considered.	Detections of 4-methylphenol (present in two of 518 samples) and bis(2-ethylhexyl)phthalate (present in four of 518 samples) were all below screening values. The single detection of di-n-butyl phthalate did exceed the ecological comparison value (ECV) for the cactus wren but did not exceed for other ecological receptors. Given the low frequency of detection of these three compounds and the absence of concentrations of concern, these compounds are not being pursued further as compounds of interest for additional data collection for Part A. Additional evaluation of these detections was presented as a precaution to determine if there was a correlation or pattern of occurrence between the presence of one or more of these compounds and other compounds of interest for the site. No pattern or correlation was found. This was done because there was no known release of these compounds in any of the SWMUs/AOCs.	DTSC Response: See minor edit for clarification as Part B will include organic analyses. PG&E Response: Response revised.
106	Specific 36	APPENDIX A, SUBAPPENDIX C (Part A Phase 1 Soil Investigation Data Gaps Evaluation Results) - p. C-7, Sect C.2.3	FMIT	See earlier comment for VOCs as presented for SVOCs.	As described in this section, methyl acetate was the only VOC detected in the Part A Phase 1 soil samples analyzed for the complete TAL/TCL suite of compounds. During the Part A soil investigation, methyl acetate was detected in three of 56 soil samples collected at 2 to 3 feet bgs at sample locations AOC1-T3a, AOC4-1, and AOC11e-2 at concentrations of 6.6 µg/kg, 12 µg/kg, and 17 µg/kg, respectively. The detected concentrations are six orders of magnitude below the interim screening level of 22,000,000 µg/kg (residential RSL). Given the low frequency of detection of these three compounds and the absence of concentrations of concern, these compounds are not being pursued further as compounds of interest for additional data collection for Part A. Additional evaluation of these detections was presented as a precaution to determine if there was a correlation or pattern of occurrence between the presence of one or more of these compounds and other compounds of interest for the site. No pattern or correlation was found. This was done because there was no known release of these compounds in any of the SWMUs/AOCs.	DTSC Response: See minor edit for clarification as Part B will include organic analyses.
107	Specific 37	APPENDIX A, SUBAPPENDIX C (Part A Phase 1 Soil Investigation Data Gaps Evaluation Results) - Section C.3.2.4	FMIT	The Tribe agrees with the inclusion of polychlorinated biphenyl compounds (PCBs) in the characterization and risk assessment for both Part A and Part B.	Comment noted.	
108	Specific 38	APPENDIX A, SUBAPPENDIX C (Part A Phase 1 Soil Investigation	FMIT	The same comment applies to pesticides as presented above for SVOCs. Pesticides were likely used at the facility and should be included in both characterization and risk	Pesticides are discussed in Section C.2.5. It is assumed the comment refers to this section. As described on Page C-10 in the second paragraph after the bullets, PG&E agrees that it is possible that 4,4-DDT and dieldrin may have been used at the site in the	DTSC: Clarification that some pesticide analyses are to be conducted at Part A and

Response to Comments on the

***Soil RCRA Facility Investigation/Remedial Investigation Work Plan, Pacific Gas and Electric Company (PG&E) Topock Compressor Station, Needles, California,* Issued May 2011**

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Combined United States Department of the Interior (DOI), California Department of Toxic Substances Control (DTSC), Fort Mojave Indian Tribe (FMIT) and Hualapai Comments

Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
		Data Gaps Evaluation Results) - Section C.3.2.5		assessment for both Part A and Part B.	past for insect control. However, pesticides were detected infrequently, with reported concentrations above the ECV in only three of 59 samples. None of the detections exceeded the residential CHHSL. As discussed, the detected concentrations do not appear significant when considering the home range for the target receptor, the range of ecological screening values available, and the basis for the ECV. Therefore, the data do not indicate the presence of concentrations of concern for residual pesticides, and no pattern of occurrence that indicates a step-out program would provide additional characterization data of value. Consistent with the RAWP, detected compounds, including pesticides, will be considered for inclusion in the risk estimates. However, the agencies have directed PG&E to analyze for pesticides in select Part A units. Ten percent of all soil samples collected in Part B units, perimeter samples, and storm drain samples will be analyzed for TAL/TCL compounds, which include pesticides.	Part B units should be included in the response. Also see Comment 113 (DOI Comment #45) below. PG&E Response: Response revised. DTSC Response: DTSC recommends that PG&E summarize the proposal for Part B pesticide characterization. PG&E: See revised response.
109	Specific 39	APPENDIX A, SUBAPPENDIX C (Part A Phase 1 Soil Investigation Data Gaps Evaluation Results) – p. C-11, para. 5	FMIT	The conclusions on lead and polyaromatic hydrocarbons (PAHs) are to include these “where data gaps have been identified”. This is a vague statement and is inconsistent with the other evaluations in this section. The Tribe either recommends the inclusion of lead and PAHs or their elimination. Characterization only where data gaps exist is likely an incomplete characterization.	The statement has been revised as follows: “Although lead and PAH detection distribution in soil are generally not consistent with the conceptual site models developed for the site and may be the result of activities unrelated to the compressor station, soil samples collected during the Part A, Phase 2 soil investigation will be analyzed for lead and PAHs in AOC 9, AOC 10, and AOC 11 and PAHs in AOC 4 and AOC 14 since gaps have been identified in those AOCs (see Subappendices C3 through C5, C10, and C7).”	
110	Specific 40	APPENDIX A, SUBAPPENDIX C (Part A Phase 1 Soil Investigation Data Gaps Evaluation Results), Section C-4	FMIT	APPENDIX C – (Part A Phase 1 Soil Investigation Data Gaps Evaluation Results) – Section C-4 – Have the results of the “less conservative” modeling of migration to groundwater been 1) applied to the data gaps evaluated in this appendix and 2) compared to the previous results to confirm that this new evaluation is less conservative?	Yes, the third-tier modeling that was performed to assess the potential threat to groundwater was applied to the data gaps evaluation in this appendix. The third tier of the assessment is much more rigorous and less conservative than the second-tier SSL calculation method. The fact that most of the metals that “failed” the SSL calculation and “passed” the third tier modeling step indicates that the modeling is less conservative.	
		Appendix A Subappendix C1		**APPENDIX A SUBAPPENDIX C1**		
111	16	Appendix A Part A Data Gaps Investigation Program AOC 1 / SWMU 1	DTSC	PG&E should keep in mind components of the groundwater remedy (infiltration gallery) during the collection of RFI/RI soil data at AOC 1/SWMU 1. The collection of data that may be useful for both the soil and groundwater portions of the project during the RFI/RI sampling will result in less intrusion into the environment.	Comment noted. An infiltration gallery in Bat Cave Wash was previously considered; however, is not included in the 30% design for the Final Groundwater Remedy. Nonetheless, PG&E desires to retain the option for a potential infiltration gallery. The gallery would be located near the mouth of the Debris Ravine (AOC 4), south of AOC 1. Soil sampling is currently being proposed in this area. Specific soil physical and chemical properties that could influence the performance of certain remedial technologies (for example, porosity, grain size, density, organic carbon content, soil chemical properties) are being collected. Boring depths and physical parameter testing were modified to collect data that would benefit the design of the infiltration gallery, if an infiltration gallery is ultimately included in the groundwater remedy. Additional detailed data collection specifically for the soil CMS/FS will be conducted during the CMS/FS phase.	DTSC Response: Because PG&E has proposed potentially using an infiltration gallery in Bat Cave Wash as part of the groundwater remedy, PG&E should determine what type of additional soil data testing will be required to assess implementation of such a system. Any opportunity to collect needed site characterization data while minimizing site intrusions and disturbances is requested. PG&E Response: See revised response. DTSC Response: Resolved
112	Specific 41	APPENDIX A, SUBAPPENDIX C – 1 (Part A Phase 1 Soil Investigation Data Gaps Evaluation Results), Tables C1-14	FMIT	Seven sampling locations have been proposed for SWMU-1. Of these, sample locations 20 and 21 are at previous sample locations. Number 19 is between two previous samples and the Tribe questions whether this level of resolution is needed. Are three sample locations (22, 23, 24) all needed to provide a needed level of resolution? It seems that 22 and 24 would be sufficient.	*DOI and DTSC Response*: In the February 25, 2011 letter to PG&E regarding the data gaps analysis, the attached table provided justification for the various sample locations. Samples at SWMU-1 were retained to either address the nature and extent of contamination associated with a previously uncharacterized potential pathway or to define the vertical extent of contamination in a specific portion of the former percolation beds area.	

Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
		Appendix A Subappendix C2		**APPENDIX A SUBAPPENDIX C2**		
113	DOI #45	Appendix A, Subappendix C2, Section C.2.5	DOI	Please retain pesticides in locations where the Agencies have requested their inclusion (e.g., AOC 14).	The Draft Soil RFI/RI Work Plan has already incorporated the agencies' request to analyze some of the proposed Phase 2 sample locations in AOC 14 for pesticides. The following sentence was added to the last paragraph of Section C.2.5 in Appendix C main text: "However, the agencies have directed PG&E to analyze for pesticide in select proposed Phase 2 sample locations in AOC 1, AOC 11, and AOC 14, see Subappendix C7 Table C7-15."	DOI Response: Although the specific text reference could not be found, it is assumed that pesticide sampling will be included in select locations for AOCs 9, 11, and 14. PG&E Response: Correct. Pesticide analysis is proposed for select sample locations for AOCs 9, 11, and 14. DOI Response: Resolved pending review of revised work plan.
114	DOI #46	Appendix A, Subappendix C2, AOC1 Data Gaps Evaluation Results	DOI	The analytes planned for the samples in the tamarisk area (mouth of Bat Cave Wash) include hexavalent chromium, Title 22 metals, and PCBs. DOI requests that you also analyze all samples for dioxins/furans and pesticides. Since we are uncertain how deposition of sediments has occurred in this area over time, the TAL/TCL analyses of 10% of the samples in this area will not be sufficient to detect dioxins/furans and pesticides.	The proposed grid sampling in the tamarisk area is based on 100-foot grid spacing and results in 23 sample locations and four depths per location (0 to 0.5, 2, 5, and 9 feet bgs) for 92 samples. Instead of analyzing all 92 samples for dioxins/furans, pesticides, and PCBs, PG&E proposes to analyze a subset of approximately 50% of the total samples for these infrequently detected organic compounds. PG&E proposes to randomly chose 10 sample locations, plus a biased sample at location AOC1-BCW29 (same location as AOC1-BCW6) and analyze those organic compounds from each depth interval at those 11 locations. This will result in 44 samples for dioxins/furans, pesticides, and PCBs from this area and 11 samples within each depth interval (0 to 0.5, 2, 5, and 9 feet bgs). This random sampling approach will provide sufficient characterization of this area for these compounds and will provide adequate data for assessing EPCs while balancing analytical costs associated with the additional organic compound samples.	DOI Response: DOI does not disagree with the proposal to analyze a subset of 50% of the samples. Please address the following conditions: 1) As discussed in the November 7, 2011 meeting, the samples that are not analyzed need to be stored, archived, and available for analysis at a future date in the event that data indicate nature and extent have not been adequately addressed. Please update the Quality Assurance Project Plan (QAPP) to describe how the stored samples will be extracted and preserved to ensure sample and data integrity. PG&E Response: The work plan and QAPP were updated to describe the extraction, archiving, and storage process. 2) As mentioned in the November 9, 2011 response to comments discussion, please provide in the Soil RFI/RI Work Plan a data evaluation rationale explaining how the 50% subset will provide sufficient characterization of this area for these compounds and how the subset will provide adequate data for assessing EPCs. Please identify and describe any statistical, spatial, or other methods that are planned to evaluate the subset 50%. PG&E Response: The work plan will provided a thorough discussion on the sampling approach and data evaluation methods. 3) DOI will need to be consulted on the selection of samples to be analyzed as the subset 50% as well any archived analyses.

Response to Comments on the
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From
Combined United States Department of the Interior (DOI), California Department of Toxic Substances Control (DTSC), Fort Mojave Indian Tribe (FMIT) and Hualapai Comments

Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
						PG&E Response: The stakeholders will be consulted on the selection of samples to be analyzed and archived. DOI was consulted on the locations of the 10 randomly-selected sample locations. DOI Response: Resolved pending review of revised work plan.
115	Specific 42	APPENDIX A, SUBAPPENDIX C – 2 (Part A Phase 1 Soil Investigation Data Gaps Evaluation Results), Tables C2-19	FMIT	A total of 39 samples (some contingency) have been proposed for AOC-1. The 22 BCW sample locations are focused on the mouth of BCW where it enters the Colorado River. These 21 samples (BCW7 being further upstream) are too many samples and will each require the removal of vegetation for access. For an area this small and with an expected pattern of deposition of contaminants to be random across the area, a random sample size of less than 10 samples would likely provide sufficient number for both statistical evaluation and extent. Some of the other AOC-1 samples could be eliminated because of the presence of physical site characteristics that provide contamination boundaries. For example, sample T5d is just downstream from 3 samples and adjacent to a culvert, which provides a divide in the deposited sediment. Also, sample groups 1, 2, 3, 4 and T1e-f seem sufficiently close that the question of whether this level of resolution is needed.	<u>*DOI Response*</u>: As identified in the October 2010 letter from BLM to the Tribes and discussed in follow-up meetings, the mouth of Bat Cave Wash is a heavily vegetated and long-term depositional area that existed before the compressor station was built." As such, the tamarisk area has the potential for exhibiting the greatest mass and concentrations of Topock Compressor Station-related contaminants along Bat Cave Wash downstream of SWMU 1. Therefore, it is not possible to reliably predict how contaminants are distributed or where the greatest mass or concentrations of contaminants may exist in the lower portion of Bat Cave Wash. Trial statistics using conservative assumptions suggest that a random sample size in the range of 20 to 26 samples may be necessary to provide reasonable assurance of point estimate statistics. While DOI understands the FMIT's concern that some of the AOC 1 samples could be eliminated because of the presence of physical site characteristics that provide contamination boundaries, DOI respectfully disagrees that the samples indentified by the commenter are sufficiently close to resolve the nature and extent of contamination data gap. Rationale for sample locations such as T5d and sample groups AOC 1-1, 2, 3, 4, and T1e-f are called out in the February 25, 2011 letter to PG&E regarding the data gaps analysis, the "crosswalk table," and Table C2-19. Given the above, DOI believes that the grid-based approach with the specified number of samples is the minimum number of samples necessary.	
		Appendix A Subappendix C3		**APPENDIX A SUBAPPENDIX C3**		
116	Specific 43	APPENDIX A, SUBAPPENDIX C – 3 (Part A Phase 1 Soil Investigation Data Gaps Evaluation Results), Tables C3-16	FMIT	Six sample locations are proposed for AOC-9. Several of the samples are very close to existing samples and the question is whether this level of resolution is necessary for CMS/FS planning. For example, samples 17 and 19 could be eliminated. The justification for sample 15 (across the road and down-slope) is unclear.	<u>*DOI and DTSC Response*</u>: In the February 25, 2011 letter to PG&E regarding the data gaps analysis, the attached table provided justification for the various sample locations. This justification was further discussed in the TWG meetings held on September 1 and 2, 2011. The vertical and lateral extents of contamination were undefined based on previous sampling, and Samples 17 and 19 should address this data gap. Sample 15 was included based on field observations made during the data gap meeting to assess the nature and extent of contamination at a runoff pathway across the dirt road.	
		Appendix A Subappendix C4		**APPENDIX A SUBAPPENDIX C4**		
117	Specific 44	APPENDIX A, SUBAPPENDIX C – 4 (Part A Phase 1 Soil Investigation Data Gaps Evaluation Results), Tables C4-18	FMIT	Twelve sample locations are proposed for AOC-10. Some locations (11, 12, 13, 14, 15, 16, and 17) are characterized by either debris fields or white powder. It seems likely that both debris fields and white powder areas will be removed as part of the cleanup however the collection of samples within these areas will require equipment access. This causes additional disturbance to surrounding land.	<u>*DOI Response*</u>: The agencies CERCLA authority addresses releases of hazardous substances. Sampling is needed to verify the presence of the substances and assess the risk to determine if an action is necessary. <u>*DTSC Response:*</u> Sample collection is necessary to determine if hazardous substances have been released into the environment from these areas. The same data will be used to evaluate risk to human health and the environment and whether remedial action is necessary.	

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Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
		Appendix A Subappendix C-5		**Appendix A SUBAPPENDIX C5**		
118	DOI #47	Appendix A, Subappendix C-5 Figure C5-11 and Table C5-19	DOI	Please add discussion of the basis for the locations of AOC 11-8 and AOC 11-9 and provide a discussion of the rationale that will trigger their collection.	The description/rationale for locations AOC 11-8 and AOC 11-9 was revised as follows: "To resolve Data Gaps #4 and #7–Assess new subareas. Located in the downslope areas below Subarea 11g."	DOI Response: Resolved
119	Specific 45	APPENDIX A, SUBAPPENDIX C – 5 (Part A Phase 1 Soil Investigation Data Gaps Evaluation Results), Tables C5-19	FMIT	Thirteen sample locations, and two contingent locations, are proposed for AOC-11. Sample 11c-3 is proposed for sampling to groundwater at approximately 70+ feet below ground surface (bgs) but the previous sample is 2 parts per million (ppm) at 10 feet bgs. With this large distance to groundwater, does the new modeling predict a potential issue at this location? Why not take samples at depth at 11c-4 where a step-out is needed? Same comment for 11e-5 if 11e-4 is needed upstream, why not take samples at depth there instead? Sample location 11e-6 is in a white powder area. See previous comment for AOC-10.	*DOI and DTSC Response*. In the February 25, 2011 letter to PG&E regarding the data gaps analysis, the attached table provided justification for the various sample locations. With regard to Sample 11c-3, soil sampling results for sample 11c-SS-2 indicate concentrations exceeding screening levels for several contaminants (see Table C5-3) at depth. Table C5-15 indicates that measured soil concentrations exceed the computed (modeled) soil screening levels for Cr(VI) and molybdenum. Similar rationale can be gleaned from the data gap analysis for AOC 11e-5 and 11e-4. With regard to sample AOC 11e-6 (white powder), please see the response to Comment 116.	
		Appendix A Subappendix C7		**APPENDIX A SUBAPPENDIX C7**		
120	DOI #49	Appendix A, Subappendix C-7, Section 7.0 MW-24 Bench Evaluation	DOI	The text notes that geophysical surveying across the bench area will be utilized to further characterize buried waste. A survey grid for the site should be proposed in the work plan based on the overall objectives of locating geophysical anomalies. Additionally, geophysical methods should be proposed for evaluating anomalies.	For the MW-24 bench, magnetic and conductivity surveys will be performed along parallel traverses spaced 5 to 10 feet apart as access and site conditions allow, and measurements will be taken along the traverses at approximately 5-foot spacing. Based on the results of the magnetic and conductivity surveys, GPR will be used in localized areas as necessary.	DOI Response: Resolved
121	DOI #50	Appendix A, Subappendix C-7, Section 7.0 MW-24 Bench Evaluation Last Sentence	DOI	The list of analytes for the MW-24 Bench should also include dioxins and furans for a comprehensive investigation.	PG&E proposes that apparent burn-like material and 10% of other soil samples be analyzed for dioxins and furans	DOI Response: See Response to Comment 97 (DOI #42) regarding borings on the MW-24 bench. Additionally, PG&E has a different sampling frequency proposed for dioxins and furans in Response to Comment 97. PG&E Response: Response was revised. DOI Response: Resolved
122	Specific 46	APPENDIX A, SUBAPPENDIX C – 7 (Part A Phase 1 Soil Investigation Data Gaps Evaluation Results), Tables C7-15	FMIT	Twelve proposed and eighteen contingent sample locations have been proposed for AOC-14. Locations 18, 19, 20 have been placed to characterize visibly-stained soil. Since this is a feature with defined size (visible staining) a single sample for characterization purposes could determine chemicals present. The eighteen contingent samples are proposed on grid intersections (pending potential findings of geophysical survey). Is this potential debris connected to that found where samples 21-25 are proposed? If you have a known debris area where these 4 sample locations are proposed, why not first step out using geophysical methods from this location, then use an appropriate number of samples to characterize the fully-identified debris area?	*DOI and DTSC Response*: At the September 15, 2011 meeting, the FMIT requested that the investigation of AOC-14/MW-24 bench area be performed in a phased manner, first employing the planned non-intrusive survey tools (XRF and surface geophysical tools), prior to making determinations about the need for and locations of intrusive activities such as drilling or trenching. Based on discussions with the Tribes at the meeting, it was agreed that the agencies, PG&E, and the Tribes should meet to review the results of the surveys prior to the agencies directing PG&E to implement intrusive activities.	
123	DOI #48	Appendix A, Subappendix C-7 Figure C7-7 and Table 7-15	DOI	Please add discussion of and rationale how the x-ray fluorescence and geophysical investigation will trigger their collection of the contingent sample.	As discussed in response to Comment 97 (DOI #42), PG&E proposes to add the following language to the text: "PG&E, agencies, and Tribes will meet to review the results of the geophysical survey and XRF results prior to making determinations about the need for and locations of intrusive activities such as trenching within the MW-24 bench area. If these intrusive	DOI Response: This process needs to be clarified. PG&E Response: See revised response to Comment 123.

Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
					activities are required, soil samples will be collected at 0 to 0.5, 2 to 3, 5 to 6, and 9 to 10 feet bgs at each area of interest and will be submitted to the laboratory for analysis for pesticides, PAHs, VOCs, SVOCs, Title 22 metals, Cr(VI), PCBs, TPH, and pH. No more than 20 trenches/potholes will be conducted in this area.”	DTSC Response: Please make this consistent with Absolute Comment 97. PG&E Response: Response revised DOI Response: Resolved
		Appendix A Subappendix C-10		**APPENDIX A SUBAPPENDIX C10**		
124	DOI #51	Appendix A, Subappendix C-10 General 1	DOI	It is evident that areas within the AOC 4 removal action boundaries exceed screening levels. In evaluating the adequacy of the sampling proposed in this section, it would be useful to have a map of the current conditions showing bedrock exposures, native material and remaining fill.	A map showing bedrock, native material, and remaining fill was developed and included in the work plan.	DOI Response: Resolved
125	DOI #52	Appendix A, Subappendix C-10 General 2	DOI	This section does not provide an adequate rationale for the Phase 2 samples proposed to fill data gaps. Inspection of Figures in Section C-10 indicates likely clustering of constituents in the northeast portion of AOC 4 just below and near the road in the general vicinity of samples C01S, C02, C03, D01, D01S, C02. The clustering includes constituents common to AOC 4 (e.g., Cr VI, B(a)P_{EQ} , Aroclor 1254, and Dioxin/$Furan_{EQ}$; as well as some constituents not always associated with AOC 4 (e.g., cobalt, copper). There is another apparent clustering of $Chromium_{total}$ and Dioxin/$Furan_{EQ}$ concentrations exceeding background and/or ECVs further northwest in the general vicinity of samples M01, L01, L02, L04, J03, O02, P03, P04, Q04. Clustering is suggestive of residual contamination associated with waste activity and there is potential for these areas to act as sources of continued release and/or local areas of exposure (e.g., Hot Spots). In light of this apparent clustering, please explain the rationale behind selection of the proposed soil sample locations (AOC 4 21 - 28). Please justify: how the proposed locations will bound the nature and extent of contamination (Data Gap 1) without sampling in the road or going inside the fence; the basis for confidence that a single step step-out approach will address Data Gap 1; and how the arrangement, as proposed, will address Data Gap 2 (exposure point concentration estimation [in light of hot spots]).	As stated in DOI Comment 12, (Absolute Comment 49), data gaps for AOC 4 were not discussed or agreed upon with agencies. Discussion of the AOC 4 data with the agencies and stakeholders is welcomed to assess and agree upon data gaps. Proposed soil sample locations (AOC 4-21 through AOC- 28) were located in the north and northeast portion of AOC 4 to bound exceedances of various COPCs in this general vicinity. Topography rises rapidly in this area and would have limited the amount of impacts from AOC 4 disposal in this direction. There is a potential for windblown dust from AOC 4 to migrate outside of the AOC 4 area. Windblown contamination, if any, is expected to be limited to surface soils. Samples AOC 4-23 through -27 were not placed in the road, rather just north of the road, so that the samples were in undisturbed soil. The road has been present since the early days of the station and is frequently graded and maintained with gravel. As discussed and agreed upon with the agencies, four additional sampling locations were added along the northern portion of AOC 4 inside the compressor station fence line to define exceedances of total chromium (Cr[T]) and dioxin/ furans at locations M01, L01, L02, L04, J03, O02, P03, P04, and Q04.	DOI Response: Resolved
126	DOI #53	Appendix A, Subappendix C-10, Section 1.1, 1st paragraph.	DOI	The text discounts the reality that more than “trash” was burned in AOC 4. It is apparent that laboratory/industrial waste was also burned in the area, resulting in the presence of dioxin.	The composition and types of materials that were burned at AOC 4 are unknown; therefore, trash was as a general term for refuse or waste.	DOI Response: Resolved
127	DOI #54	Appendix A, Subappendix C-10, Section 1.1, 3rd paragraph.	DOI	It should be recognized that the TCRA was meant to “address the <u>substantial</u> threat of a release of hazardous substances to the HNWR” and that additional action may be necessary under CERCLA as well. Evaluation of the available data and additional data from the ongoing investigation will determine if the threat of release has effectively been mitigated.	Comment noted	DOI Response: Resolved
128	DOI #55	Appendix A, Subappendix C-10, Section 1.1, 5th paragraph.	DOI	The statement is incorrect. The “<u>substantial</u> threat of release of hazardous substances” has been mitigated.	Substantial has been added to the statement.	DOI Response: Resolved
129	DOI #56	Appendix A, Subappendix C-10, Section 1.1, 7th paragraph.	DOI	It should be noted that soil removed from behind the gabion will be characterized for proper disposal.	Comment noted, and text was revised to clarify that soil removed from behind the gabion will be characterized for proper disposal.	DOI Response: Resolved
130	DOI #57	Appendix A, Subappendix C-10, Section 1.2, 2nd paragraph.	DOI	The site conceptual model should be updated to address current conditions at AOC 4. This paragraph leads the reader to believe that debris and significant buried material remain at the site. The 3rd and 4th sentences do not acknowledge that contaminants on surface soil may have also leached into the shallow and subsurface soil. Although this is addressed later	The conceptual model text was updated to reflect that the time-critical removal action (TCRA) has removed debris and burnt material. PG&E disagrees that the language is misleading. The second sentence states a primary release mechanism is leaching of contaminants from debris and burned waste. The sixth sentence states that primary source media are surface and subsurface soils, and	DOI Response: Resolved

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Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
				in the paragraph, it is misleading.	the seventh sentence states "*Contaminants could have leached from surface soil and shallow soil into underlying deeper soils.*"	
131	DOI #58	Appendix A, Subappendix C-10, Section 1.3 AOC 4 Data third paragraph last sentence Page C10-3	DOI	Revise "Solid Waste Management Unit 1" to say AOC 4.	The text was revised.	DOI Response: Resolved
132	DOI #60	Appendix A, Subappendix C-10, Section 2.0 **Decision 1 – Nature and Extent** first paragraph last sentence Page C10-4	DOI	This appears to be a relic from the SWMU 1 write up.	The sentence was removed.	DOI Response: Resolved
133	DOI #61	Appendix A, Subappendix C-10, Section 2.1.4 Cadmium first paragraph second sentence Page C10-5	DOI	Revise "barium" to "cadmium"	The text was revised	DOI Response: Resolved
134	DOI #59	Appendix A, Subappendix C-10, Section 2.1.6.	DOI	It is noted that "two samples (AOC4-J06_J07 and AOC4-M10) in the bottom of the ravine are bounded by topography". It is unclear if the associated contamination is bounded by topography or if the sample location makes additional sampling impractical. Please clarify.	Text was revised to state contamination in the bottom of the ravine is bounded to the south by topography.	DOI Response: Resolved DTSC Response: The response does not address potential for windblown transport of contamination both during waste burning and afterwards. The revised work plan should address this issue. PG&E Response: The potential for windblown transportation of contaminants from AOC 4 to this area was noted in the revised work plan.
135	DOI #62	Appendix A, Subappendix C10 Section 2.2 and 2.3	DOI	A review of the sampling results for the various constituents indicates that the lateral extent remains undefined not only at the south-southeast end of the AOC 4 but at the north and northeastern end of the site as well. Lateral extent in this area is not bounded for total chromium (samples 2x background), copper, nickel, PCBs to a lesser extent, and dioxins/furans. DOI requests an opportunity to ground-truth sample locations and is interested in samples at the northern and northeastern boundaries of the site. (Note: These areas are not currently addressed in the perimeter sampling.)	Discussion of the AOC 4 data with the agencies and stakeholders coupled with a site walk to assess and agree upon data gaps is welcomed.	DOI Response: Resolved
136	DOI #63	Appendix A, Subappendix C-10, Section 3.0 Decision 2 – Data Sufficient to Estimate Representative Exposure Point Concentrations last paragraph Page C10-12	DOI	It appears that the vast majority of samples are surface samples. Please add a statement on how the existing data are adequate to address the vertical exposure intervals defined in the risk assessment work plan.	The samples for AOC 4 largely represent samples collected from the bottom/base of the excavation. Thus, they are not "surface" samples in the same way that there are surface samples from other AOCs. The excavation was a TCRA and was guided by existing soil sampling data, as well as many physical constraints (bedrock or topography). Additionally, in general, the excavation continued until confirmation samples achieved the TECs, or until access restrictions limited the ability to conduct additional removal. At AOC 4, some areas were vacuumed down to bedrock. Generally, when samples from a deeper exposure interval do not exist, it can be conservatively assumed that the shallower samples (or surface samples) are	DOI Response: Resolved

Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
					representative of the deeper intervals; any uncertainty associated with overestimating risks will be discussed in the uncertainty analysis in the risk assessment. For AOC 4, additional sampling is planned to delineate potential vertical impacts that may have occurred. If and when data become available, they will be included in the Decision 2 discussions. Also, releases and impacts at AOC 4 were at the surface, with decreasing concentrations with depth. As a result of the TCRA, impacted soils were excavated, and it is likely that deeper soils are less or not impacted.	
137	DOI #64	Appendix A, Subappendix C10, Section 4.0 Decision 3 – Potential Threat to Groundwater from Residual Soil Concentrations second paragraph third sentence Page C10-13	DOI	Justify the depth to groundwater suggested at AOC 4. If this is projected from the alluvial aquifer data, then it may not be accurate.	Because no wells exist within AOC 4, the depth to groundwater is uncertain. The 150- to 200-foot depth to water was estimated from the Topock groundwater flow model as of September 2009. The depth to water in recently installed well MW-69 is approximately 180 feet. MW-69 is approximately 200 feet away from AOC 4. Because the elevation difference within AOC 4 from the top to the bottom of the ravine is approximately 50 feet, the depth to water in AOC 4 likely varies from 180 to 130 feet bgs.	DOI Response: Resolved
138	DOI #65	Appendix A, Subappendix C-10 Decision 3 – Potential Threat to Groundwater from Residual Soil Concentrations second paragraph last sentence Page C10-13	DOI	This does not appear to have been the case at AOC 10. Please remove this statement.	Comment noted. Statement has been removed.	DOI Response: Resolved
139	DOI #66	Appendix A, Subappendix C-10 Page C10-13 Decision 3 Potential Threats to Groundwater	DOI	The assessment is not complete. Samples collected beneath the Gabion have not been evaluated to address potential impacts to groundwater in Bat Cave Wash. Specifically, there are no comparisons to soil screening levels impacting groundwater (SSL_{GW}). Comparing data from AOC4 GB samples (GB 10, 11, 12) with Dioxin Equivalent, B(a)P Equivalent, and Total PCB SSL_{GW}s from EPA's November 2010 Regional Screening Levels (RSLs) indicates subsurface concentrations of these constituents well in excess of EPA's conservative RSLs. Please discuss how you intend to address subsurface soils potentially impacting groundwater at this location; including possible use of the proposed Bat Cave Wash samples (AOC[4] BCW 1 though 6), other data as appropriate, estimation techniques if appropriate, and adequacy of the analytical program to address SSL_{GW} driven detection limits.	Dioxin and PCBs were not modeled given their transport properties. The extremely high Kd values of these compounds combined with the minimal precipitation at Topock suggest that they would be relatively immobile in soils in this environment. Transport modeling of these compounds can be conducted once the Phase 2 sampling is complete. The USEPA SSLs for potential threat to groundwater are calculated based on an assumed recharge rate of 7 inches per year, which is appropriate for a fairly temperate region. Topock specific SSLs were calculated to take into account the extremely low recharge rate in arid environments. Assessment of the potential threat to groundwater in this area will follow the approach outlined in the work plan. In 2009, after the detections of dioxin/furans in soil at AOC 4, monitoring wells MW-9, MW-10, MW-12, MW-57M, and MW-59 were sampled and analyzed for dioxins to assess if groundwater has been impacted by dioxins. All results were below reporting limits.	DOI Response: Resolved
140	DOI #67	Appendix A, Subappendix C10, Section 4.1 Vanadium First bullet Page C10-13	DOI	Please explain how this is known with no wells in the AOC 4 area.	Because no wells exist within AOC 4, the depth to groundwater is uncertain. The 150- to 200-foot depth to water was estimated from the Topock groundwater flow model as of September 2009. The depth to water in recently installed well MW-69 is approximately 180 feet. MW-69 is approximately 200 feet away from AOC 4. Because the elevation difference within AOC 4 from the top to the bottom of the ravine is approximately 50 feet, the depth to water in AOC 4 likely varies from 180 to 130 feet bgs.	DOI Response: Resolved
141	DOI #68	Appendix A, Subappendix C10,	DOI	This was not demonstrated at AOC 10 and should not be presumed for AOC 4.	Based on the October 27, 2011 Comment Resolution Call, the comment pertains to the	DOI Response: Resolved

Response to Comments on the *Soil RCRA Facility Investigation/Remedial Investigation Work Plan, Pacific Gas and Electric Company (PG&E) Topock Compressor Station, Needles, California,* **Issued May 2011** From Combined United States Department of the Interior (DOI), California Department of Toxic Substances Control (DTSC), Fort Mojave Indian Tribe (FMIT) and Hualapai Comments						
Absolute Comment No.	**Agency/Tribe Comment No.**	**Comment Location (Section/Page)**	**Commenter**	**Comment**	**Response [a]**	**Comment Resolution**
		Section 4.1 Vanadium First bullet Page C10-13			third bullet not the first bullet. Comment noted. Third bullet has been deleted.	
142	DOI #37	Appendix A, Subappendix C10, Section 5.2 Waste Characterization Parameters first paragraph third sentence Page C10-14	DOI	The TCRA was implemented to remove all debris and powder. Please explain if any debris and white powder remain.	Removal of all fill and debris, which includes white powder, was completed as part of the 2010 TCRA in all safely accessible areas of AOC 4. References in Section 5.0 pertaining to characterization of debris and white powder have been removed.	DOI Response: Resolved
143	Specific 47	APPENDIX A, SUBAPPENDIX C – 10 (Part A Phase 1 Soil Investigation Data Gaps Evaluation Results), Tables C10-15 –	FMIT	Six sample locations are proposed for BCW and other twelve locations for AOC-4. The six locations in BCW are in a narrow portion of this drainage and one upstream (BCW6), one at confluence (BCW4) and one more downstream (BCW1) with one contingent (BCW2) along centerline is sufficient for characterization. Existing samples along the road where the proposed samples AOC4-17 to 28 are located are either non-detect (ND) or below screening levels for dioxin, 2 samples with PCBs and PAHs above screening….which suggest that limiting additional samples to AOC4-25 and 26 and AOC4-19-28 areas would be sufficient to complete characterization.	*DOI and DTSC Response*: In the February 25, 2011 letter to PG&E regarding the data gaps analysis, the attached table provided justification for the various sample locations. The AOC 4 points in question in Bat Cave Wash are retained to assess the potential for contamination migrating into Bat Cave Wash. The potential for migration from AOC 4 to Bat Cave Wash is indicated by Gabion sample results shown in AOC 4 Tables C10-3 and C10-5. DOI respectfully disagrees with the assertion that limiting additional samples to AOC4-25 and -26 and AOC4-19-28 areas would be sufficient to complete characterization. DOI's interpretation of figures in Section C-10 (for example, Figure C10-17) indicates possible clustering of constituents in the northeast portion of AOC 4. Clustering is suggestive of residual contamination associated with waste activity, and there is potential for these areas to act as sources of continued release and/or local areas of exposure (for example, hot spots).	
				APPENDIX B		
144	Specific 48	APPENDIX B – (General)	FMIT	The Work Plan identifies that, at many locations, the ability to collect subsurface samples is restricted due to the facility structures. This means that even after the implementation of this Work Plan, characterization will be incomplete. The work plan does not discuss how the within-facility RFI/RI will be completed with the operating facility present.	PG&E Response: PG&E has proposed that the RFI/RI and any necessary remediation that cannot be performed now be completed when the facility is decommissioned in the future. The Part B investigation specifically includes data collection to support the evaluation of potential migration pathways, exposure control, and worker protection measures. DTSC Response: DTSC also notes that any necessary remediation that cannot be performed now can be completed should an area become accessible in the future. This could be well before the facility is permanently decommissioned.	
145	18	Appendix B Part B Data Gaps Investigation Program Section 2.4.1 Inputs to Decision 4, Page 2-12	DTSC	Text should be revised to acknowledge that soil that may be prone to erosion (near surface soils) should also be evaluated as part of the offsite migration evaluation. It may not always be appropriate to limit offsite migration analysis exclusively to surface soils. This change should occur throughout Section 2.4.	The text was revised to indicate that near-surface soils located within the fence line of the compressor station that may be prone to erosion may be considered in the evaluation of potential offsite migration.	DTSC Response: Resolved pending review of the revised Work Plan
146	19	Appendix B Part B Data Gaps Investigation Program, Potential Transport Mechanisms and Pathways, Page 2-13	DTSC	The text only discusses surface water transport for the offsite migration evaluation. It should also mention that wind transport is a viable mechanism to transport contaminated media offsite. Text should mention that the evaluation of potential off site migrations routes is a current site conditions evaluation. As the site changes in the future, new pathways could occur and old pathways may be eliminated.	It is agreed that surface water is not the only potential migration pathway. The human health conceptual site model was modified to acknowledge that wind transport is a potentially complete transport pathway and this updated conceptual site model was added to the Appendix B main text, and this will be discussed/addressed in the upcoming risk assessments. Appendix B1 of Appendix B includes Figure 7, which is an overall CSM for Part B that presents potential migration and transport mechanisms. This figure was modified to	DTSC Response: Comment resolved pending review of the revised Work Plan

Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
					clarify wind dispersion as a potentially complete migration and dispersion pathway for offsite receptors.	
147	Specific 49	APPENDIX B – p. 2-15 (Data Sufficiency to Support Corrective Measures Study/ Feasibility Study Evaluation)	FMIT	The discussion of potential CMS/FS technologies does not include a discussion of the level of certainty in cleanup areas or soil volume estimates. For many of these technologies, estimates ranging within an order of magnitude are sufficient to scope these technologies in the CMS/FS. Therefore, the amount of sampling employed should reflect this needed level of certainty.	Please see response to Absolute Comment 62.	
148	20	Appendix B Part B Data Gaps Investigation Program Section 3.0 Accessibility Evaluation for Areas within the Fence Line, Page 3-1, Paragraph 1.	DTSC	Photographs of the SWMUs/AOCs are appreciated (Appendix B25), but may not adequately illustrate access limitations. DTSC requests to attend a field evaluation of each unit with PG&E to understand and confirm access restraints. Findings resulting from the field visit will need to be incorporated into the revised Work Plan.	A field visit was conducted on October 24, 2011.	DTSC Response: See DTSC letter to PG&E dated November 28, 2011 for reference. Potential revisions to the accessibility assessment and sampling are pending. PG&E Response: The sampling approach discussed during comment resolution meetings in March and April 2012 and agreed to by PG&E and the agencies, incorporates phased approach sampling for units located within the compressor station fence line. The phased sampling approach incorporates use of hydrovac technology allowing for deeper sampling, where feasible, and contingency sample locations. DTSC Response: Resolved DTSC appreciates PG&E's willingness to work with agencies to work around access issues identified at the facility
149	21	Appendix B Part B Data Gaps Investigation Program Section 3.1 Access and Sampling Feasibility Assessment, Page 3-1, Last Paragraph.	DTSC	The last paragraph on this page arbitrarily limits surface sampling to 1 foot bgs without any supporting rationale. The Work Plan should be revised to indicate that hand tools, such as augers or shovels, can be used to greater depths limited only by refusal. Additionally, different drilling techniques should also be acknowledged/listed that can be utilized at the station. These subsurface sampling techniques should be discussed in more detail. DTSC notes a 2010 PG&E response to one of DTSC comments on the Part B Work Plan, "*Further, all boring locations will be hand-excavated to at least 3 feet bgs for safety reasons, regardless of the results of a utility survey (see response to General Comment 11, above).*" PG&E is inconsistent with regards to safety measures for soil sampling.	The surface interval was based on the depth that an individual may be able to sample with a hand trowel. As discussed during the October 24, 2011 site visit with DTSC and DOI, areas defined as accessible for surface soil sample location only are frequently under utilities that are low to the ground. Hand excavation deeper than 1 foot bgs in the hard and rocky soils of the compressor station using only a hand trowel or very small shovel is likely to be infeasible. The text was modified to indicate that Level 3 areas can typically only be sampled to 1 foot bgs or less but that some locations may allow slightly deeper samples with shovels.	DTSC Response: DTSC disagrees with the response and witnessed PG&E staff shoveling successfully past 1 foot bgs on October 24, 11. PG&E has drilled wells greater than 200 feet bgs on the station. Please respond to the original comment. See DTSC letter to PG&E dated November 28, 2011 regarding sampling inside the facility fence line for reference. PG&E Response: The sampling approach discussed during comment resolution meetings in March and April 2012 and agreed to by PG&E and the agencies incorporates phased- sampling for units located within the compressor station fence line. The phased sampling approach incorporates use of hydrovac technology allowing for deeper sampling, where feasible, and contingency sample locations. DTSC Response: Resolved pending review of the revised Work Plan. DTSC appreciates PG&E's willingness to work with agencies

Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
						to work around access issues identified at the facility
150	22	Appendix B Part B Data Gaps Investigation Program Section 3.2 Initial Assessment of Subsurface Utilities	DTSC	This section calls out numerous utility lines (e.g., electric, gas, water) at the station, but does not accurately locate them or address whether the lines are active or inactive within AOCs/SWMUS. Therefore, utility impact on sample selection is not known at this stage. This critical part of utility evaluation will need to be completed for each AOC/SWMU in conjunction with DTSC oversight and input. DTSC is perplexed as to why such a basic assessment is being deferred by PG&E especially since PG&E was alerted to this concern during development of the previous Part A and Part B Work Plans.	As discussed during the October 24, 2011 site visit with DTSC and DOI, identifying the locations of all utilities at the facility without physically uncovering them is infeasible. Past geophysical surveys have shown that tracing lines is difficult due to the many lines (active and abandoned) present in the subsurface. Utility risers were counted and documented for the accessibility assess because it is clear that at least one utility is present at that location for each riser. Typically, the specific direction(s) that the utility may travel and the actual subsurface alignment of the utility or utilities cannot be determined from visual observations at the surface.	DTSC Response: See DTSC letter to PG&E dated November 28, 2011 regarding sampling inside the facility fence line for reference. PG&E Response: The phased sampling approach developed during the March and April 2012 comment resolution meetings, combined with the compressor station requirement for hand clearance of intrusive work, addresses this comment. DTSC Response: Resolved
151	23	Appendix B Part B Data Gaps Investigation Program Section 3.3 Safety Assessment for Sampling within the Compressor Station Fence Line, Page 3-2	DTSC	DTSC has witnessed PG&E conduct operational and maintenance work on the station that included highly intrusive soil excavations, including excavations below areas with thick concrete, within tight confines of operating infrastructure, and surrounded by/underneath numerous utilities (see 2008 photos below and in succeeding comments). Former soils excavations and sampling by PG&E have also been successful (see Closures Reports, Part B soil sampling). For soil sampling to be successful, DTSC requests that PG&E disclose in the Work Plan its process/method for excavating onsite (e.g., include utility clearance protocols mentioned in Figure B-2, Footnote 5) so that it can be followed for soil sampling and amended as necessary. 	Worker safety is of utmost importance to PG&E. While PG&E does conduct intrusive activities associated with periodic compressor station and pipeline maintenance and facility upgrades, those intrusive activities are carefully weighed against the physical threat of conducting subsurface work. The repairs and maintenance activities typically require large excavations with extensive shoring to ensure the stability of adjacent and exposed lines and/or foundations. All intrusive work at the station follows strict project-specific health and safety protocols for utility clearance to protect the safety of the workers and the underground facilities. The basic protocol includes preventing airborne dust and evaluating the excavation for the presence of unusual conditions that may add health and safety concerns. It is Topock Compressor Station policy to minimize operational and safety risks by limiting subsurface intrusion as much as possible and, thus, abandoned utilities are typically left in place. Because positive identification of all active and abandoned underground utilities prior to any intrusive activity within the station fence line is impossible, compressor station protocol requires all intrusive work be performed by hydrovac or hand excavation methods. As described during the October 24, 2011 site visit with DTSC and DOI, PG&E policy requires all excavations in the vicinity of existing infrastructure to be hand dug to *a minimum* of 3 feet; in more open areas, hydrovac excavation may also be used. Depending on the location, density of utilities encountered, and available information regarding a specific location, hand excavation or clearing using the hydrovac may be required as deep as 10 feet bgs. No power equipment is used until the excavation has been physically cleared for utilities. A station employee observes each excavation effort and determines when it is safe to proceed with more intrusive methods. PG&E does not have a written procedure for this requirement; however, it is policy and is understood and strictly followed by all station personnel. The above information was added to the text in this section.	DTSC Response: Please also respond to the original comment "DTSC requests PG&E disclose in the work plan its process/method for excavating onsite (for example, include utility clearance protocols mentioned in Figure B-2, Footnote 5) so that it can be followed for soil sampling and amended as necessary." DTSC noted on the October 24, 2011 site walk that PG&E periodically maps out/ marks underground utility locations on the ground surface prior to subsurface work. DTSC is perplexed that PG&E does not have a written procedure/protocol for underground work when worker safety is stated to be of upmost importance. The revised work plan must have a written procedure. PG&E Response: PG&E does not have a written protocol for intrusive underground work; however, the general procedure outlined in the original comment response is followed for all intrusive work. These details were added to the revised work plan in Section 2.0. DTSC Response: Resolved pending review of revised work plan.

Response to Comments on the

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From

Combined United States Department of the Interior (DOI), California Department of Toxic Substances Control (DTSC), Fort Mojave Indian Tribe (FMIT) and Hualapai Comments

Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
				 		

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152	26	Appendix B Part B Data Gaps Investigation Program Table B-12	DTSC	Metals should be added to SWMUs 5 through 9 as indicated in the individual chapters for these SWMUs. This table should be double-checked to ensure it is consistent with tables for individual AOCs/SWMUs.	Title 22 Metals analysis was added to the proposed sample tables for SWMUs 5 through 8. The tables were also double-checked to ensure consistency with tables for individual AOCs/SWMUs. If a sample is determined to be required at SWMU 9, Title 22 metals analysis will be included in the analytical suite for that sample.	DTSC Response: Resolved
153	24	Appendix B Part B Data Gaps Investigation Program Figure B-1	DTSC	The orange areas on the figures are AOCs and should be colored green.	Please see response to Comment 25 (DTSC Comment 14).	DTSC Response: See DTSC letter to PG&E dated November 28, 2011 for reference. Resolved. PG&E Response: the requested changes were made in the work plan. DTSC Response: Resolved

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154	25	Appendix B Part B Data Gaps Investigation Program Figure B-2 Compressor Station Accessibility Map,	DTSC	The map does not clearly determine if an area is accessible for soil sampling. For example, just because an area is covered (orange color) it should not be automatically eliminated from further investigation during this phase of work. Based on the unclear safety assessment presented in the Work Plan, DTSC is requiring field visits to each AOC/SWMU to evaluate access restrictions. The Work Plan should be revised after DTSC input from these field visits. Footnote 2: Comments arbitrarily limiting sampling to 1 foot bgs should be removed. Obviously, deeper samples have been collected onsite in the past and will need to be collected at depth in the future. Footnote 3: DTSC disagrees with the conjecture contained in this footnote and requests that it be deleted. Operating and closed facilities under DTSC oversight, routinely sample through asphalt and concrete. Any increased risk due to sampling should be de minimis as PG&E is required to ensure workers are not exposed to COCs during soil characterization activities. Sites, in general, would never be cleaned up if the postulated concern identified in the footnote was given any priority. Characterization efforts are requested by DTSC to ensure protection of human health. Based on DTSC's 2008 observations of PG&E conducting deep soil excavations at the station (see photos below and in preceding comments), DTSC believes that soil contamination could have been encountered without maintenance worker knowledge. Site maintenance workers seemed to rely on visual clues of contamination. This visual method of "site characterization" seems to be the realistic risk to workers rather than any conventional soil sampling. It appears that a soils management plan (SMP) needs to prepared by PG&E for DTSC approval to ensure site workers will not inappropriately or inadvertently encounter, move, or manage contaminated soils at or around the station. Additionally, the SMP should ensure that contaminated soils on the station are not placed offsite as the same soils could pose an unacceptable risk offsite (residential screening), but not onsite (commercial risk screening). Reference to "Table X" needs to be corrected. 	Orange colored areas are covered with thick concrete (for example, loading docks). Coring through these thick layers of concrete would be very difficult, and there is very little chance that any constituents trapped under thick concrete would migrate downward. The requested site visit was conducted on October 24, 2011. As explained in response to Comment 149 (DTSC Comment 21), the 1-foot depth is not arbitrary but is based on physical access constraints limiting use of excavation tools. The text was modified to indicate that Level 3 areas can typically only be sampled to 1 foot bgs or less but that some locations may allow slightly deeper samples with shovels. The footnotes have been revised. Footnote 3 is now Footnote 2, and has been modified as follows: "Given the presence of asphalt/concrete, any potential surface exposure/migration risks associated with contaminants that may be present are currently mitigated." PG&E conducts a project-specific safety analysis prior to all projects, and appropriate precautions are taken to protect workers against risks associated with chemicals of concern and physical hazards including subsurface utilities. A Soil Management Plan is currently being prepared by PG&E. The reference was corrected.	DTSC Response: Please modify or delete the concrete response as concrete is routinely cored on other RCRA/CERCLA hazardous waste sites. PG&E Response: See response to Comment 149. DTSC Response: Based on DTSC observations (e.g., no monitoring or personal protection equipment by PG&E worker), it would appear that PG&E could do a better job with worker protection associated with potential soil contamination. PG&E Response: PG&E and DTSC discussed and resolved DTSC's observations during a meeting on November 28, 2011. As mentioned during the meeting, a PG&E health and safety specialist has reviewed all onsite soil data and determined that the inhalation exposure pathway is not a concern as long as visible dust is not present. A "no dust" policy has been enacted for all excavations at the compressor station. The worker observed by DTSC was using a hand shovel for excavation, a method that does not create dust. DTSC Response: Resolved pending review of the revised Work Plan

Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
				 		

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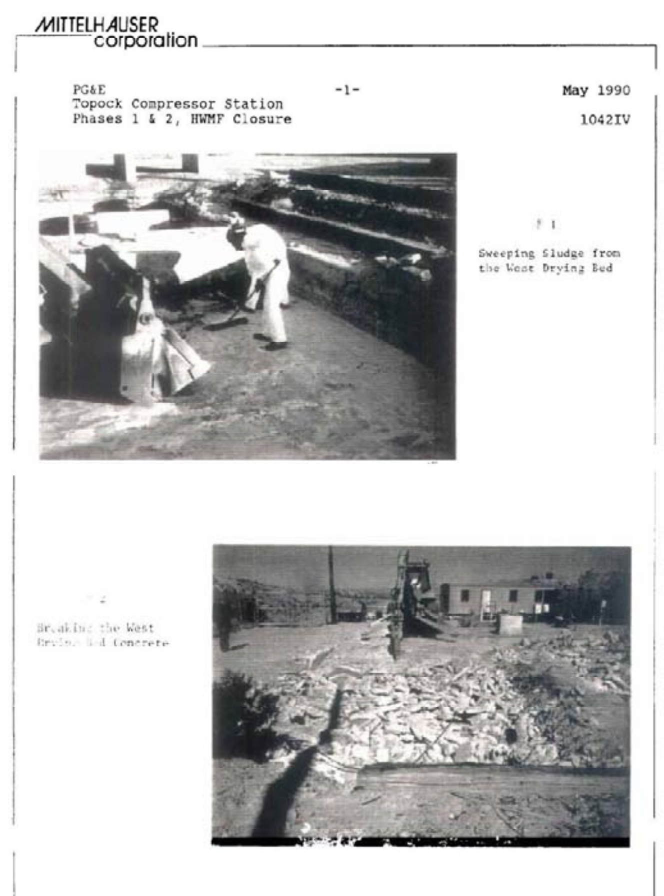
		Appendix B, Subappendix B2		**APPENDIX B, SUBAPPENDIX B2**		
155	27	Appendix B Part B Data Gaps Investigation Program, Appendix B2 Section 3.1 SMWU 5 Access Constraints, Page 2-3	DTSC	DTSC does not believe there is a significant access limitation for this unit based on the information provided in the Work Plan. Please see comments on Section 3 of the Work Plan. DTSC first notes that the Work Plan documents historic sampling in the exact area to three feet bgs and in the general area to 19 feet bgs. Secondly, PG&E conducted demolition activities for the former unit including destruction of the entire subgrade, 8-inch thick reinforced concrete sludge beds and 30-inch thick concrete footings. The concrete was broken in place with heavy equipment (i.e., 1,200 pound hydraulic breaker – see 1990 Closure Report figure below) and would have had to have been removed with heavy equipment. Deeper sampling (to approximately 10 feet) must be proposed by PG&E in the revised Work Plan to appropriately characterize the unit. PG&E originally proposed drilling to 10 feet in the 2007 Part B Work Plan, sampling at 1, 3, 6, and 10 feet bgs. It simply does not make sense that drill rigs for groundwater well extending hundreds of feet deep, earth moving bulldozers, and concrete shattering backhoes can operate in the area, yet less intrusive soil sampling equipment cannot. Do note that the Closure Report indicates the area as very rocky so contingent sampling methods must be included in the Work Plan (e.g., sonic drilling or backhoe). Contingent drilling methods should occur for all AOCs and SWMUs.  MITTELHAUSER corporation PG&E -1- May 1990 Topock Compressor Station Phases 1 & 2, HWMF Closure 1042IV # 1 Sweeping Sludge from the West Drying Bed # 2 Breaking the West Drying Bed Concrete	As discussed during the site visit on October 24, 2011, there are subsurface access limitations that apply in all areas of the station. Every soil sample location will have to be hand dug until it is certain (as established by the plant operator or his designee) that no utilities are likely to be encountered at greater depths. Although there appear to be fewer utilities in this area than in most other areas of the station, the site visit did indicate the presence of electrical, telecommunications, gas, and potentially water lines in this area. Other unknown lines may also be present. The 2007 RFI/RI Soil Investigation Work Plan indicated that soil samples would be collected to the depths indicated if feasible. The additional accessibility review conducted last year indicated that the feasibility of installing borings is limited on much of the station. PG&E recognizes that well installation and demolition have been conducted. Well installation also required clearing of each location to 10 feet bgs; this was relatively more feasible for well installation because (1) only a few locations were required (approximately 10% as many as for the soil investigation), and (2) the clearing occurred in open areas to accommodate the need for a drill rig, and utility clearing could therefore be expedited somewhat using the hydrovac equipment. Many of the soil samples are proposed in areas where access for the hydrovac is not feasible. Most of the demolition was surface demolition. Subsurface intrusion occurred in a limited number of borings; a small number compared to the proposed Soil Part B sampling effort.	DTSC Response: DTSC's commented on SWMU 5, and PG&E's response is generally off base talking about Part B characterization in its entirety. Based on the October 24, 2011 site walk of SWMU 5, DTSC believes deeper sampling is feasible. Please revise the work plan to reflect this. See DTSC letter to PG&E dated November 28, 2011 for reference. PG&E Response: The sampling approach discussed during March 29, 2012 meeting and agreed to by PG&E and agencies incorporates phased- sampling at SWMU 5. Proposed borings will be advanced to 6 feet bgs using hydrovac. DTSC Response: Resolved

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156	28	Appendix B Part B Data Gaps Investigation Program, Appendix B2 Section 3.2 SMWU 5 Proposed Sampling, Page B2-4, Paragraph 2	DTSC	The two samples proposed are not assessing releases from SWMU 5. The shallow depth proposed would evaluate the composition of the backfill used during closure of the unit. Additional sampling at depths to approximately 10ft bgs is needed to evaluate potential releases from below the bottoms of the former sludge beds (bottom approximately 3 feet bgs). As the units were approximately 50 feet long, DTSC proposes that two boring be completed in each of the two former beds. Additionally, four more locations are requested around the units (north, east, south, and west) to assess for surface spillage outside the boundaries of the unit (See 2008 DTSC Specific Comment 7). Please note that metals analyses are included for all samples (See Table B2-3). A conceptual site figure, in the form of an up close cross-section, should be prepared for this SWMU.	Please see response to Comment 155. The two proposed sample locations inside the former sludge drying beds are located in the deeper portion of the sludge drying bed (i.e., in the area where releases would have been most likely, as liquids would have been present most frequently in the deeper portions of the drying bed). Soil samples have been proposed to the north, east, south, and west of SWMU 5 as part of the SWMU 6, Unit 4.3, 4.4, and 4.5, AOC 13, AOC 18, and AOC 21 investigations. Sufficient data are being collected in this area for characterization, additional sample locations are not needed for characterization.	DTSC Response: Response unacceptable as it does not respond to the comment. PG&E Response: Comment 155 addresses DTSC's comment regarding sample depth in this area. Additional information has been added to address DTSC's remaining comments. DTSC Response: Please see Absolute Comment 155 regarding deeper sampling. Please revise the work plan to address the original comment, including the requested two borings per sludge bed. Additional samples to the north, west, and south are needed to assess the potential for surface spillage. Please respond to the original comment regarding a conceptual site model. PG&E Response: See response to Absolute Comment 155. During the March 29, 2012 meeting, it was determined that proposed sample locations at other units provide adequate coverage to address spillage issues. A conceptual site model, cross-section view, was provided in the revised work plan. DTSC Response: Resolved
157	29	Appendix B Part B Data Gaps Investigation Program, Appendix B2 Figure B2-1 and B2-2	DTSC	AOC 21 (surface impoundment with white material) is not plotted accurately on both figures as it is located too close to SWMU 5 (former sludge beds). It is imperative that the former units be accurately located so that soil samples can be properly placed. 1955 oblique aerial photographs indicate that the AOC 21 impoundment is 30 to 50 feet south of the sludge beds. The Work Plan must be revised and associated sampling points shifted.	The figure and proposed sampling locations were modified as appropriate.	DTSC Response: Resolved pending review of the revised Work Plan
		Appendix B, Subappendix B3		**APPENDIX B, SUBAPPENDIX B3**		
158	30	Appendix B Part B Data Gaps Investigation Program, Appendix B3 Section 1.0 Introduction and Background SWMU 6, Page B3-1, Paragraph 2.	DTSC	PG&E should confirm the depth of the pit in which the chromate reduction tank sat. A six foot depth is cited in the Work Plan, while the 1990 closure report indicates a 4 foot depth, but that the tank sat upon 2 foot tall concrete footings. The assigned depth of the analytical data should also be double checked as it is referenced in the Closure Report to the base of the pit after one foot of soils was already removed. Based on the Closure Report, DTSC would assume that the confirmation soil samples were collected from 5.5, 6, and 6.5 feet bgs, not 7.5, 8 and 8.5 feet bgs as reported in the Work Plan.	The only information available regarding the depth of the soil samples is from the text of the closure report, and the closure report is unclear in its description. The tank is described as being "lifted out of the 4-foot deep hole in which it sat." (Middlehauser, 1990). It is unclear whether the footings were considered to be part of the "hole" (that is, the bottom of the tank would have been at 2 feet bgs) or not (bottom of the tank would have been at 4 feet bgs). Neither DTSC's nor PG&E's interpretation of the description in the closure plan can be determined with certainty to be correct. PG&E's assumption that the depth of the footings was not included in the 4-foot depth of the hole is the more conservative approach because it assumes that contamination was present at a deeper depth and that the backfill is deeper.	DTSC Response: Resolved

Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
					The text will include a statement that there is uncertainty (approximately, 2 feet) in the exact depth of the chromate tank pit.	
159	31	Appendix B Part B Data Gaps Investigation Program, Appendix B3 Section 1.0 Introduction and Background SWMU 6, Page B3-1, Last sentence.	DTSC	Please delete the following sentence*, "No indications of any releases were observed during a facility inspection performed as part of the Resource Conservation and Recovery Act facility assessment (Kearny, 1987).* DTSC is perplexed as to why PG&E would perpetuate the false notion that the chromium reduction tank area is not impacted when the 1990 Closure Report suggests otherwise (note that PG&E has been previously informed by DTSC regarding this specific oversight). The section should add findings of the Closure Report (e.g., "bathtub ring" in the bottom on the unlined soil floor on which the tank sat; disposal of soil as hazardous waste from the floor because it might have been contaminated). Even if one ignores the oil staining observed within the trench below the tank area during closure, existing soil analytical data also suggests the tank area soil had been impacted.	This section was revised to add the following text: "However, during closure of the chromate reduction tank, a 'bathtub ring' was noted on the wall of the tank excavation after the tank was removed, and the closure report also indicated that the soil beneath the tank 'appeared compacted as though water had sat on it' (Middlehauser, 1990). As a precaution, approximately 1 foot of soil was removed from the sides and bottom of the tank excavation and disposed of as hazardous waste (Middlehauser, 1990). It does not appear as though the soil was analyzed for contaminants because the closure report only indicates that the soil was removed because it " could have been contaminated" (Middlehauser, 1990).	DTSC Response: Please also add that the soil was contaminated as the closure report documents releases from the Chromium Reduction Tank area based on observations (Page 6-5 of the Report: oil staining from 1 inch to 1 foot bgs) and from analytical data (Table 6-1 of the Report: elevated chromium and zinc above background in sample CRT-4 at 0.5 feet bgs. PG&E Response: Apparent oil staining was noted on the south wall of the excavation in the interval noted by DTSC, primarily in the southwest corner of the excavation; however, no samples from SWMU 6 were analyzed for oil and grease or other hydrocarbon constituents. Cr(T) and zinc were detected at concentrations exceeding background in one sample collected from this area (CRT-4 at 0.5 foot bgs). Detected concentrations were 120 mg/kg vs. 39.8 mg/kg and 96 mg/kg vs. 58 mg/kg, respectively, for Cr(T) and zinc. The duplicate sample from this location contained concentrations of Cr(T) and zinc very close to background (43 mg/kg and 59 mg/kg, respectively). No other constituents were present above background, and none of the detected constituents in the 1- and 1.5-foot samples from the same location exceeded background. The above information was included in the revised work plan. DTSC Response: Resolved
160	32	Appendix B Part B Data Gaps Investigation Program, Appendix B3 Section 3.1 SMWU 6 Access Constraints, Page B3-3	DTSC	As with SWMU 5 (see above), DTSC does not believe there is a significant access limitation for this unit based on the information provided in the Work Plan and 1990 Closure Report. Please see comments on Section 3 of the Work Plan. Historic sampling has occurred within the tank pit area to approximately 7 to 8 feet bgs from a trench dug with a backhoe (see Closure Report). Demolition activities and pit backfilling also occurred at the unit. PG&E originally proposed drilling to 10 feet in the 2007 Part B Work Plan, sampling at 1, 3, 6, and 10 feet bgs. Do note that the Closure Report indicates the area as very rocky so contingent sampling methods must be included in the Work Plan (e.g., sonic drilling or backhoe).	The sampling approach was discussed during a March 29, 2012 meeting, and it was agreed that phased-approach sampling would be conducted at SWMU 6. The proposed boring will be advanced to 10 feet bgs using hydrovac.	DTSC Response: Resolved

Response to Comments on the

***Soil RCRA Facility Investigation/Remedial Investigation Work Plan, Pacific Gas and Electric Company (PG&E) Topock Compressor Station, Needles, California,* Issued May 2011**

From

Combined United States Department of the Interior (DOI), California Department of Toxic Substances Control (DTSC), Fort Mojave Indian Tribe (FMIT) and Hualapai Comments

Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
161	33	Appendix B Part B Data Gaps Investigation Program, Appendix B3 Section 3.2 SMWU 6 Proposed Sampling, Page B3-4, Paragraph 2	DTSC	One sample location proposed is acceptable provided that it can be located precisely in relation to the former unit. If it cannot be precisely located, then additional locations are warranted (up to two more locations). The Work Plan should be revised to specify that the location should target the oil staining left in place during closure. The shallow depth proposed in the Work Plan is problematic as it would only evaluate the composition of the backfill used during closure of the unit. Additional sampling depth is needed to approximately 10ft bgs to evaluate potential releases from below the base of the pit (base approximately 5 feet bgs). A conceptual site figure, in the form of an up close cross-section, should be prepared for this SWMU.	A drawing with precise location of this area, including SWMU 6, was found during the engineer drawing review and was used to precisely locate the unit/proposed boring. A conceptual site model, cross-section view, was provided in the revised work plan.	DTSC Response: Resolved Please include a detailed cross section so that the base of units, potential soil backfill, etc. can be easily visualized.
162	34	Appendix B Part B Data Gaps Investigation Program, Appendix B3 Table B3-1	DTSC	Duplicate data for CRT-4 should be included on the table as originally done in the 2007 Part B Work Plan.	The duplicate data for CRT-4 is included in the revised work plan.	DTSC Response: Please retain all data. The Closure Report 9 (page 6-9) indicates that "Sample 1042-52-8 is a duplicate of 1042-52-5 and was analyzed by the second laboratory." It appears to be a routine duplicate soil sample analyzed by another lab. Please modify the work plan. It is also suggested that the PG&E response be modified to avoid confusion. PG&E Response: Response revised DTSC Response: Resolved
		Appendix B, Subappendix B4		**APPENDIX B, SUBAPPENDIX B4**		
163	35	Appendix B Part B Data Gaps Investigation Program, Appendix B4 Section 1.0 Introduction and Background SWMU 8, Page B4-1, Paragraph 2, Last sentence.	DTSC	Please delete the following sentence from the Work Plan, *"No indication of a release was observed during a facility inspection performed as part of the Resource Conservation and Recovery Act facility assessment (Kearny, 1987)"* as the more definitive 1990 Closure Report and this Work Plan both clearly indicate that a release from the former unit did occur.	The text was modified to add the following sentence: "However, as discussed below, subsequent work conducted during the closure of this unit indicated that a limited release had occurred (Middlehauser, 1990)."	DTSC Response: Resolved
164	36	Appendix B Part B Data Gaps Investigation Program, Appendix B4 Section 1.0 Introduction and Background SWMU 8, Page B4-2, Paragraph 2	DTSC	The following sentence needs to be revised, *"Following removal of the tank, concrete foundation, and subsoils, and approximately 1.5 feet of contaminated soil, a trench was dug and samples were collected from the wall of the trench at 2 feet and 3 feet below the bottom of the excavation (which corresponds to approximately 4 and 5 feet below ground surface [bgs])."* Page 6-8 of the 1990 Closure Report indicates that the 2 and 3 foot bgs samples obtained from the trench were based on measurements from "beneath the former Process Pump Tank foundation" not the bottom of the excavation. This may require changes to the 4 and 5 foot reference throughout the entire chapter.	The text indicates that the February 8, 1989 samples were collected from 2 and 3 feet bgs, respectively, beneath the former tank foundation. It is unclear from the text whether the depth of the samples is physically being referenced to the foundations or whether this is simply an indication that the samples were collected in the area that was formerly covered by the tank foundations. The report describes that an approximately 2-foot-deep hole was left after the foundations (and presumably underlying gravel) were removed. The report then states that "a few inches of soil" were removed because most of the samples showed some (low) levels of contamination. Following this removal, additional trenches were dug, and samples were collected at the same locations at 2 feet and 3 feet bgs. If the latter samples depths were referenced to the bottom of the foundation, they would be at 4 and 5 feet bgs, respectively, perhaps less any gravel fill below the foundation. It is unlikely that the sample depths are referenced directly to the bottom of the foundation (that is, not including footings) because there would not have been a 2-foot depth (which was the preexisting condition after the removal of the foundations and before the removal of the several inches of soil). The text was revised as follows:	DTSC Response: Upon further review, it appears that foundation reference is simply referring to the footprint of the unit. Suggest modifying the cited text as follows: "Following removal of the tank, concrete foundation, and contaminated soil (total of approximately 2 feet bgs), a trench was excavated, and samples were collected from the wall of the trench at 2 feet and 3 feet below the bottom of the excavation (which corresponds to approximately 4 and 5 feet bgs)." PG&E Response: Response revised DTSC Response: Resolved

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					"Following removal of the tank, concrete foundation, and contaminated soil (total of approximately 2 feet bgs), a trench was excavated, and samples were collected from the wall of the trench at 2 feet and 3 feet below the bottom of the excavation (which corresponds to approximately 4 and 5 feet bgs)."	
165	37	Appendix B Part B Data Gaps Investigation Program, Appendix B4 Section 3.1 SMWU 8 Access Constraints, Page B4-3	DTSC	As with SWMU 5 and SWMU 6, DTSC does not believe there is a significant access limitation for this unit based on the information provided in the Work Plan and 1990 Closure Report (excavation and trenching with a backhoe, concrete demolition with heavy equipment).	As discussed in the March 29, 2012 meeting, originally proposed sample location and depths are acceptable.	DTSC Response: Resolved
166	38	Appendix B Part B Data Gaps Investigation Program, Appendix B4 Section 3.2 SMWU 8 Proposed Sampling, Page B4-3, Paragraph 2	DTSC	Sampling to only 0.5 feet bgs or even 3 feet bgs will result in inadequate site characterization and require another characterization effort in the area. DTSC believes obtaining as much necessary site characterization data during one effort is fundamental to the project. Therefore, samples from greater depths are required. PG&E originally proposed sampling to 10 feet at this unit in the 2007 Part B Work Plan, sample depths at 1, 3, 6, and 10 feet bgs at three locations. This sampling interval should be followed. The shallow bedrock called out in the Closure Report is probably in error based on information collected during recent groundwater well installations on the station. Mention of bedrock in this chapter should be revised based on this new data. DTSC recommends that two locations be sampled to ten feet. One location from directly below the former pad and one location adjacent to the pad to assess for leaks and overflow from the unit directly to the unpaved soil. A conceptual site figure/cross-section should be prepared for this SWMU that includes illustration of backfill. This should assist in ensuring that some samples are collected from non-1989/90 backfill that would potentially be contaminated.	See response to Absolute Comment 165. As discussed in the March 29, 2012 meeting, the conceptual site figure/cross section is not required since the proposed boring is located outside the original backfill area.	DTSC Response: Resolved
		Appendix B, Subappendix B5		**APPENDIX B, SUBAPPENDIX B5**		
167	39	Appendix B Part B Data Gaps Investigation Program, Appendix B5 Section 3.1 SMWU 9 Access Constraints, Page B5-2	DTSC	As with SWMUs 5, 6, and 8 DTSC does not believe there is a significant access limitation for this unit based on the information provided in the Work Plan and 1990 Closure Report (deep excavation to approximately 20 feet bgs and concrete demolition with heavy equipment).	As discussed in the March 29, 2012 meeting, sampling in SWMU 9 will be postponed until after organics data are received from the other units (SWMU 5, SWMU 6, and AOC 18) associated with the wastewater treatment system. If organic contamination is found in the other units associated with the wastewater treatment system, then one soil boring may be advanced to collect a soil sample from beneath the former transfer sump for organic analysis. The decision to advance this boring will be made with stakeholders during the first data call after the initial soil samples have been collected.	DTSC Response: Resolved
168	40	Appendix B Part B Data Gaps Investigation Program, Appendix B5 Section 3.2 SMWU 9 Proposed Sampling, Page B5-3, Paragraph 2	DTSC	Sampling to only 0.5 feet bgs or even 3 feet bgs will result in inadequate site characterization and require another characterization effort in the area. The shallow depth proposed in the Work Plan is problematic as it would only evaluate the composition of the backfill used during closure of the unit. DTSC believes obtaining as much necessary site characterization data during one effort is fundamental to the project. Therefore, samples from greater depths are required. PG&E originally proposed sampling to 25 feet at this unit in the 2007 Part B Work Plan. This depth and the sampling interval contained in PG&E's 2007 Work Plan should be followed. One sample location proposed is acceptable provided that it can be located precisely in relation to the former unit. If it cannot be precisely located, then additional locations are warranted (up to two more locations). A conceptual site figure/cross-section should be prepared for this SWMU that includes illustration of backfill. This should assist in ensuring that some samples are collected from potentially contaminated non-1989/90 backfill.	See response to Absolute Comment 167.	DTSC Response: Resolved

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		Appendix B, Subappendix B6		**APPENDIX B, SUBAPPENDIX B6**		
169	41	Appendix B Part B Data Gaps Investigation Program, Appendix B6 Section 1.1 Background SWMU 11, Paragraph 2, Last Sentence	DTSC	Change "contaminated" to "containment" in the following sentence, "These tanks were located within the original epoxy-coated concrete contaminated structures."	The text was corrected.	DTSC Response: Resolved
170	42	Appendix B Part B Data Gaps Investigation Program, Appendix B6 Section 1.1 Background SWMU 11	DTSC	A detailed map/figure (scale of approximately 1" = 5') of the former sulfuric acid tank and containment area is requested. It should illustrate the current and former tanks, any sumps/low spots, etc. A site visit to these units is requested. Additional history for SWMU 11 appears necessary. A 2006 DTSC photograph (see photo below) indicates that an old 2,600 gallon tank was still in place by Cooling Tower B in 2006 even though it is reported out of service in 1984. When were the 2,600 gallon tanks installed? How old is the containment structure? The 2006 photo does not illustrate the location of the newer acid tanks within the containment structure. The revised Work Plan should indicate other locations where the acid would have been stored during historical operations. 1955 aerial photos do not show the 2,600 gallon tanks. Where were acids stored during this era? A complete history of SWMU 11 is requested. Additional sampling should be proposed in the revised Work Plan if additional storage locations are identified. 	A detailed figure is provided in the Work Plan showing the exact shape and location of the former acid tanks. Additional historical information will be provided to the degree available, and additional sampling locations will be proposed as appropriate.	DTSC Response: DTSC awaiting additional information required to respond to this comment. Resolved, pending review of revised work plan. PG&E Response: PG&E is still reviewing the historical engineering drawings and historical maps of the former sulfuric acid tanks. Pertinent information uncovered during this review is included in the revised work plan.
171	43	Appendix B Part B Data Gaps Investigation Program, Appendix B6 Section 3.1 SMWU 11 Data Gaps, Decision 2	DTSC	As no data has been intentionally collected for this unit, Decision 2 should not be identified as having sufficient data for supporting exposure point concentrations. Revision is requested.	This comment refers specifically to Appendix B6 for SWMU 11. As stated in the first sentence of Section 2.2 of Appendix B (page 2-8) on Decision 2: "This section presents the process used to evaluate Decision 2 – Data Sufficiency to Estimate Exposure Point Concentrations for the entire area within the fence line." Consistent with the approved Human Health and Ecological RAWP, EPCs for human exposure are being developed for the overall Part B area inside the fence line and not for each individual SWMU or AOC within the fence line. Therefore, the language in Section 3.1 for Decision 2 in Appendix B6 is based on the overall data and EPC evaluation for Decision 2 for the Part B area as summarized in Table B9 of Appendix B. The sampling plan does not propose to collect data adequate for EPC calculation for each individual SWMU or	DTSC Response: DTSC concurs that data needs to be collected and the data will be used in the risk evaluation and in the evaluation of the SWMU for releases, including hot spots. Please ensure that hot spots are evaluated properly. Resolved.

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					AOC. Revisions to the language as requested are not consistent with the approach for the risk assessment. However, as stated on page 2-9, "the Decision 2 data evaluation performed using the existing data will be expanded to include the combined data set once the Part B investigation had been completed." The text will acknowledge that data have not been collected at this SWMU, and data that will be collected will be combined with the existing data for the site and considered in the EPCs developed for the risk assessment.	
172	44	Appendix B Part B Data Gaps Investigation Program, Appendix B6 Section 3.2 SMWU 11 Access Constraints	DTSC	Based on the information provided in the Work Plan, DTSC is uncertain if any significant access limitations truly exist for this unit. DTSC is requiring field visits for this SWMU to evaluate access restrictions. The Work Plan should be revised after DTSC input from these field visits.	As discussed during the April 10, 2012 meeting, a phased sampling approach will be implemented in this AOC, and existing secondary containment will be demolished in the near future; therefore, a soil sample will be collected within the secondary containment unit.	DTSC Response: Resolved
173	45	Appendix B Part B Data Gaps Investigation Program, Appendix B6 Section 3.3 SMWU 11 Proposed Sampling	DTSC	Sampling to only 0.5 feet bgs or even 3 feet bgs will result in inadequate site characterization and require another characterization effort in the area. DTSC believes obtaining as much necessary site characterization data during one effort is fundamental to the project. Therefore, samples from greater depths are required. PG&E originally proposed sampling to 15 feet at the nearby cooling towers in the 2007 Part B Work Plan. This depth and the sampling interval contained in PG&E's 2007 Work Plan should be followed. The feasibility of locating samples within the containment area of the former tank should be discussed in the revised Work Plan and implemented if possible. If feasible, DTSC would be willing to reduce the number of sample locations. Otherwise, DTSC requests that angle borings be directed under the units. PG&E should recall that DTSC's Acting Deputy Director was in favor of angle or horizontal soil borings to gain proper access at the station.	See response to Comment 172.	DTSC Response: Resolved
		Appendix B, Subappendix B7		**APPENDIX B, SUBAPPENDIX B7**		
174	46	Appendix B Part B Data Gaps Investigation Program, Appendix B7 Section 1.1 Background AOC 5, Page B7-1	DTSC	The following sentence must be modified as indicated as it does not properly define the AOC, "Area of concern (AOC) 5 consists of the area below and surrounding original Cooling Tower A, as shown in Figure B7-1". Same issue for AOC 6. The Work Plan should indicate if grading occurred or fill soil has been placed at AOC 5 (potentially covering contaminated soil), especially after the cooling towers were replaced. Areas that were historically uncovered soils, but are now paved or under concrete should be identified as it can affect sampling locations and understanding of the site.	The text for AOCs 5 and 6 was modified as requested. No filling or grading was required to install the new cooling towers. However, as discussed during the October 24, 2011 site walk, the former cooling tower basins at both AOCs 5 and 6 were extended to the north to allow installation of the heat exchangers. The location of the new concrete is visible in the field. Concrete pathways were also installed in a portion of the areas formerly occupied by the acid houses at each cooling tower. The acid house for Cooling Tower A was located near the southeastern corner of the cooling tower; the acid house for Cooling Tower B was located on the eastern side of the tower, closer to the middle of the tower. In addition, at AOC 6, the cooling towers initially installed ca. 1954 were expanded approximately 4 to 5 years later, and the basin was extended at the same time. The difference in construction between the two portions of the basin is readily apparent. This information was added to the text, and photographs of the hotwell expansions are provided in the Work Plan (Appendix B, Subappendix B26).	DTSC Response: Resolved
175	47	Appendix B Part B Data Gaps Investigation Program, Appendix B7 Section 1.1 Background AOC 5, Page B7-2	DTSC	The Work Plan states, "Chemical Storage Tanks: There are three aboveground storage tanks at the southern end of the cooling tower that are used for the storage of the currently used cooling water treatment products". The Work Plan should state what chemicals are stored in these tanks and propose additional analytical methods if necessary.	The work plan text was revised to state the chemicals are stored in these tanks. PG&E has also reviewed the Material Data Safety Sheets for the current chemicals stored in these tanks and has determined that no changes to the analytical suite are required.	DTSC Response: Resolved pending review of Material Data Safety Sheets and revised work plan.
176	48	Appendix B Part B Data Gaps Investigation Program, Appendix	DTSC	The last sentence on the page, "In all cases, the lowest concentrations of detected constituents were found in the shallow soil sample", should be deleted as it is	The last sentence was deleted from the section.	DTSC Response: Resolved

Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
		B7 Section 2.0 Summary of Past Soil Characterization AOC 5, Page B7-3		erroneous for sample PS-13 and does not apply at the other three surface sample locations.		
177	49	Appendix B Part B Data Gaps Investigation Program, Appendix B7 Section 3.0 AOC 5 Nature and Extent Data Gaps, Page B7-3	DTSC	All sections summarizing data (3.1 to 3.4 and 4.0) indicate that the lateral extent of contamination is not identified to the east, north, and west. The Work Plan should be revised to indicate that it is also not identified to the south. Table B7-2: The industrial screening level for chromium changed from 450 mg/kg in the 2007 Work Plan to 1,400 in the current Work Plan. Please clarify this change.	The text was modified as suggested. A DTSC CHHSL has not been developed for total chromium, so the screening level defaults to the USEPA Region 9 RSL. The 1,400 mg/kg is based on the April 2009 RSL, which was the most current RSL at the time of the work plan.	DTSC Response: Comment Resolved
178	50	Appendix B Part B Data Gaps Investigation Program, Appendix B7 Section 4.1 AOC 5 Access Constraints	DTSC	Based on the information provided in the Work Plan, DTSC is uncertain if there is a significant access limitation for this unit including sampling below the unit. PG&E should obtain samples from beneath the old Cooling Tower basins as contaminated liquids constantly resided within the basins of the towers. DTSC previously commented on this issue (see DTSC's 2008 comments). Ignoring this critical pathway would be akin to not sampling under a surface impoundment that contained contaminated liquids. PG&E should recall that DTSC's Acting Deputy Director was in favor of angle or horizontal soil borings to gain proper access at the station. A DTSC field visit to this AOC is required to evaluate access restrictions. The Work Plan should be revised after DTSC input from field visits. PG&E originally proposed sampling to 15 feet at this unit in the 2007 Part B Work Plan. This depth and the sampling interval contained in PG&E's 2007 Work Plan should be followed as a default.	The sampling approach was discussed during a March 28, 2012 meeting and phased-approach sampling at AOC 5 was agreed upon.	DTSC Response: Resolved
179	51	Appendix B Part B Data Gaps Investigation Program, Appendix B7 Section 4.2 AOC 5 Proposed Sampling	DTSC	The proposed sampling is inadequate to characterize the site or select any potential remedial measures. DTSC and CRIT had requested that additional samples be proposed for this unit. Instead, PG&E has removed two AOC 5 samples from PG&E's original proposal contained in the 2007 Part B Work Plan. Additionally, FMIT's 2008 proposal to utilize XRF in the field has not been incorporated into the site assessment process for this unit. The Work Plan should include better rationale for each sample locations at this AOC. DTSC is uncertain why the exact sample locations have been proposed. For example, are certain locations specifically located in a low spot or an area where discharges were likely to occur (i.e., AOC5-3 to assess former chemical storage shed)? Sampling should be based on where contaminants likely traveled. Other than under the Cooling Tower Basin and former chemical storage shed, the Work Plan does not mention potential problem areas. DTSC requests that the Work Plan be revised to allow XRF screening first be conducted to assist in guiding drilling and quickly defining surficial hot spots. Based on the XRF, conventional soil sample locations could be added, moved, or dropped if needed. DTSC recommends that 10 soil sample locations be initially proposed for this AOC based on information presented in the Work Plan. This number could be modified based on the DTSC field visit. It is not clear if organics would have been associated with the cooling towers. The conceptual site model briefly touches on organics. If it is uncertain if organics were used at the cooling towers, then it is recommend that organics be added to the analyte list. However, as organics were possibly sprayed onto soils as part of old station maintenance (see 1955 oblique aerial photograph), analyses for organics is requested.	The sampling approach was discussed during a March 28, 2012 meeting and phased-approach sampling at AOC 5 was agreed upon (three additional locations were added to be screened by XRF and potentially sampled). Proposed sample locations were placed in areas of most likely contamination based on historical site knowledge and historical data. The exact sample location will be refined in the field using visual observations (that is, low areas or obvious flow pathways) and XRF field screening as discussed in the XRF field screening protocol. An XRF screening protocol has been developed and discussed at the November 9, 2011 comment resolution meeting. The protocol was submitted to the agencies for review on November 12, 2011. Ten percent of all samples collected at AOCs 5 and 6 and SWMU 11 will be analyzed for TAL/TCL, which includes VOC analysis. Given the limited use of organics associated with the cooling towers the past, this subset of samples is sufficient to assess whether or not these areas have been impacted by organics. Discussion of potential sampling implications is pending.	DTSC Response: Resolved DTSC Response: As organics were sprayed onto soils as part of station maintenance activities, all shallow soils (e.g. down to 3 feet bgs) should be analyzed for organics, including PCBs, SVOCs, PAHs, TPH. PG&E Response: All soil samples collected in AOC 13 – Unpaved Areas at the Compressor Station will be analyzed for the requested analytes (PCBs, SVOCs, PAHs, and TPH analyses). Also, as previously noted, 10 percent of all samples collected from the Part B AOCS will be analyzed for TAL/TCL compounds, which includes PCBs, SVOCs, PAHs, and TPH analyses. PG&E believes that the nature and extent of the requested organic compounds will be sufficiently assessed with the sampling plan as proposed. TAL/TCL analysis was added to proposed sample locations AOC 5-5 and AOC 5-6. DTSC Response: Resolved.

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		Appendix B, Subappendix B8		**APPENDIX B, SUBAPPENDIX B8**		
180	52	Appendix B Part B Data Gaps Investigation Program, Appendix B8 AOC 6	DTSC	Comments on AOC 5 (Cooling Tower A) above also apply to AOC 6 (Cooling Tower B).	The responses above for AOC 5 also apply to AOC 6.	DTSC Response: Resolved
		Appendix B, Subappendix B9		**APPENDIX B, SUBAPPENDIX B9**		
181	53	Appendix B Part B Data Gaps Investigation Program, Appendix B9 Section 1.1 Background AOC 7, Page B9-1	DTSC	The section should indicate that the Carpenter Shop used to be a chemical storage building.	The text was modified as requested.	DTSC Response: Resolved
182	54	Appendix B Part B Data Gaps Investigation Program, Appendix B9 Section 1.2 Conceptual Site Model AOC 7, Page B9-2,Paragraph 2	DTSC	The paragraph states, "The concrete foundations in this area are quite thick, and it is unlikely that any materials migrated through the concrete". Revision to the conceptual model/paragraph is suggested as DTSC has noted migration of contaminants through concrete on this and other sites.	PG&E believes that the site conceptual model is correct as written, that it is unlikely that materials migrated through the thick concrete in this building. The conceptual model states: "if any material did penetrate either asphalt or concrete and reach surface soil, they could also have migrated into shallow soil."	DTSC Response: Resolved
183	55	Appendix B Part B Data Gaps Investigation Program, Appendix B9 Section 3.2 AOC 7 Access Constraints	DTSC	Based on the information provided in the Work Plan, DTSC is uncertain if there is a significant access limitation for this unit including sampling inside buildings. A DTSC field visit to this AOC is required to evaluate access restrictions. The Work Plan should be revised after DTSC input from field visits. PG&E originally proposed sampling to six feet at this unit in the 2007 Part B Work Plan. In review of the 2007 Plan, DTSC commented on this depth and requested 10 feet. The 10-foot depth and the sampling interval contained in PG&E's 2007 Work Plan should be followed as a default.	A field visit was conducted on October 24, 2011. PG&E does not agree with necessity for sampling inside buildings at the compressor station. Coring through the concrete poses risk of encountering and damaging subsurface utilities. Any contaminants, with the exception of some VOCs (not expected to be present), if present below the concrete, are effectively capped, eliminating any exposure pathway and reducing or eliminating the driving mechanism for migration of constituents through the vadose zone.	DTSC Response: Based on the October 24, 2011 field visit, DTSC is not currently requesting sampling inside the former Chemical Storage Building. Instead, soil gas sampling is requested along the perimeters of the buildings. PG&E Response: Soil gas sampling will be conducted along the perimeter of the AOC 7 buildings to assist with characterization. DTSC Response: Resolved
184	56	Appendix B Part B Data Gaps Investigation Program, Appendix B9 Section 3.3 AOC 7 Proposed Sampling	DTSC	DTSC requests at least four additional sample locations. Some on the west side of the building north of the Carpenters Shop/Chemical Storage Building as the 1955 aerial illustrates that drums appear to have been stored in this area and a couple more for the Carpenters Shop/Chemical Storage Building. Sampling inside the buildings should also be considered as they were used for chemical storage and PG&E had originally planned on sampling inside as indicated in the 2007 Part B Work Plan. XRF screening for this area should be considered as should soil gas sampling, especially if access constraints truly exist. Soil gas sampling should also be considered for all applicable AOCs/SWMUs.	The sampling approach was discussed during an April 3, 2012 meeting and phased-approach sampling at AOC 7 was agreed upon. Proposed/modified soil sample locations and baseline sampling associated with the groundwater remedy (which includes sampling under the building foundations after removal) will address potential drum storage shown in 1955 aerial photograph and request for sampling inside the buildings. An XRF screening protocol has been developed and discussed at the November 9, 2011 comment resolution meeting. The protocol was submitted to the agencies for review on November 12, 2011. Soil gas sampling will be performed in areas as directed by DTSC.	As discussed during November 9, 2011 response to comments resolution meeting, DTSC requests soil gas samples be collected from applicable SWMUs/AOCs to assist with characterization. Applicable SWMUs/AOCs for soil gas sampling to be defined (PG&E and DTSC to define areas). As discussed during an April 3, 2013 meeting, a phased sampling approach will be incorporated into AOC 7, and baseline sampling will be implemented within the footprint of the hazardous waste storage area building, carpenter shop building, and pipe storage rack during construction of groundwater remedy support structures. It was agreed that soil gas sampling is not necessary provided that organic analyses are to be collected as part of baseline sampling at potential source areas. DTSC Response: Resolved pending review of the revised Work Plan

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		Appendix B, Subappendix B10		**APPENDIX B, SUBAPPENDIX B10**		
185	57	Appendix B Part B Data Gaps Investigation Program, Appendix B10 AOC 8	DTSC	The age of the storage locker should be stated in the Work Plan. Comments on AOC 7 apply to AOC 8, however, no additional sample locations are requested and XRF screening does not seem applicable due to pavement.	The age of the storage locker is not known. Comment noted regarding additional sampling requirements.	DTSC Response: Resolved
		Appendix B, Subappendix B11		**APPENDIX B, SUBAPPENDIX B11**		
186	58	Appendix B Part B Data Gaps Investigation Program, Appendix B11 Section 4.2 AOC 13 Access Constraints	DTSC	While access constraints exist for portions of AOC 13, this section is of no value documenting what the true constraints are for each sample proposed. It is assumed that there are no/minimal access constraints for many locations. This is assumed since intrusive activities periodically/routinely conducted at the compressor station (e.g., trenching/excavations/sampling) have been successfully undertaken by PG&E in the past. The following sentence contained in this section (and some other AOC sections) will need to be revised for clarity, "Sample locations and depths identified for AOC 13 reflect the identified access constraints and will be modified." The Work Plan will need to be revised to indicate that sample locations and depths will not be modified without DTSC approval. The Work Plan needs to be revised to reflect that borings are to be completed to 6 to 10 feet bgs as originally proposed by PG&E in their 2007 Part B Work Plan (see Table 5-12 of that plan).	The sampling approach was discussed during an April 3, 2012 meeting and phased-approach sampling at AOC 13 was agreed upon. Modifications to sample locations and depths will not be done without DTSC approval.	DTSC Response: Resolved pending review of the revised Work Plan
187	Specific 50	APPENDIX B – Table B11-10	FMIT	Twenty two samples are proposed for AOC 13. The justification and placement of some of the samples is not clear. Some are near previous samples. For example, the reasons for AOC13-26, 27, 30, 31, 32 are not clear, especially since the overall characterization will not be completed until some future date due to the inability to collect deep samples.	A non-biased grid-based sampling approach was chosen for AOC 13 – lower yard since the potential release mechanisms could have resulted in releases over a wide area. Proposed sample locations AOC13-21 through AOC13-34 (renumbered to AOC13-19 through AOC13-31) are on an approximate 100-foot grid. Samples AOC13- 30(renumbered AOC13-27) is located near a former sample of lower data quality. AOC 13-32 (renumbered AOC 13-29) was be relocated slightly to the west.	
188	59	Appendix B Part B Data Gaps Investigation Program, Appendix B11 AOC 13 Figure B11-3	DTSC	Additional borings are requested within close proximity to the following sample locations due to historic elevated contaminant detections: PGE-LT8, BGCS-5, BGCS-6 (possibly BGCS-3). Analyze for the full suite of AOC 13 analytes. Please also add a boring based on soil discoloration depicted in the 1955 oblique aerial photograph (Figure 3-14 of RFI Volume 1). This area is located on the slope between the compressor engine building and the lower yard where the paved, descending, access road bends.	As discussed during the April 3, 2012 meeting, proposed/modified sample locations are adequate to assess elevated detections at PGE-LT8, BGCS-5, BGCS-6, and BGCS-3. A surface sample location (AOC13-32) has been added in the area of discolored soil as shown in 1955 oblique aerial photograph.	DTSC Response: Resolved
189	60	Appendix B Part B Data Gaps Investigation Program, Appendix B11 AOC 13 Figure B11-4	DTSC	Additional borings are requested based on the numerous detections of elevated TPH illustrated on this figure. PG&E needs to revise the Work Plan to include appropriate characterization of these previously screened areas. Figure B11-2 and data tables should be utilized to assist in selecting additional locations. Additional samples are also needed where Figure 3-15 of the RFI Volume 1 (1955 oblique aerial photograph) illustrates soil discoloration around the jacket water coolers and auxiliary jacket water coolers.	During the April 24, 2012 site walk, proposed soil sample locations (AOC13-6, AOC13-7, AOC13-11, AOC13-12, and AOC13-16; renumbered to AOC13-5, AOC13-6, AOC13-7, AOC13-10, AOC13-11, AOC13-14, and AOC13-15) were relocated to areas showing staining potentially indicative of elevated TPH concentrations. During March 28′ 2012 meeting, proposed sample locations were added to AOCs 15 and 19 to address discolored soil as shown in the 1955 oblique aerial photograph.	DTSC Response: Resolved.
190	61	Appendix B Part B Data Gaps Investigation Program, Appendix B11 AOC 13 Figure B11-5	DTSC	Please modify this figure or create a new one to include only AOC 13 locations so that they may be appropriately viewed without distraction.	An additional figure was created. However, it is important to recognize that other sampling will be conducted at many other units, and that that sampling will have utility for the data evaluation at AOC 13.	DTSC Response: Resolved

Response to Comments on the

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Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
		Appendix B, Subappendix B12		**APPENDIX B, SUBAPPENDIX B12**		
191	62	Appendix B Part B Data Gaps Investigation Program, Appendix B12 Section 1.1 Background AOC 15, Paragraph 2	DTSC	The cited sentence should be revised as indicated for accuracy, "Incidental leaks and spills have occurred and ~~may have~~ resulted in impacts to the soil beneath the pumps." PG&E must reinsert information removed from the 2007 Part B Work Plan regarding when then neighboring areas were unpaved (at least 1967). Provide the rationale for PG&E's removal of the information. As requested by DTSC in 2008, surface drainage and low points, etc., should be identified for this unit. PG&E should review DTSC's 2008 Specific Comment 24 again and address it in the revised Work Plan. Information regarding where contamination likely flowed from this unit is necessary, otherwise a larger, less focused, investigation is required.	The text was modified as requested. The information was reinserted as requested. PG&E removed certain information in an effort to reduce the lengthiness of the work plan. There are no low points within this unit; however, as observed during the October 24, 2011 site walk, the ground surface at the unit slopes slightly to the southwest. This information was added to the revised work plan.	DTSC Response: Resolved pending review of the revised Work Plan
192	63	Appendix B Part B Data Gaps Investigation Program, Appendix B12 Section 1.2 Conceptual Site Model AOC 15, Last Paragraph	DTSC	The section states, "Because the entire AOC is covered with gravel or concrete pavement, runoff of contaminated surface soil in rainwater is not considered a potential migration pathway." The sentence should be revised as gravel would not stop soluble contaminants, such as hexavalent chromium, from migrating away from the unit.	The text was modified to read: "Because the entire AOC is covered with gravel or concrete pavement, runoff of contaminated surface soil in rainwater is considered to be only a minor migration pathway (that is, where gravel cover is thin); however, soluble constituents located in surface soils, including in surface soils adjacent to the eastern edge of the unit, may dissolve into rain water and be carried in surface water run-off."	DTSC Response: Comment resolved
193	64	Appendix B Part B Data Gaps Investigation Program, Appendix B12 Section 3.6 AOC 15 Zinc	DTSC	Interpretations regarding zinc concentrations above background are incorrect and the Work Plan will need to be revised.	The discussion in Section 3.6 was revised to reflect that seven detected concentrations of zinc exceeded the background threshold value but did not exceed the commercial screening level.	DTSC Response: The text should be corrected to cite the correct ranges of zinc, as originally requested. Resolved if revision is made to the text. PG&E Response: The text was corrected to cite the correct ranges of zinc. DTSC Response: Resolved
194	65	Appendix B Part B Data Gaps Investigation Program, Appendix B12 Section 4.0 AOC 15 Data Gaps	DTSC	Decision 2: This bullet indicates that SVOCs/PAHs are being added to all soil samples collected within the fence line. Clarification is requested as the analytical summary tables do not reflect this.	The statement is incorrect, and was revised as follows: "However, since semivolatile organic compound analysis, which includes polycyclic aromatic hydrocarbons, has been added to most soil samples collected within the fence line, this data gap has been addressed."	DTSC Response: Resolved for AOC 15, but DTSC may request SVOCs/PAHs for certain SWMUS/AOCs where it was believed they were already included in the analyte list.
195	66	Appendix B Part B Data Gaps Investigation Program, Appendix B12 Section 4.2 AOC 15 Access Constraints	DTSC	While access issues certainly exist for AOC 15 based on surface structures alone, PG&E has successfully sampled to depth in the past at this unit beyond what is proposed in the Work Plan. PG&E originally proposed sampling to 15 feet at this unit in PG&E's 2007 Part B Work Plan. This depth and the sampling interval contained in PG&E's 2007 Work Plan should be followed as a default. PG&E should identify small drilling units that can be moved into the AOC15 area as several exist on the market. A site visit is warranted for this unit.	As was apparent at the October 24, 2011 site walk that bringing any kind of drilling rig into this area is infeasible. The only feasible method of "boring" is hand excavation. The 2007 RFI/RI Soil Investigation Work Plan proposed sampling to 15 feet bgs, if feasible, and the accessibility investigation determined that it is not feasible.	DTSC Response: The work plan depths need to be revised. Depths of 3 feet and greater are feasible at this AOC as they have already been proven by PG&E to be feasible based on previous sampling depths. Suggest revision to "10 feet if feasible" for this AOC. PG&E Response: The sampling approach was discussed during a March 29, 2012 meeting and phased-approach sampling at AOC 15 was agreed upon. DTSC Response: Resolved

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Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
196	67	Appendix B Part B Data Gaps Investigation Program, Appendix B12 Section 4.3 AOC 15 Proposed Sampling	DTSC	PCBs, SVOCs, and PAHs should be added to the analyte list due to the detections of PCBs elsewhere at the station and also due to the historical oiling of roads/soils at the station. The Work Plan must be revised to incorporate XRF screening to first be conducted to assist in guiding drilling and quickly defining surficial hot spots. The rationale for the proposed sampling is poor, especially since the original rationale for the older samples is essentially missing. Based on the information presented in the Work Plan, additional step out borings are needed for this AOC as impacted soils have been detected at all previous locations and there is no assurance that hot spots do not exist In the area. Seven additional locations are required for this AOC (five in the pump area and a couple south of location AOC15-6). Additional locations may also be needed based on potential historic releases (e.g., potential flow offsite). Hopefully, the XRF screening will help to reduce the number of conventional borings. Decision 5: STLC and TCLP analyses should be considered for <u>all</u> SMWUs and AOCs (Part A and Part B) if high concentrations are detected (such as at this AOC). The revised Work Plan should address this data gap to evaluate issues associated with hazardous waste. The need to conduct pilot tests for contaminated soils should be considered for the project and inclusion in the Work Plan. Some Tribes have shown interest in soil washing. Perhaps known contaminated soils removed from this AOC could be utilized in a pilot project(s), especially if excavation methods are used to obtain samples and clear utilities. Best management practices/upgrades should be evaluated for this AOC to minimize the likelihood for future releases. Can lined sumps be installed to catch periodic spills associated with operations?	PCBs and SVOCs, including PAHs, were added to the analyte list for AOC 15-6 and AOC15-7 (new location). An XRF screening protocol has been developed and is included in Section 2.0 of the main text of this Work Plan. The potential for contingent samples is limited by adjacent facilities, and XRF screening is limited to the graveled areas. XRF cannot penetrate pavement, and PG&E does not believe the potential results from removal of concrete to perform XRF is worth the risk inherent in such an invasive procedure. The sampling approach was discussed during the March 29, 2012 meeting and phased-approach sampling at AOC 15 was agreed upon. As outlined in the DQO Part A and Part B DQO Technical Memorandums, soluble threshold limit concentration (STLC) and toxicity characteristic leaching procedure (TCLP) analyses will be considered for each AOC where sample concentrations are 10X the STLC and 20X the TCLP values. This information was added to the text for Decision 5 in Section 2.5.2 of the main text of Appendix B. Specific soil physical and chemical properties that could influence the performance of certain remedial technologies (for example, porosity, grain size, density, organic carbon content, soil chemical properties) are being collected. Additional detailed data collection specifically for the CMS/FS will be conducted during the CMS/FS phase. Comment noted. PG&E will evaluate the potential for implementation of best management practices/upgrades in this area to minimize the likelihood of future releases, including discussions with the Topock Compressor Station operations staff on the appropriateness of additional best management practices/upgrades.	DTSC Response: Resolved
		Appendix B, Subappendix B13		**APPENDIX B, SUBAPPENDIX B13**		
197	68	Appendix B Part B Data Gaps Investigation Program, Appendix B13 Section 1.1 Background AOC 16	DTSC	The section indicates that the unit was installed in the early 1990s. The section should be revised to indicate where sandblasting occurred prior to the installation of the shelter. The second paragraph discusses sandblast grit waste visible at the surface surrounding this unit. The presence of the waste at the surface suggests that PG&E operations could be improved. PG&E should consider best management practices to contain the grit including, if necessary, cleaning it up from the surface once work is completed.	This section was revised/corrected to include the following information: Some sandblasting historically occurred in this area before the sandblast shelter was constructed. As described in the text, sandblasting for larger components occurred in situ. It is uncertain when the concrete pad was installed; the metal roof was installed in the late 1980s (1988 or 1989) and the shelter in its current configuration was only used by PG&E until the early 1990s. At that time, regulatory requirements for sandblasting were changed, and PG&E began to exclusively hire contractors to do sandblasting. All sandblasting contractors are licensed, maintain the proper permits, and are required to implement best management practices to contain sandblast material. The majority of the work is conducted offsite. For any work done onsite, contractors are required to implement best management practices to contain sandblast material. No change to plant operations to minimize future risks associated with current sandblasting activities is required. As noted during the site visit, the dark material mixed with sand on the west side of the sandblast shelter that was previously identified as possible abrasive material (sandblast grit) may also be coke breeze (that is, granular carbon material used to fill the cathodic protection anodes at the station).	DTSC Response: Comment resolved

Response to Comments on the

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Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
198	69	Appendix B Part B Data Gaps Investigation Program, Appendix B13 Section 2.0 Summary of Past Soil Characterization AOC 16, Paragraph 3	DTSC	This paragraph will need to be revised as it incorrectly states that all four constituents analyzed were only detected at concentrations at or below their respective background threshold values.	The sentence has been revised as follows: "All four constituents were only detected at concentrations at or below their respective background threshold values, with the exception of zinc in the surface soil samples collected at location AOC 2A, which exceeded the background threshold value."	DTSC Response: Resolved
199	70	Appendix B Part B Data Gaps Investigation Program, Appendix B13 Section 4.1 AOC 16 Data Gaps, Paragraph 3	DTSC	Data Gap #1: The text should be revised to indicate that the extent of contamination has also not been assessed to the south.	The text was revised as suggested.	DTSC Response: Resolved
200	71	Appendix B Part B Data Gaps Investigation Program, Appendix B13 Section 4.2 AOC 16 Access Constraints	DTSC	Based on the information provided in the Work Plan and from previous site visits, access constraints for this unit seem minimal. A site walk would be beneficial to specifically observe any obvious constraints. The revised Work Plan should indicate that a drill rig can access this area.	The sampling approach was discussed during an April 3, 2012 meeting and phased-approach sampling at AOC 16 was agreed upon. Sampling at deeper depths using hydrovac technology and contingency sample locations are included in the phased approach.	DTSC Response: Resolved
201	72	Appendix B Part B Data Gaps Investigation Program, Appendix B13 Section 4.3 AOC 16 Proposed Sampling	DTSC	PG&E originally proposed to drill all locations to a depth of 10 feet bgs in their 2007 Part B Work Plan. DTSC believes that drilling to 3 feet should be sufficient based on the nature of the unit (dry waste releases to the surface). Provided that liquids were not used, DTSC requests that samples be collected at 0, 1, and 3 feet bgs for each boring. PCBs, SVOCs, and PAHs should be added to the analyte list due to the detections of PCBs elsewhere at the station and also due to the historic oiling of roads/soils at the station. The Work Plan must be revised including updating Table B13-4. PG&E has indicated in RTCs (Appendix B26) that sandblast operations occurred in the area prior to construction of the shelter. Therefore, sampling beneath the concrete slab should be considered. Step out (lateral and vertical) contingency borings should be utilized at this unit (and other un-sampled AOCs/SWMUs) as it has not been previously sampled. These contingency locations should be identified in a different color on revised Work Plan figures. The Work Plan must be revised to incorporate XRF screening to first be conducted to assist in guiding drilling and quickly defining surficial hot spots.	See response to Absolute Comment 200. TAL/TCL analysis, which includes organics, will be done at sample location AOC16-1. An XRF screening protocol has been developed and is included in the revised work plan.	DTSC Response: Resolved
202	73	Appendix B Part B Data Gaps Investigation Program, Appendix B13 Figure B13-1 and B13-3	DTSC	The Figures B13-1 and B13-3 of the Work Plan should be revised for AOC 16. The scale of the existing figures is inappropriate as it does not focus on the AOC and includes several other unrelated AOCs. A scale of approximately 1" = 15' should be used.	A revised figure at a greater resolution was added; however, it is important to understand where other samples in the vicinity have and/or will be collected to determine whether there will be adequate sample coverage to define the nature and extent of contamination.	DTSC Response: Resolved
		Appendix B, Subappendix B14		**APPENDIX B, SUBAPPENDIX B14**		
203	74	Appendix B Part B Data Gaps Investigation Program, Appendix B14 Section 1.1 Background AOC 17	DTSC	The background section should mention when the septic system was installed.	The septic system appears to have been installed when the plant was installed because toilet and shower facilities were included in the original design of the Auxiliary Building. This information was added to Section 1.1	DTSC Response: Resolved
204	75	Appendix B Part B Data Gaps Investigation Program, Appendix B14 Section 3.1 AOC 17 Data Gaps	DTSC	Decision 2: As no data has been collected for this AOC, Decision 2 should not be identified as having sufficient data for supporting exposure point concentrations. Revision is requested.	This comment refers specifically to Appendix B14 for AOC 17. See response to Comment 171 (DTSC Specific Comment 43, for SWMU 11).	DTSC Response: Resolved. See response to Comment 171.

Response to Comments on the
Soil RCRA Facility Investigation/Remedial Investigation Work Plan, Pacific Gas and Electric Company (PG&E) Topock Compressor Station, Needles, California, **Issued May 2011**
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205	76	Appendix B Part B Data Gaps Investigation Program, Appendix B14 Section 3.2 AOC 17 Access Constraints	DTSC	Based on the information provided in the Work Plan and PG&E's 2007 Part B Work Plan, the only known access constraint for the septic system is the system itself. However, after the geophysical survey described in Section 3.3 is conducted, a better understanding of the leachfield location should be known. Therefore, sampling depth intervals for this AOC should be those originally proposed by PG&E in their 2007 Part B Work Plan that includes drilling to 15 feet. The Work Plan must be revised to reflect PG&E's original proposal.	The sampling approach was discussed during a March 29, 2012 meeting and it was agreed to advance borings to 10 feet bgs and incorporate appropriate elements of phased-approach sampling at AOC 17.	DTSC Response: Resolved
206	77	Appendix B Part B Data Gaps Investigation Program, Appendix B14 Section 3.3 AOC 17 Proposed Sampling, Paragraph 1	DTSC	The section states, "A geophysical survey will be performed to attempt to locate the exact location of the leachfield to assist with sample location placement." Details regarding this survey should be included in this section including the suite of instruments that will be used. The Work Plan should also indicate that a better figure will be prepared for AOC 17 once the geophysical survey is completed. The scale (1" = 50') of the existing figure (Figure B14-1) is inappropriate as it includes several other unrelated AOCs. A scale of approximately 1" = 15' should be used.	Please see the response to Absolute Comment 35 (Comment DOI#4). A specific figure was prepared for AOC 17; however, it is important to recognize that there will be nearby samples associated with other units (AOCs 13 and 22) that can help characterize the area. Therefore, PG&E has chosen to depict the larger area.	DTSC Response: Please ensure details regarding the geophysical survey are included in this section (or clearly referenced to another section), which includes the suite of instruments that will be used. PG&E Response: A clear reference to details regarding the geophysical survey was included in this section. DTSC Response: Resolved
207	78	Appendix B Part B Data Gaps Investigation Program, Appendix B14 Section 3.3 AOC 17 Proposed Sampling, Paragraphs 2 and 3	DTSC	PCBs should be added to the analyte list due to the detections of PCBs elsewhere at the station and also due to potential incorporation of PCBs into oil that had been used to oil roads in the past. Table B14-2 will need to be revised (also see comment above on AOC 17 access constraints). Step out (lateral and vertical) contingency borings should be considered at this unit (and other un-sampled AOCs/SWMUs) as it has not been previously sampled. These contingency locations should be identified in a different color on figures.	During the March 29, 2012 meeting, PCB analysis was added to all surface soil samples at this unit, and at 3 feet bgs at AOC17-2 and AOC17-4. The sampling approach was discussed during a March 29, 2012 meeting and phased-approach sampling at AOC 17 was agreed upon. Contingency samples are included in the phased sampling approach.	DTSC Response: Resolved
		Appendix B, Subappendix B15		**APPENDIX B, SUBAPPENDIX B15**		
208	79	Appendix B Part B Data Gaps Investigation Program, Appendix B15 Section 3.0 AOC 18 Data Gaps and Proposed Sampling	DTSC	Revise the first stated data gap as follows: Data Gap #1 – Collect additional soil samples to analyze for organics <u>especially at areas where releases have been documented</u>. As a result of this clarification, PG&E will need to go back to the closure plan and confirm that proposed samples are properly located where contaminated materials were removed or pipeline leaks were identified. PG&E will need to provide this critical information/rationale in a revised Table B15-4 and text. The revised Work Plan should provide assurances that proposed locations (and depths) are carefully located in relation to the former/current pipelines. Otherwise, additional sample locations will be needed or trenching/excavation should be employed.	PG&E has verified that pertinent information from the closure plan, including removed pipelines/soil and areas of potential pipeline leaks, was considered in the placement of proposed sample locations. Table 15-4 has been revised to reflect available information. Table 15-1 has been revised to show estimated pipeline depths. During the April 3, 2012 meeting, proposed sample locations were adjusted to areas of known releases.	DTSC Response: Resolved pending review of revised work plan.
209	80	Appendix B Part B Data Gaps Investigation Program, Appendix B15 Section 4.1 AOC 18 Access Constraints	DTSC	Based on the nonspecific information provided in the Work Plan, DTSC is uncertain if there is a significant access limitation for these units. Previous intrusive closure activities (pipeline removal, contaminated soil excavations) were successful in the past and suggest that sample access is not a concern in most areas.	The sampling approach was discussed during an April 3, 2012 meeting and phased-approach sampling at AOC 18 was agreed upon.	DTSC Response: Resolved
210	81	Appendix B Part B Data Gaps Investigation Program, Appendix B15 Section 4.2 AOC 18 Proposed Sampling	DTSC	See comment above regarding Data Gap # 1 for AOC 18. Target depth should be 10 feet bgs as originally proposed by PG&E in their 2007 Part B Work Plan. Include PCBs in the analysis for these samples due to oily/organic association.	See response to Absolute Comments 208 and 209. PCB analysis has been added to all sample locations. As discussed during the April 3, 2012 meeting, proposed/modified sample locations are adequate to assess vertical and lateral extents of contamination at PH-2.	DTSC Response: Resolved pending review of the revised work plan.

Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
				Sample location AOC18-9 does not define the vertical and lateral extent of the PH-2 sample result. Additional samples are required.		
211	Specific 51	APPENDIX B – Table B15-4	FMIT	Proposed samples for AOC 18 overlap areas that are being proposed for sampling at AOC 13. Therefore, seek opportunities to co-locate samples which characterize both of these AOCs to reduce the number of sample locations.	Comment noted. As discussed during the October 24, 2011 site visit, sample locations were placed to avoid duplicate sampling locations.	
		Appendix B, Subappendix B16		**APPENDIX B, SUBAPPENDIX B16**		
212	82	Appendix B Part B Data Gaps Investigation Program, Appendix B16 Section 1.1 Background AOC 19	DTSC	Based on the description of the chemical additive shed and highly contaminated green chromium droplets at the surface of the unit by the emergency eyewash, PG&E must start focusing on remedial/interim measures for this area. The measures installed by PG&E (visqueen and wooden pad covering contaminated areas) are only temporary and may not be adequate. The revised Work Plan should indicate how PG&E plans on moving expeditiously to take care of this problem.	The requested information is provided in the revised work plan.	DTSC Response: DTSC requests some detail in PG&E's response to see what PG&E is considering prior to insertion into the revised work plan. PG&E Response: The contaminated concrete pad will be removed, sampled, and properly disposed at an offsite facility. One surface soil sample and one shallow subsurface soil sample will be collected beneath the removed concrete pad; both samples will be analyzed for Title 22 Metals and hexavalent chromium. The area beneath the pad will then be covered with 10 mil plastic and gravel (to match the adjacent gravel in this area). XRF screening will be used below and around the concrete pad. Additional soil samples may be sent to an offsite analytical laboratory based on XRF screening results (that is, if XRF screening results are above screening levels). DTSC Response: DTSC recommends using the XRF below and around the pad to assist in evaluating the area. Based on the XRF results, additional soil samples may be proposed. PG&E Response: Response revised DTSC Response: Resolved pending review of revised work plan.
213	83	Appendix B Part B Data Gaps Investigation Program, Appendix B16 Section 1.2 Conceptual Site Model AOC 19, Last Paragraph	DTSC	The section states, "Because the entire AOC is covered with gravel or concrete pavement, runoff of contaminated surface soil in rainwater is not considered a potential migration pathway." The sentence should be revised as highly contaminated soluble chemicals (e.g., greenish chromium droplets) are readily transported away from the unit. PG&E should make this revision for other applicable units as well.	The text was modified to read: "Because the entire AOC is covered with gravel or concrete pavement, runoff of contaminated surface soil in rainwater is considered to be only a minor migration pathway (that is, where gravel cover is thin); however, soluble constituents located in surface soils may dissolve into rain water and be carried in surface water run-off."	DTSC Response: Resolved
214	84	Appendix B Part B Data Gaps Investigation Program, Appendix B16, 2.0 Summary of Past Soil Characterization AOC 19	DTSC	The section states, "Since the concrete debris and soil samples collected from the former hotwell have been removed and are not representative of current site conditions, these data are not presented on tables and figures in this sub-appendix, but are discussed in the following nature and extent discussion for context".	The soil data were for sediments deposited within the hotwell and are clearly not representative of site conditions. Similarly, contaminant concentrations in the concrete do not provide any information regarding the potential impacts to underlying soils because it is not possible to determine which concrete samples represented	DTSC Response: DTSC disagrees with PG&E's response because the historic data are suggestive of what may currently exist in the remaining remnants of the hot well.

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				Historic data should not be downplayed as it indicates what was found and is valuable as it should suggest what to anticipate in the future. Please note that not all concrete or soils were removed in the past.	which portion of the hot well and whether any portion of the concrete samples were collected from the portion of the hotwell bottom in contact with the underlying soil. Thus, the text correctly sets these data apart.	To better alert the reader to the magnitude of the historic data, please replace the last paragraph of page B16-1 of Section 1.1 of the work plan with the following paragraph that came from the approved 2007 RFI Volume 1 Report: "A cleanup project was conducted to remove the hot well remnants. The remaining concrete and the soil contained in the hot well were removed, and the concrete debris and soil were sampled. The soil samples contained Cr(T) at 280 and 220 mg/kg respectively, and Cr(VI) at 4 and 3.6 mg/kg. The concrete sampled contained Cr(T) at concentrations ranging from 530 to 2,300 mg/kg, and Cr(VI) at concentrations ranging from 37 to 330 mg/kg. The two samples with the highest Cr(T) concentrations were analyzed for soluble Cr(T) and Cr (VI) using the California Waste Extraction Test (WET). The two samples were also tested for soluble Cr(T) using the toxicity characteristic leaching procedure (TCLP). All samples exceed the soluble threshold limit concentration (STLC) and total threshold limit concentration (TTLC) criteria of 5 mg/L. The TCLP indicated soluble Cr(T) at 40 and 68 mg/L, respectively, while the WET indicated soluble Cr(T) at 78 and 110 mg/L, respectively. The soluble Cr(VI) concentrations were 64 mg/kg and 80 mg/kg, respectively. No soil samples were collected under the hot well." Please also add that the unaffected concrete sample (U1) also contained Cr(T) at 530 mg/kg and soluble Cr(VI) at 37 mg/kg, suggesting that visual clues for chromium contamination may be misleading. Please delete the cited sentence below from the work plan. "Since the concrete debris and soil samples collected from the former hotwell have been removed and are not representative of current site conditions, these data are not presented on tables and figures in this sub-

Response to Comments on the

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Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
						appendix, but are discussed in the following nature and extent discussion for context." PG&E Response: The suggested changes were made in the revised work plan. DTSC Response: Resolved.
215	85	Appendix B Part B Data Gaps Investigation Program, Appendix B16, Nature and Extent Conclusions AOC 19	DTSC	The short paragraph on Page B16-7 (Section 4.9) should also indicate that, while above background and below screening levels, the lateral and vertical extent of elevated cadmium, copper, and molybdenum have not been determined. Individual sections on the metals will have to be revised to reflect this (Note: Page B16-6 contains numerous typos where "copper" was inadvertently inserted for the metal of interest). More importantly, the individual sections and overall conclusion should not indicate that any constituent has been adequately defined. Please recall that very little data has been collected from the unit. The opportunistic samples are exactly that, samples collected from a trench in the vicinity of this AOC for an entirely different purpose (The Work Plan should be revised to remind the reader of this and unique sample designation should be utilized – e.g., use "OS" designation to sample identifier). The Work Plan should be revised to also indicate that the opportunistic samples currently lie beyond PG&E's inferred AOC boundary.	The nature and extent conclusions and individual constituent discussions were modified to state that the lateral and vertical extents of cadmium, copper, and molybdenum have not been defined. The typographical errors on Page B16-6 were corrected. The sample IDs of the opportunistic soil samples will not be updated. However, the following sentence was added to Section 3.0, after the first sentence in the first paragraph: "The 2011 utility trench samples were collected outside the inferred boundary of AOC 19."	DTSC Response: As indicated in the DTSC comment, <u>none</u> of the sections should conclude that the extent of contamination has been defined. PG&E Response: Comment noted. DTSC disagrees: Please change the sample IDs of opportunistic samples. This is important for several reasons. PG&E Response: The opportunistic soil sample IDs was modified as suggested. DTSC Response: Resolved, DTSC concurs with adding the last statement to the revised work plan.
216	86	Appendix B Part B Data Gaps Investigation Program, Appendix B16 Section 5.2 AOC 15 Access Constraints	DTSC	While access issues certainly exist for AOC 19 based on surface structures alone, PG&E had originally proposed to sample to a depth of 15 feet at this unit (see PG&E's 2007 Part B Work Plan). This depth and the sampling interval contained in PG&E's 2007 Work Plan should be followed as a default. PG&E should identify if any small, portable drilling units can be used at this AOC. A site visit is warranted for this unit.	The sampling approach was discussed during a March 28, 2012 meeting and phased-approach sampling at AOC 19 was agreed upon. A small, portable drilling unit is not practicable for this AOC; however, two proposed sample locations are accessible by hydrovac.	DTSC Response: Resolved
217	87	Appendix B Part B Data Gaps Investigation Program, Appendix B16 Section 5.3 AOC 19 Proposed Sampling	DTSC	PCBs, SVOCs, and PAHs should be added to the analyte list due to the detections of PCBs elsewhere at the station and also due to the historic oiling of roads/soils at the station. The 1955 aerial photograph suggests heavy discoloration in this area. The Work Plan must be revised to incorporate XRF screening to first be conducted to assist in guiding drilling and quickly defining surficial hot spots. The rationale for the proposed boring locations is not clear. Good rationale must be stated in the revised Work Plan. Additional borings are probably needed. This should become more apparent after a site walk. DTSC had requested drilling beneath and around the hot well and around leak areas (Appendix B26, Specific Comments 41) in 2008. Additional locations may also be needed based on potential historic releases (e.g., potential flow offsite). Hopefully, the XRF screening will help to reduce the number of conventional borings. Decision 5: STLC and TCLP analyses should be considered for <u>all</u> SMWUs and AOCs (Part A and Part B) if high concentrations are detected (such as at this AOC). The revised Work Plan should address this data gap to evaluate issues associated with hazardous waste. The need to conduct pilot tests for contaminated soils should be considered for the project and inclusion in the Work Plan. Some Tribes have shown interest in soil washing. Perhaps known contaminated soils removed from this AOC could be utilized in a pilot project(s), especially if excavation methods are used to obtain samples and clear utilities. . PG&E has indicated potential to remove contaminated concrete from this area (Appendix B26, Specific Comments 43), yet no concrete sampling is proposed (DTSC requests that XRF be utilized for concrete surfaces as well).	An XRF screening protocol has been developed and is included in the revised work plan in Section 2 of the main text. As outlined in the DQO Part A and Part B DQO Technical Memorandums, STLC and TCLP analyses will be considered for each AOC where sample concentrations are 10X the STLC and 20X the TCLP values. This information was added to the text for Decision 5 in Section 2.5.2 of the main text of Appendix B. Specific soil physical and chemical properties that could influence the performance of certain remedial technologies (for example, porosity, grain size, density, organic carbon content, soil chemical properties) are being collected. Additional detailed data collection specifically for the CMS/FS will be conducted during the CMS/FS phase. Please see Comment 212 for discussion on concrete removal and sampling in AOC 19. The XRF will be used to screen concrete surfaces in this area. Comment noted.	DTSC Response: PCBs, SVOCs, and PAHs should be added to the analyte list as originally requested. PG&E Response: As discussed at March 28, 2012, TAL/TCL analysis will be performed at sample location AOC 19-8. DTSC Response: Resolved pending review of the revised Work Plan

Response to Comments on the

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Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
				Best management practices/upgrades should be evaluated for this AOC to minimize the likelihood for future releases (e.g., from valves and pumps).		
218	88	Appendix B Part B Data Gaps Investigation Program, Appendix B16, Figure B16-3 AOC 19	DTSC	Most of the lead values should also be bolded as they exceed industrial screening criteria.	Lead concentrations exceeding the industrial screening level were bolded.	DTSC Response: Resolved
		Appendix B, Subappendix B17		**APPENDIX B, SUBAPPENDIX B17**		
219	89	Appendix B Part B Data Gaps Investigation Program, Appendix B17 Section 1.1 Background AOC 20	DTSC	Reference to piping segment I-1 in this section and Section 2.0 requires that it be adequately located on a figure. Revision to the Work Plan is requested.	The revision was made to the work plan based on the available information.	DTSC Response: DTSC awaits the revision. PG&E Response: During the engineer drawing review, a figure was found showing the location of segment I-1. This segment was added to the figure. DTSC Response: Resolved
220	90	Appendix B Part B Data Gaps Investigation Program, Appendix B17 Section 3.2 AOC 20 Access Constraints	DTSC	The section indicates that sampling might occur underneath aboveground portions of the system, but no attempt will be made to locate and uncover underground piping. DTSC is quite concerned by this response especially in light of Specific Comment 46 (see Appendix B26). In 2008 DTSC requested clarification on the depth to the drains. In PG&E's 2010 response to this comment, they indicated that hand excavation would be conducted until the lines are physically encountered. PG&E's 2007 Part B Work Plan also proposed sampling to 10 feet bgs at all proposed locations. Having thought the issue clarified and resolved, DTSC did not find it necessary to respond in 2010. In 2011, Specific Comment 46 indicates that PG&E also did not have the need to respond to the matter. Yet after building upon three years of resolution, PG&E decided to go in another direction in 2011 which is opposite of the originally agreed-upon path. This change in direction has adverse impacts on the working relationship between DTSC and the facility as it may set precedence for future occurrences. PG&E shall utilize their 2010 Response to Specific Comment 46 (Appendix B26) in the revised Work Plan.	The comment response referenced by DTSC is merely intended to point out that hand excavation would be required to uncover the lines. PG&E did not commit to conducting this work in this comment response. Pending response to DTSC request to uncover the lines.	DTSC Response: Most readers of Specific Comment 46 would think that PG&E had committed to conducting the work cited. PG&E Response: The sampling approach was discussed during an April 10, 2012 meeting and a phased sampling approach at AOC 20 was agreed upon, and originally proposed sample locations and depths have been adjusted for focused characterization of pipelines. DTSC Response: Resolved pending review of the revised Work Plan
221	91	Appendix B Part B Data Gaps Investigation Program, Appendix B17 Section 3.3 AOC 20 Proposed Sampling	DTSC	The rationale for selection of sample locations should be included in the revised Work Plan (e.g., areas of known leaks). PG&E should perform leak testing to locate lines of concern. DTSC defaults to PG&E's 2007 sample locations and drilling depths in light of the shallow proposal contained in the Work Plan. Also see Specific Comment 47 contained in Appendix B26. Revision of the Work Plan is required. As with all new units, contingent sampling locations should be identified in the event preliminary borings identify contamination requiring step outs	The sampling approach was discussed during the April 10, 2012 meeting and a phased sampling approach at AOC 20 was agreed upon, including contingency sample locations. The sampling approach also includes sampling at select pipeline joints in lieu of pipeline testing. Video of the line will be attempted, if possible given the small diameter of the pipe (4-inches). Also, all samples will be collected from beneath the line.	DTSC Response: Resolved pending review of the revised Work Plan.
222	Specific 52	APPENDIX B – Table B17-2	FMIT	AOC 20 address storm drains across the facility. However, these drains are located in or near other SWMUs/AOCs which had processes and releases that would define what ended up in these drains. Recommend to eliminate AOC20 and put the storm drains within their appropriate and respective AOC. This will simplify reporting and data evaluation with the drains characterized and results reported with other AOC data.	*DTSC Response*: AOC 20 addresses industrial floor drains that are unique from storm drains. The industrial floor drains capture liquids from various compressor station activities and convey the liquids to the oily water treatment system. They are distinctly different than the conventional storm drains. Past work by PG&E found that some of the older lines had leaked and contaminated surrounding soils. Therefore, DTSC concurs with the approach to investigate the lines themselves. DTSC is open to linking specific drains to specific units and past/present activities but is not clear on how this will necessarily improve/minimize the characterization effort.	

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Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
		Appendix B, Subappendix B18		**APPENDIX B, SUBAPPENDIX B18**		
223	92	Appendix B Part B Data Gaps Investigation Program, Appendix B18 Section 1.1 Background AOC 21	DTSC	The background section should mention when the septic system was installed.	This comment appears out of place and related to AOC 17.	DTSC Response: Resolved
224	93	Appendix B Part B Data Gaps Investigation Program, Appendix B18 Section 3.3 AOC 21 Proposed Sampling	DTSC	See comments regarding AOC 21 captured in comments on SMWU 5 including access constraints and sampling depths. As with all new units, contingent sampling locations should be identified in the event preliminary borings identify contamination requiring step outs. PCBs, SVOCs, and PAHs should be added to the analyte list due to the detections of PCBs elsewhere at the station and also due to the historic oiling of roads/soils at the station.	See responses to AOC 21 comments captured in SWMU 5 comment responses.	DTSC Response: SWMU 5 comments were not acceptable to DTSC. Resolution needed. PG&E Response: The sampling approach was discussed during March 29, 2012 meeting and phased-approach sampling at AOC 21 was agreed upon. Contingency samples are included in the phased sampling approach. VOC, SVOC, PAH, TPH, and PCB analyses were added to AOC21-1. Based on the March 29, 2012 meeting, this unit was resized, and one proposed sample location was eliminated. DTSC Response: Resolved
		Appendix B, Subappendix B19		**APPENDIX B, SUBAPPENDIX B19**		
225	94	Appendix B Part B Data Gaps Investigation Program, Appendix B19 Section 4.2 AOC 22 Access Constraints	DTSC	Based on the information provided in the Work Plan, DTSC is uncertain if there is a significant access limitation for this unit. A DTSC field visit to this AOC is required to evaluate access restrictions. The Work Plan should be revised after DTSC input from field visits.	The sampling approach was discussed during a March 29, 2012 meeting and phased-approach sampling at AOC 22 was agreed upon. Contingency samples are included in the phased sampling approach.	DTSC Response: Resolved
226	95	Appendix B Part B Data Gaps Investigation Program, Appendix B19 Section 4.3 AOC 22 Proposed Sampling	DTSC	As with all new units, contingent sampling locations should be identified in the event preliminary borings identify contamination requiring step outs. Sampling to 10 to 15 feet bgs is requested (PG&E's Part B default sampling depth assumed to be based on risk). An additional primary location is requested approximately 10 to 20 feet southwest of AOC22-1 due to uncertainty in the exact location of the unit and process operations. DTSC requests that the Work Plan be revised to allow XRF screening to first be conducted to assist in guiding drilling and quickly defining any surficial hot spots. Based on the XRF, primary soil sample locations could be moved.	An XRF screening protocol has been developed and included in the revised work plan in Section 2 of the main text.	DTSC Response: Based on the October 24, 2011 site walk of AOC 22, DTSC believes deeper sampling is feasible. Please revise the work plan to reflect this. PG&E indicated this area was going to be used for groundwater remedy piping/infrastructure, and groundwork would occur in this area. Therefore, characterization in this and other affected AOCs needs to be expedited. PG&E Response: See response to Absolute Comment 225. DTSC Response: Resolved
		Appendix B, Subappendix B20		**APPENDIX B, SUBAPPENDIX B20**		
227	96	Appendix B Part B Data Gaps Investigation Program, Appendix B20 Section 1.1 AOC 23 Background	DTSC	The section should indicate that the majority of the building appears abandoned and portions of the floor have been backfilled indicating a basement formerly existed. Stained concrete inside and out at this building should also be mentioned as it prompted DTSC to include it as an AOC.	As discussed during the October 24, 2011 site visit, PG&E has uncovered additional drawings showing that the foundation of this building was designed to hold tanks. The foundation was built up around the tanks to provide for easy access during operations. Sometime after the tanks were removed, the foundation was brought to a common level, and a small former stairway was also filled in. The doorway leading to the stairwell was sealed off, thereby dividing the building in half completely.	DTSC Response: Clarify what the tanks held. PG&E Response: The water-softening process used soda ash and lime to remove minerals from the raw plant water. Although the drawings do not specify the

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					While concrete of different ages and colors was present in the building at the time of the site visit, the stained concrete noted by DTSC was only apparent on the steps outside of the building. This information was added to Section 1.1.of Appendix B, Subappendix B20.	proposed contents of the tanks, PG&E believes that the two tanks held these two chemicals because these chemicals were used in bulk in the softening process. DTSC Response: Figure 6-1 (Precipitation and Process Pump Tanks Sample Locations) of the 1990 Closure Plan shows a connection between the building and the line connected to the sump and precipitation tank. Please clarify this connection and any related hazardous waste operations. PG&E Response: Drawings from 1957 show two lines running from the Water Softening Building to SWMU 7; these lines connected the chemical vats/mixing tanks used for the water softening process to the Permutit precipitator. The first line is associated with the initial chemical vat installed at the time the station was constructed; the second line was added when the second chemical vat/mix tank was added in 1957 (the two tanks were later moved outside the building and reused in the Hazardous Waste Treatment System). A line shown in the 1967 engineer drawings also connects the Permutit precipitator to Sludge Drying Bed #1 (there was only one drying bed at this time).There were two floor drains in the Water Softening Building that were initially connected to the industrial drain that also collects flow from the floor drains in the Compressor Building. The northern floor drain was later capped off, and the southern floor drain was apparently connected to the same line as the Precipitation Tank. There is no evidence that the building was ever used to process or handle any materials associated with the hazardous waste treatment system. DTSC Response: Resolved.
228	97	Appendix B Part B Data Gaps Investigation Program, Appendix B20 Section 3.3 AOC 23 Proposed Sampling	DTSC	As with all new units, contingent sampling locations should be identified in the event preliminary borings identify contamination requiring step outs. Sampling to 10 to 15 feet bgs is requested (PG&E's Part B default sampling depth assumed to be based on risk). Additional primary locations are requested inside the building due to the abandoned nature of the building and associated staining.	The sampling approach was discussed during an April 3, 2012 meeting and phased-approach sampling at AOC 23 was agreed upon. Contingency samples are included in the phased sampling approach. An XRF screening protocol has been developed and included in the revised work plan in Section 2 of the main text.	DTSC Response: Resolved

Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
				DTSC requests that the Work Plan be revised to allow XRF screening to first be conducted to assist in guiding drilling and quickly defining any surficial hot spots. Based on the XRF, primary soil sample locations could be cited. Screening should include concrete to assist in determining the nature of contamination at this AOC. Pending results, concrete sampling may be required. See DTSC access comment on AOC 22 above as it applies to this unit as well.		
		Appendix B, Subappendix B21		**APPENDIX B, SUBAPPENDIX B21**		
229	98	Appendix B Part B Data Gaps Investigation Program, Appendix B21 Section 1.1 AOC 24 Background	DTSC	The section begins with the sentence, "Area of Concern (AOC) 24 is the stained area near the former structure found on the northern edge of the lower yard, and also includes the footprint of this former structure." This sentence is uninformative and should be revised to provide value (a better introductory sentence is needed). The section should include photos of the oil/water separator as many are available (see PG&E's August 22, 2007 letter re. photos of the station) as well as the large stained area from the 1955 aerial photograph. The approximate dimensions of the oil/water separator and large staining should be documented in text. The footprint of the oil/water separator and large oil staining should be carefully plotted on Figure B21-2 (as well as B21-1) so that samples can be taken from these areas (Please include the buried scrubber header on the Figure B21-2 as the clarifier was located just north of it). The section is misleading in stating that, "No staining is visible in either of these photos." The cited photos cut off the area where large staining was noted in 1955. As PG&E has several other photographs available to them, a more complete documentation of the information that can be observed from the photos should be included in the revised Work Plan. This shall include, at a minimum, the following: 1) that a single pipe discharges into the clarifier and that the clarifier is always noted to contain liquids.; 2) staining is noted on the sides of the clarifier; 3) at least two discharge pipes exit the clarifier on its north side, the lower, longer one appears to discharge to the surface and the other upper one is pictured discharging to a container at times, and 4) discolored soils and debris are noted in some photographs north of the clarifier.	The available information regarding the former API oil/water separator is provided in the text, and the figure was modified as requested.	DTSC Response: Resolved pending review of the revised Work Plan
230	99	Appendix B Part B Data Gaps Investigation Program, Appendix B21 Section 1.2 AOC 24 Conceptual Site Model	DTSC	The CSM needs to be revised for clarification. The section states, "There is a potential for the discharge to have migrated past what was then the northern boundary of the lower yard; however, with the expansion of the compressor station, the affected area would now be covered by several feet of additional soil." This three dimensional concept should be included in a revised Figure B21-1. An additional conventional cross-section will better illustrate locations of former waste discharge. The old edge of the lower yard prior to expansion should be carefully located on all figures. The CSM also states, "Because the entire AOC is covered with additional soil, runoff of contaminated surface soil in rainwater is not considered a potential migration pathway." It is not clear if this is a true statement. PG&E should indicate how it knows that additional soil was added to the <u>entire</u> AOC. If soil was added, was the clarifier buried? Based on the unknown history of this site, a geophysical survey should be conducted to look for remnants of the clarifier and identify waste/debris dumped in the vicinity of the waste unit. The survey would also identify any subsurface utilities in the area.	Figure B21-1 was revised to portray that filling of this area has occurred. The exact amount of soil added to the station at the time the northern portion of the lower yard was expanded is not known and will need to be estimated. A cross section was added to the figure to indicate the topographic relief in this area. The text was clarified to indicate that it appears that grading occurred throughout this area in the 1954 and 1955 photo album photos and is likely to have occurred subsequently as well (for example, during construction of the Transwestern Pipeline facilities in the vicinity). The entire unit is clearly not buried because the level of soil relative to the scrubbers has not increased by an amount sufficient to bury such a large structure. The dimensions of the former clarifier will also be described in the text. A drawing with the precise location of the clarifier was found during the engineer drawing review and was used to precisely locate the unit/proposed boring. The location of the clarifier was added to the figure.	DTSC Response: Resolved pending review of the revised Work Plan

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231	100	Appendix B Part B Data Gaps Investigation Program, Appendix B21 Section 3.1 AOC 24 Data Gaps	DTSC	Modify data gap # 1 as follows: Data Gap #1 – Lateral and vertical extent of contamination near the clarifier and stained soil.	The text was modified as requested.	DTSC Response: Resolved
232	101	Appendix B Part B Data Gaps Investigation Program, Appendix B21 Section 3.2 AOC 24 Access Constraints	DTSC	Based on the nonspecific information provided in the Work Plan, DTSC is uncertain if there is a significant access limitation for this unit. Obvious above grade structures do not appear to limit access. A DTSC field visit to this AOC is required to evaluate access restrictions. The Work Plan should be revised after DTSC input from field visits.	The sampling approach was discussed during an April 3, 2012 meeting and phased-approach sampling at AOC 24 was agreed upon. Contingency samples are included in the phased sampling approach	DTSC Response: Resolved
233	102	Appendix B Part B Data Gaps Investigation Program, Appendix B21 Section 3.3 AOC 24 Proposed Sampling	DTSC	As with all new units, contingent sampling locations should be identified in the event preliminary borings identify contamination requiring step outs. Sampling to 10 to 15 feet bgs is requested (PG&E's Part B default sampling depth assumed to be based on risk). Additional primary locations are requested for this unit due to PG&E's current lack of knowledge regarding the location and history of this unit. No locations appear to target historic staining. Without additional information, DTSC requests that five additional primary samples be added to this AOC. Potholing/trenching is recommended for this unit due to potential burial of the unit and waste/debris. The number of potholes/trenches should be identified for planning purposes and should be ultimately located based on photographs and/or geophysics. DTSC requests that the Work Plan be revised to allow XRF screening to first be conducted to potentially assist in guiding drilling and defining any surficial hot spots. Based on the XRF, primary soil sample locations might be moved.	See response to Absolute Comment 232. An XRF screening protocol has been developed and included in the revised work plan in Section 2 of the main text.	DTSC Response: Resolved
		Appendix B, Subappendix B22		**APPENDIX B, SUBAPPENDIX B22**		
234	103	Appendix B Part B Data Gaps Investigation Program, Appendix B22 AOC 25 Compressor and Generator Engines and Basements	DTSC	Soil gas sampling is requested to monitor the basements peripherally for volatile organic compounds that would have been associated with the engines. A site visit may be beneficial. Provide a discussion of areas which cannot be characterized under normal operation, but where investigation might be undertaken if operations are offline for maintenance, etc. Please discuss sampling that can be conducted currently at Compressor Number 1. It is understood that this unit no longer operates and will remain offline as it has been used for parts.	As discussed during November 9, 2011 comment resolution meeting, DTSC requests soil gas samples be collected from applicable SWMUs/AOCs to assist with characterization. Applicable SWMUs/AOCs for soil gas sampling will be defined by PG&E and DTSC. Sampling within the Compressor Building is risky and will not be performed. There is little risk of releases from the building other than from the engine basements themselves, and the engine basements contain piping and other obstructions that would still be present even in the unlikely case that a compressor itself was completely disassembled for maintenance purposes. Furthermore, any discharges to a basement would either be captured by the floor drain in the basement (and thus be addressed as part of AOC 20), or be discharged through the opening in the sidewall of the Compressor Building (if a very large quantity of oil were released at one time). Finally, even if one or more units were off-line, the remaining units will be active, and any sparks generated from investigation activities would be extremely dangerous. Sampling at Unit 1 will not be performed for the same reasons described above.	PG&E Response: As discussed during the April 10, 2012 meeting, soil gas samples will be collected from four sample locations around the compressor building. Exact locations of soil gas samples were determined during the April 24, 2012 site walk. DTSC Response: Resolved.
		Appendix B, Subappendix B23		**APPENDIX B, SUBAPPENDIX B23**		
235	104	Appendix B Part B Data Gaps Investigation Program, Appendix B23 Section 1.1 AOC 26 Background	DTSC	Photographs of the former scrubber sump are requested to be included in the revised Work Plan. The former location of the sump should be carefully plotted on Figure B23-2 as should locations of known residual contamination.	Photos will be provided if they can be located. An engineering drawing showing the configuration of the scrubber sump and its location have been discovered and the information is reflected in the revised work plan.	DTSC Response: Please also plot the former location of the sump carefully on Figure B23-2, as well as known residual contamination. PG&E Response: The former location of the

Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
						sump, based on the engineering drawings, was plotted on Figure B23-2. PG&E has discovered a more complete copy of the Scrubber Sump Closure Report that contains drawings showing the approximate sample locations and provided this information in the revised work plan. DTSC Response: Resolved pending review of the revised Work Plan.
236	105	Appendix B Part B Data Gaps Investigation Program, Appendix B23 Section 4.3 AOC 26 Proposed Sampling	DTSC	Due to lost data, including sample locations, this unit should be treated as a new unit and contingent sampling locations should be identified in the event preliminary borings identify contamination requiring step outs. Sampling to 10 to 15 feet bgs is required for this unit due to historic detections at this horizon. PG&E should utilize safe methods to obtain samples from this general horizon just as they did when they excavated the entire area during sump closure in 1996. Additional primary sample locations are requested for this unit if the location of the former unit is not known with certainty.	Two scrubber sump closure reports (Trident, August and October 1996) and the scrubber sump investigation report (E&E, 1997) were recently located and submitted to Agencies on April 10. 2012. Remediation of the scrubber sump included removal of soil to 10 feet bgs in and around the area of the former sump. Soil excavation was conducted to the greatest extent feasible without endangering the safety of the station by undermining foundations or digging too close to pipelines in three directions. A post-remediation investigation was performed in January 1997, Five borings were drilled, and twenty soil samples were collected to further define lateral and vertical extent. The E&E report includes cross-sections of the former scrubber sump area showing the extent of the excavation, with remaining TPH contamination posted. The E&E report concluded that lateral and vertical extent of TPH in soil has been adequately characterized, no further characterization was recommended, and no further remedial action was necessary since the scrubber sump (the source) has been removed along with the surrounding soil to a depth of 10 feet bgs. The report further concludes that additional removal of affected soil beneath the former sump is restricted due to the lack of access for large construction equipment and the proximity of the electrical conduit and high pressure gas piping. Finally , the report notes that the depth to groundwater is about 150 feet bgs, and annual precipitation is very low, therefore it is unlikely that residual TPH would migrate into groundwater and because petroleum hydrocarbons exhibit low toxicity, there is little potential for adverse effects to human health or the environment.	DTSC Response: Reference to a new unit was included merely to suggest contingency sampling as was also suggested by DTSC for other new units without data. Additional sampling locations are needed as only one location is currently proposed – what do you do if contaminants are detected? DTSC Response: According to the February 27, 1997 Scrubber Sump Soil Sampling Results recently provided by PG&E to the agencies on April 10, 2012, petroleum hydrocarbon concentrations greater than 8,000 mg/kg were detected up to a depth of 35 feet bgs, with a maximum concentration of 9,700 mg/kg at 27 feet bgs. The previous soil removal extended to only 10 feet bgs. Also, previous sampling results related to this removal action indicate that VOCs, including BTEX, were detected from a soil stockpile sample, but were not analyzed from investigation and/or confirmation samples. The deepest soil sample at 40 feet bgs did not detect petroleum hydrocarbons above the detection limit of 22 mg/kg. Based on the historic information from this AOC, DTSC believes that additional soil sampling should be conducted at AOC-26. Specifically, as discussed during the April 27, 2012 meeting, shallow soil samples should be collected around the previous excavation and analyzed for metals, PAHs, PCBs, SVOCs, VOCs and TPH, consistent with the agreed upon phased approach. Additionally, because known TPH contamination exists from 10 feet bgs to approximately 35 feet bgs, and the previous singular non-detection of TPH at

Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
						40 feet bgs does not provide substantial confidence that contaminant concentration attenuation and/or the vertical extent of the contamination has been defined, DTSC believes that a minimum of one deep soil boring should be installed within the former excavation area, and deep samples (25, 50, 75 feet bgs) should be collected and analyzed for the COCs for this AOC. Sample depths may be adjusted and/or additional samples proposed based on field observations including field measurements, soil discoloration and odors that may indicate contamination. DTSC also requests that soil vapor samples be collected including potentially installing permanent soil vapor monitoring probes at multiple depths to assess volatile contaminants that may be associated with the known organic contaminant release at this AOC. PG&E Response: As discussed during the May 9, 2012 RCRA/CERCLA meeting, DTSC directed PG&E to perform the deep soil sampling beneath the former scrubber sump. PG&E will attempt to drill to 75 feet bgs, and samples will be collected at 25, 50, and 75 feet bgs, if feasible. Shallow soil samples will also be collected from around the previous excavation and analyzed for metals, PAHs, PCBs, SVOCs, VOCs and TPH, consistent with the agreed upon phased approach. PG&E does not agree that soil vapor monitoring is warranted at this location and does not propose to install permanent soil vapor monitoring probes. The proposed sampling will assess the presence of VOCs in the subsurface. Furthermore, there is no current threat to indoor air from soil vapor intrusion and existing above and below ground utilities prevent future construction of buildings in this area. Therefore collection of soil vapor data will not be useful for evaluation of current or future exposures. DTSC Response: Resolved pending review of the revised work plan. DTSC believes that soil vapor sampling should be performed at this location as indicated

Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
						above. Due to the known organic contaminants released at depth in this area, DTSC reiterates its previous note to collect soil vapor samples to evaluate threat to groundwater. Depending on the local stratigraphy/soil type, drilling method, and the known contaminants, soil vapor sampling may likely be the more suitable sample collection method for this location. In addition, if a remedial action for the organic contaminants is determined to be necessary at this location, soil vapor monitoring will likely be the preferred method to evaluate the effectiveness the potential remedy. As previously indicated, soil vapor sampling is required at this location. Revise the soil workplan to Include soil vapor sample collection at this location.
		Appendix B, Subappendix B24		**APPENDIX B, SUBAPPENDIX B24 (Now Subappendix B25)**		
237	106	Appendix B Part B Data Gaps Investigation Program, Appendix B24 Section 3.1 Units 4.3,4.4, and 4.5 Access Constraints	DTSC	Based on the nonspecific information provided in the Work Plan, DTSC is uncertain if there is a significant access limitation for these units. Previous intrusive closure activities (tank removal, concrete removal, contaminated soil excavations) were successful in the past and suggest that sample access is not a concern. Obvious above grade structures do not appear to limit access.	As discussed at the March 29, 2012 meeting, originally proposed sample locations are acceptable.	DTSC Response: Resolved
238	107	Appendix B Part B Data Gaps Investigation Program, Appendix B24 Section 3.2 Units 4.3,4.4, and 4.5 Proposed Sampling	DTSC	Contingent sampling locations should be identified in the event preliminary borings identify contamination requiring step outs. Sampling to 10 feet bgs is required for this unit due to historic detections at depth (10 feet bgs was also proposed by PG&E in their 2007 Part B Work Plan). PG&E should utilize safe methods to obtain samples from these units just as they did when excavations and samples were collected during closure. Additional primary sample locations are requested for these units if the locations of the former units are not known with certainty. PCBs should be added to the analyte list due to the detections of PCBs elsewhere at the station and also due to the historical oiling of roads/soils at the station.	The sampling approach was discussed during a March 29, 2012 meeting and phased-approach sampling at these units was agreed upon. Contingency samples are included in the phased sampling approach. As discussed at the March 29, 2012 meeting, PCB analysis was added to Unit 4.3-1 and Unit 4.3-2.	DTSC Response: Resolved
		Appendix C		**APPENDIX C**		
239	Specific 53	APPENDIX C – Perimeter General	FMIT	The perimeter areas, being outside the facility fence line, should be part of the Part A sampling plan. They could be lumped together as a new AOC.	As discussed in response to Comments 9, 15, 16, 17, and 19 (DTSC Comments 2, 6, 7, 8, and 10, respectively), PG&E believes that it is not appropriate to add new units at this stage of the program. In particular, it is not appropriate to group the perimeter area into an AOC, as potential sources of constituents to the perimeter could differ greatly depending on the specific location. The need to designate any portion of the perimeter area as a separate investigation area will be determined during the data gaps evaluation phase.	DTSC Response: It seems the perimeter area already is a new AOC identified in a separate appendix with the additional onsite to offsite concern. PG&E Response: Response revised. FMIT Response: The Tribe disagrees with the report organization and format that results in a non-integrated presentation of the proposed soil sampling.

Response to Comments on the

***Soil RCRA Facility Investigation/Remedial Investigation Work Plan, Pacific Gas and Electric Company (PG&E) Topock Compressor Station, Needles, California,* Issued May 2011**

From

Combined United States Department of the Interior (DOI), California Department of Toxic Substances Control (DTSC), Fort Mojave Indian Tribe (FMIT) and Hualapai Comments

Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
						Please see FMIT letter November 30, 2012, appended below.
240	DOI #72	Appendix C, General Comment	DOI	The rationale for the perimeter sampling approach is not provided in sufficient detail.	Based on discussions between the agencies on October 27, 2011, and between DTSC and DOI on October 31, 2011, agencies provided the following approach for the perimeter sampling program on November 3, 2011: Objective: Sampling is needed along the perimeter of the station to evaluate whether historical contaminant releases within the compressor station have migrated to the edge of the facility where they may pose a concern to areas and receptors outside the fence line. Sampling: Previously identified perimeter samples (PA 01 to PA 12) should remain at the locations identified on Figure C-1 (without screening/moving) because they were selected based on topographic considerations and/or due to association with staining/wastes. As historical sheet flow pathways may be different than current pathways along the perimeter, agencies request that perimeter samples be collected along the entire perimeter regardless of the location of current or historic berms/curbs. To focus sampling at areas with the highest potential for contamination and to minimize the total number of samples, XRF screening should first be performed every 50 feet in all areas along the perimeter except the following areas: between PA 01 & 02 and between PA 03 & 04 (because the spacing of these samples adequately addresses those perimeter segments) and between PA 02 and Storm Drain Line 13 (because sample locations AOC13-20, AOC13-21, and AOC13-23 address those perimeter segments); northern, eastern, and southern boundaries near the main office since compressor station operations have not historically occurred and are not currently occurring in this area; along the southern boundary of the site, except the orange berm pictured in Figure C-1 (because the topography slopes upward from the station at this location). If the XRF results exceed offsite (Part A) screening values, then a conventional soil sample should be collected for laboratory analysis consistent with Table C-1. If screening values are not exceeded, a sample should still be collected at least every 100 feet along the perimeter. These new samples should be collected at the same depths and analyzed for the same suite of constituents as the other perimeter samples (see Table C-1). The detection/quantification limits of the XRF screening method should be specified in the work plan. The analytical limits should be discussed with respect to how they relate to offsite screening values. Methods to optimize XRF detection limits should be described and employed. When possible, PG&E will conduct the perimeter sampling after the nearest samples from other AOCs/SWMUs have been collected and the results are available. Perimeter sampling locations will then be adjusted based on this “neighboring” data. Additional constituents may also be included with certain perimeter samples based on the neighboring data.	DOI: Resolved pending review of the revised work plan.
241	DOI #73	Appendix C, Section 1.1, Perimeter Area Description and History first paragraph, fourth sentence	DOI	Need to verify that these areas were not deferred to the perimeter sampling plan in the AOC discussions. There has been some cross pointing with these sections in the past.	PG&E has verified that there is no cross-pointing between AOCs outside the fence line and the perimeter area investigation.	DOI Response: Resolved pending review of map to verify.

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Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
		Page C-1-1				
242	108	Appendix C Perimeter Area Investigation Program, 1.1 Perimeter Area Description and History, Paragraph 2	DTSC	The second paragraph indicates that some of the perimeter area that is currently bermed with soil is known to be or were likely to have been un-bermed in the past. Based on this information and looking at Figure C-1 it becomes apparent that samples are generally not being proposed along the orange berm areas depicted on the figure. DTSC requests that at a minimum, ten additional samples locations be added to the program along the berms. Adding a boring could be contingent upon a few items: Lack of general coverage along the perimeter; Relation to contamination discovered as a result of the on-site investigation (e.g., AOC-13); Screening of the berm area with XRF or other techniques; or Discovery of waste, discoloration, or former drainage during implementation of the plan. The same rationale could also be used for additional contingent borings elsewhere along the perimeter based on data to be collected during implementation of the Work Plan.	Please see response to Comments 240 and 245.	DOI and DTSC Responses: Resolved
243	DOI #74	Appendix C, Section 1.1, page C-1-1	DOI	The 3rd sentence in the 2nd paragraph only notes that, historically, some areas that are currently bermed may have not been bermed in the past. Provide a discussion of the process used to determine past areas of potential run-off (e.g., review of historical photos). The 4th sentence in the 2nd paragraph notes that perimeter samples will "provide information on potential recent discharges". Depending on the nature of the contaminant, perimeter samples will provide information on historical discharges as well.	It is not feasible to determine with certainty which soil berms have existed in the past and the degree to which these berms have maintained their integrity over time. In addition, various grading activities have occurred within the station, such that current sheet flow patterns may not be the same as they were in the past. It is likely that historically, as today, much of the runoff was channeled to storm drains. The 1955 aerial photos indicate that some berms and curbs were present at the facility, although the resolution and view angle of the two photographs does not allow for detailed analysis regarding the presence of berms and curbs. Nonetheless, areas that did not have curbs in the past may either have lacked berms, or the berms may have lacked integrity. Thus, all areas that did not have curbs and are below the level of the compressor station may in the past have been subject to releases via sheet flow. For example, in the May 1955 aerial photographs, some erosion is apparent on the southeastern slope of the station, and the southwestern edge of the station appears to be less well defined than it is currently. The proposed perimeter sampling location screening and optimization approach outlined in response to Comment 240 will address these uncertainties. The fourth sentence in the second paragraph was revised to include historical discharges as well.	DOI Response: Resolved
244	109	Appendix C Perimeter Area Investigation Program, 1.1 Perimeter Area Description and History, Paragraph 4	DTSC	The Tea Pot Dome waste pit should be handled as a separate unit due to unique features that should be associated with it. For example, geophysical surveys should be used to locate the buried pit with increased confidence prior to drilling. The Work Plan should be revised to incorporate these issues/requests.	As requested, a geophysical survey will be conducted in the area believed to be the former Teapot Dome Restaurant Oil Pit; however, as discussed in response to Comments 9, 15, 16, 17, and 19 (DTSC Comments 2, 6, 7, 8, and 10, respectively), PG&E believes that it is not appropriate to add new units at this stage of the program. Also, it should be noted that a geophysical survey in this area may encounter interference due to nearby overhead utilities. Nonetheless, as directed by DTSC, the Teapot Dome Oil Pit has been designated as a new AOC (AOC 31).	DTSC Response: See DTSC response re. AOCs contained in an upcoming key points communication to PG&E. PG&E Response: Response revised DTSC Response: Resolved, concur with response to geophysical surveys.
245	DOI #75	Appendix C, Section 1.3 Perimeter Area Data Proposed Sampling second paragraph Page C-1-2	DOI	The DTSC site walk identified sampling locations based on conditions observed at the time. The site walk did not address historic conditions that were not observable at the time of the walk. The current presence of berms and curbs may not reflect past conditions. Also, the nature of the effectiveness of the partially bermed area along the lower yard as a barrier to historic discharge is not clear. In order to rule out segments of the perimeter based on the presence of berms or curbs, PG&E must be able to demonstrate that the berms and curbs have always been present and effective at preventing discharge.	Concerns expressed in this comment have been addressed by the jointly developed perimeter sampling approach.	DOI Response: Resolved pending review of revised work plan.

Response to Comments on the

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246	DOI #76	Appendix C, Section 1.3 Perimeter Area Data Proposed Sampling third paragraph, first sentence Page C-1-2	DOI	This rationale regarding sampling being limited to "only hand sampling" warrants further discussion.	As stated in the text, only hand sampling will be feasible in many locations. Many of the areas where samples would be collected are on a very narrow ledge, and only use of trowels is feasible. While shovels could be used in hand sampling to achieve deeper sampling depths, many portions of the perimeter area cannot accommodate a sufficiently large hole to allow sampling at deeper depths. Use of mechanical equipment has not been ruled out; however, it is subject to the same limitations on sampling as areas within the fence line of the compressor station.	DOI Response: Resolved
247	110	Appendix C Perimeter Area Investigation Program, 1.3 Perimeter Area Data Proposed Sampling, Last Paragraph	DTSC	XRF and possibly other screening techniques should be incorporated into the perimeter program to focus characterization on areas of impact and minimize step out borings. Also see Appendix C comments above.	XRF will be used to screen the perimeter area, as described in response to Comment 240.	DOI and DTSC Responses: Resolved
248	111	Appendix C Perimeter Area Investigation Program, 2.2 Evaluation of Perimeter Area Investigation Data, Number 3	DTSC	Assigning perimeter data to onsite or offsite areas based only on if an area is flat is not entirely logical in all cases (for instance, soils on the flat area could eventually flow or be blown offsite). The Work Plan should be revised regarding this item. The report states "Incorporate soil areas with COPC concentrations above Part A screening levels located in flat area adjacent to compressor station fence into the appropriate Part B AOC or AOC 13". AOC 13 was not clearly shown on the figures of the report. Based on the wording of the sentence DTSC assumes AOC 13 should be located interior of the perimeter fence in Area B. Since Part A (outside) the fence line has been designated as habitat the meaning of 'adjacent needs to be clarified. If the described flat areas are outside the perimeter fence in Part A then they are within the designated habitat area and should be included in a Part A AOC. The report needs to clarify the location of AOC 13, particularly in reference to its position relative to the perimeter fence.	Please see response to Comment 64 providing detailed information regarding the modified approach to assigning perimeter area sample data to existing units. Comment 64 proposes new text for Appendix C, Section 2.2, that does not reference AOC 13. AOC 13 is defined as the unpaved areas within the compressor station fence line.	DOI Response: Resolved DTSC Response: See DTSC and DOI responses to Comment 64. PG&E Response: See Comment 64. DTSC Response: Resolved pending review of the revised Work Plan
249	DOI #77	Appendix C, Section 2.2, page C-2-1	DOI	For the Federal agencies, the function of the perimeter sampling is to delineate potential sources of contamination from the compressor station and assess their potential for migration and impact to land under Federal jurisdiction. While combining the data from the perimeter investigation with the closest or "appropriate" Part A or Part B AOC/SWMU may generally be appropriate, there may be instances where it is best to assess the location in and of itself or as an indicator of another source. Please discuss the steps for evaluating and combining the information from this investigation with the Part A or Part B sites. For example will the evaluation involve comparing contaminant profiles between associated data (e.g., sources) including a spatial assessment, and will fate and transport considerations, in light of the Conceptual Site Model (CSM), be integrated in making the association. Additionally, at what point will DOI and DTSC be consulted on these occurrences?	Please see response to Comment 64. The text that this comment references has been rewritten and presented in Comment 64. The new text no longer references AOC 13.	DOI Response: Resolved
250	DOI #78	Appendix C, Section 2.2 Evaluation of Perimeter Area Investigation Data Bullet 3 Page C-2-1	DOI	AOCs outside the fence line are subject to different risk assessment considerations than AOCs inside the fence line. It may not be appropriate to exclude data from outside the fence line in the evaluation of Part A AOCs.	Comment noted. Please see response to Comment 64 for the detailed revised approach to assigning data to various units. The referenced text was removed. PG&E concurs that the risk assessment conducted for outside the fence line considers different receptors than those inside the fence line. PG&E is not proposing to exclude data from outside the fence line in the evaluation of Part A AOCs. Rather, data from the perimeter sampling collected outside the fence line on downslope areas, which exceed Part A screening levels, will be incorporated into the appropriate Part A AOC.	DOI Response: Resolved
251	DOI #79	Appendix C, Figure C-1	DOI	The justification for samples locations PA09 and PA08 is not clear.	Both PA-08 and PA-09 are designed to evaluate locations where runoff from the compressor station may have flowed. PA-08 and PA-09 are locations that also consider the potential flow pathways for storm drain runoff from nearby former or current	PG&E Response: PA-08 has been relabeled PA-06. PA-09 and PA-10 were relabeled as storm drain samples SD-5 and SD-6.

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Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
				The previous Part B perimeter sample locations (AOC13-36 through AOC13-50) are referenced in the text but are not shown on the figure. For clarity and to demonstrate assessment coverage, it would be appropriate to show these sample locations.	storm drain discharges. It would be confusing to show both current and former sample location IDs on the same figure so they were not be added to the figure. However, these sample name changes were added to the respective sample tables for AOC 13 and the perimeter area.	DOI Response: Resolved DOI Response: Resolved pending map to include AOC 13 and perimeter sample locations.
252	Specific 54	APPENDIX C – Figure C-1	FMIT	It is not clear on the figure which drainage feature each of the proposed perimeter samples is intended to characterize. Some of the proposed perimeter samples are near proposed sample locations for other SWMUs/AOCs and therefore, when possible, sample locations can be combined to address characterization for multiple SWMUs/AOCs if the same feature/drainage is being characterized. For example, the area of PA-9 and 10 have other samples nearby. If a drainage has already been, or will be, sampled then those data should first be considered before collecting additional samples as part of the PA program.	The sample locations proposed in the work plan were identified in collaboration with DOI and DTSC, as described on page C-1-1. Sample locations were originally identified based on visual observations, topographical considerations, locations of adjacent or nearby facilities that could have released contaminants and to provide coverage of the entire perimeter that could have received sheet flow runoff, taking into consideration existing curbs and berms. If there was apparent visual evidence of contamination in areas outside of existing berms and curbs, samples were also proposed (for example, PA-08, the apparent location of the Teapot Dome Oil Pit). Per further discussions with the agencies and renumbering of sample locations, there are now eight perimeter area soil sample locations. The detailed rationale for each of the eight proposed locations is provided in Table C-9. Please also see response to Comment 240.	
				Appendix D		
253	Specific 55	APPENDIX D – General	FMIT	The Tribe was informed by PG&E during a field inspection that the Topock Compressor Station is categorically exempt from permitting under the Storm Water Pollution Prevention Permit (SWPPP) Program under the Clean Water Act. If the facility is being required to gather equivalent information pursuant to Resource Conservation and Recovery Act/ Comprehensive Environmental Response, Compensation, and Liability Act (RCRA/CERCLA) investigations, then the exemption, for all intents and purposes, seems inappropriate. The one difference seems to be that under the SWPPP Program, non-point as well as point sources would be considered. But then the approach taken here in regard to perimeter areas seems to address the non-point mechanisms. The Tribe has many concerns about stormwater management, as expressed in its January 2011, letter objecting to the FEIR.[3] ___________________ [3] See letter from Ms. Courtney Ann Coyle, Esq. (FMIT Counsel) to Ms. Karen Baker, DTSC, dated January 29, 2011, re: "Objections of Fort Mojave Indian Tribe to Final Environmental Impact Report for the Topock Compressor Station Groundwater Remediation Project- SCH#2008051003."	DOI defers to DTSC regarding the EIR. *DTSC Response*: DTSC defers to PG&E regarding the explanation for PG&E's Storm Water Pollution Prevention Plan (SWPPP) exemption. In the referenced January 29, 2011 letter, the FMIT requests to be involved in the drafting or SWPPP and BMP plans. This comment is noted. *PG&E Response:* The USEPA has delegated to the State Water Resources Control Board (SWRCB) the authority to implement the National Pollutant Discharge Elimination System (NPDES) program in California. USEPA regulations allow authorized states, such as California, to issue general permits to regulate stormwater discharges. The Industrial Storm Water General Permit Order 97-03-DWQ is the current California NPDES general permit that regulates discharges associated with 10 broad categories of industrial activities. Industrial facilities not within a listed category of the General Industrial Permit have no obligation to obtain NPDES stormwater permit coverage. *See* SWRCB, General Industrial Permit, pp. II-VII (Apr. 17, 1997). Attachment 1 to the General Industrial Permit lists the covered industrial categories, which are coextensive with those covered by the federal permit program. *See* 40 C.F.R. § 122.26(b)(14). The Topock Compressor Station does not fall within an industrial category listed on Attachment 1 and, therefore, has no obligation to obtain NPDES stormwater permit coverage or prepare a SWPPP. Nonetheless, the Topock Compressor Station has an existing spill response plan that is part of the Topock Compressor Station Hazardous Materials Business Plan and is designed to prevent releases of hazardous constituents to the environment, including the storm drains. These requirements include secondary containment around stored hazardous material. PG&E also conducts annual training of all onsite employees to ensure staff are familiar with spill response requirements. Additionally, consistent with the 2005 Consent Agreement between PG&E and the federal government, work being undertaken for the soils RFI/RI (including investigation studies) is part of the work covered by that agreement and exempt from procedural permitting requirements under CERCLA 121(e). *See* Consent Agreement	The Hazardous Materials Business Plan and the Spill Prevention Control and Countermeasure Plan were submitted to DOI and DTSC on December 8, 2011.

Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
					Article IX (Work to be performed); *id*. at Section 4.2 ("As provided in Article XI (Other Applicable Laws) and consistent with Section 121(e) of CERCLA, performance of the Work does not require Federal, State or local permits."); *id*. at Article XI (no permits required "for any portion of any action conducted entirely onsite, including studies").	
254	DOI #80	Appendix D, Section 1.1 Storm Drain Description and History second paragraph last sentence Page D-1-1	DOI	The second sentence in this paragraph notes "Thirteen active and inactive storm drain outfalls have been visually identified outside the fence line." The last sentence notes "15 identified storm drain outfalls". Please rectify the inconsistency.	Sixteen is the correct number. Two catch basins were located outside the southwestern corner of the compressor station fence line. These two storm drain lines are identified as Storm Drain Lines 14 and 15 on Figure D-1. At the time the work plan was written, there was no information regarding the alignment of these storm drains. One catch basin (associated with Storm Drain Line 15) was removed during the AOC TCRA, and a small portion of the former clay pipe is visible on the upper portion of the slope in this area. A portion of the piping associated with Storm Drain Line 14 upstream of the catch basin was uncovered during the AOC 4 TCRA, and erosion has uncovered a small portion of the pipe on the upper slope below the catch basin. The text was revised to read "Sixteen active and inactive storm drain outfalls have been visually identified outside the fence line; the catch basin associated with inactive Storm Drain Line 15 was removed during the AOC 4 TCRA." In addition, Figure D-1 was revised to include the currently known information regarding the pipe locations for these two storm drain lines.	DOI Response: Resolved
255	112	Appendix D Storm Drain Investigation Program, 1.1 Storm Drain Description and History, Paragraph 3	DTSC	The paragraph quickly dismisses characterizing storm drains on site. PG&E should perform a more thorough evaluation of this matter and revise the Work Plan. There might be situations where potential contamination within the storm drain (at a break for example or adjacent to a catch basin) could act as a source to the drain.	The need for additional sample locations along the storm drain lines inside the compressor fence line will be assessed after the implementation of the storm drain sampling investigation program. The work plan was modified to reflect that sampling of storm drains inside the fence line may occur.	DTSC Response: Resolved pending review of work plan.
256	DOI #81	Appendix D, Section 1.3, page D-1-2, first paragraph	DOI	The Decision 4 statement is specific to residual contamination in soils potentially being a source of contamination for receptors outside the fence. It is not clear if the implication is that historical storm drains are considered potential sources similar to soil or if storm drain alignments may indicate a potential soil sample location.	Storm drain lines may convey contaminated soil located inside the fence line to areas outside the fence line through stormwater run-off. Thus, storm drain lines may provide a migration pathway, and it is important to understand which catch basins and storm drain lines inside the fence line discharge to specific outfalls to correctly assess the potential for current and historic releases at a given storm drain outfall. Releases could also occur at breaks in the storm drain lines. The information is provided in the text. In addition, DTSC has previously requested that soil samples be collected along storm drain lines to evaluate whether there have been discharges from the storm drain lines at locations other than the outfalls.	DOI Response: Resolved
				The last sentence of the first paragraph needs clarification. Storm drains would only be considered a transport pathway if they were operational (i.e., not abandoned) and should be addressed as part of the facility Storm Water Pollution Prevention Plan, particularly to address "spilled liquids" or "discharge of contaminants".	The potential for the storm drain lines to serve as a source of contamination to areas outside the fence line will be evaluated as part of the storm drain investigation, and the need for any actions to control stormwater discharges to areas outside the compressor station fence line will be evaluated once the sample data are available. Most, if not all, of the storm drain outfalls appear to have one or more active lines associated with them (that is, they discharge water during storm events). The sentence is acknowledging that information of the catch basins and associated storm drain alignments is needed. The Topock Compressor Station is exempt (see detailed discussion in response to Comment 253, FMIT Comment Specific 55) and not required to implement a formal storm water management program. The Topock Compressor Station has an existing Spill Response Plan that is part of the Topock Compressor Station Hazardous Materials Business Plan and that is designed to prevent releases of hazardous constituents to the environment, including the storm drains. These requirements include secondary	DOI and DTSC Response: Resolved pending receipt of the Hazardous Materials Business Plan and the Spill Prevention, Control, and Countermeasure Plan. PG&E Response: The Hazardous Materials Business Plan and the Spill Prevention, Control, and Countermeasure Plan were submitted to DOI and DTSC on December 8, 2011.

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					containment around stored hazardous material. Control of potential hydrocarbon releases is addressed in the Topock Compressor Station Spill Prevention, Control, and Countermeasure Plan. PG&E also conducts annual training of all onsite employees to ensure staff are familiar with spill response requirements. PG&E has provided copies of the Hazardous Materials Business Plan and the Spill Prevention, Control, and Countermeasure Plan to DOI as requested.	
257	Specific 56	APPENDIX D – p. D-1-2, para. 2 (Storm Drain System Data Needs)	FMIT	It is unclear why storm drain sampling will only occur outside the fence line. The collection points for the storm drains, often within or on the fence line, can provide an initial understanding of the potential contaminants that may have entered the storm drain. Storm drain sampling should begin at within the storm water collection area and then proceed downstream as warranted by either the data or records of release/repair.	The need for additional sample locations along the storm drain lines inside the compressor fence line will be assessed after the implementation of the storm drain sampling investigation program. The work plan was modified to reflect that sampling of storm drains inside the fence line may occur.	
258	DOI #82	Appendix D, Section 1.3, page D-1-2, second paragraph	DOI	The Decision 1 statement is specific to characterization of residual contamination in soils. Please clarify how potential discharge of storm drains may influence soil characterization. In the second sentence, both types of information are required to satisfy Part A <u>and</u> B Decision 4 <u>and</u> Decision 5. See comment on first paragraph regarding facility operation and discharge of contaminants into the storm drains. An evaluation of operational storm drains should be done to assess whether outfalls influence migration of current 'residual soil contamination'.	Storm drain outfalls may have resulted in localized and/or downslope impacts to soil; therefore, it is necessary to characterize the soil at, and potentially downslope of, the outfalls. There is no Part A Decision 5. The text was corrected to reflect that both types of information are required to evaluate Part B Decisions 4 and 5. See response to Comment 256. As discussed during the September 22, 2011 comment resolution meeting, the storm drain investigation program will provide the data needed to assess the potential for migration through active storm drains. Water samples will be collected during the flow testing phase of the investigation program (Step 4) and will be analyzed to evaluate whether contamination is present. If COPCs are detected at concentrations that may reflect a risk to areas outside the fence line, appropriate control measures will be evaluated. This may include an assessment of the potential sources of the contaminants (that is, residual soils within the storm drain lines or current runoff from the facility), as well as the appropriate means for preventing migration of the contaminants. Potential future migration control could include cleaning of the storm drains (if feasible), capturing and treating stormwater runoff, paving unpaved areas of the station, sealing certain catch basins or sections of storm drains and rerouting stormwater discharges, and/or other methods. An appropriate response, if needed, will be developed in consultation with the stakeholders. The Topock Compressor Station has an existing Spill Response Plan that is part of the Topock Compressor Station Hazardous Materials Business Plan and is designed to prevent releases of hazardous constituents to the environment, including the storm drains. These requirements include secondary containment around stored hazardous material. PG&E also conducts annual training of all onsite employees to ensure staff are familiar with spill response requirements.	DOI Response: Resolved DOI Response: Resolved DOI and DTSC: Resolved pending receipt of Hazardous Materials Business Plan and Spill Prevention, Control, and Countermeasure Plan. PG&E Response: The Hazardous Materials Business Plan and the Spill Prevention, Control, and Countermeasure Plan were submitted to DOI and DTSC on December 8, 2011.
259	113	Appendix D Storm Drain Investigation Program, 1.4.2 Storm Drain Alignment Investigation Process	DTSC	Five step investigation process: PG&E indicates that the process will span several months. The basis for this time requirement is not clear. The Work Plan will need to be revised regarding this issue. Results of Steps 1 to 3 can be included in the revised Work Plan. PG&E should consider whether to run the video camera prior to flow testing to observe in situ conditions prior to the flow test.	Step 1s and 2 are largely complete, and the information generated from this work is reflected in the revised work plan to the degree feasible given time constraints. Step 3 cannot be completed in time for the work plan revisions and will be included with the data gaps evaluation report. It is more appropriate to complete the flow test to refine the understanding of the line connections prior to beginning the camera work. Any disturbance of soils in the pipelines during the flow test would be no greater than, and typically less than, the disturbance caused by a larger rain event.	DTSC Response: Resolved
260	DOI #83	Appendix D, Section 1.4.2 Storm Drain Alignment Investigation Process	DOI	This has not yet been determined. The statement should say "No intrusive investigation (i.e., uncovering of lines to trace them) to identify storm drain alignments	Because any potential discharges from storm drains can be controlled at the outfall, any potential migration and exposure concerns associated with the storm drain	DOI Response: Resolved DTSC Response: Please delete the strikeout

Response to Comments on the

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Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
		second paragraph Page D-1-3		is planned"	system can be addressed without intrusive investigation. The text was revised as follows: "No intrusive investigation (i.e., uncovering of lines to trace them) to identify storm drain alignments is planned. Intrusive investigation of storm drains would pose the same concerns as intrusive soil investigation."	added to the last line of PG&E's response as it is either inconsistent with Part B characterization DQOs or is forecasting results of data that have not been collected. PG&E Response: Response revised
261	DOI #84	Appendix D, Section 1.4.2 Storm Drain Alignment Investigation Process third paragraph last sentence Page D-1-3	DOI	Please explain this statement. What would preclude locating subsurface storm drain lines outside the compressor station? Couldn't trenching be used to do this if necessary?	The storm drain lines outside the compressor station are located on steep slopes. Depending on the storm drain line conditions, video camera tracing may not be feasible in those lines with steep slopes. Trenching would also be difficult on many of these steep slopes. Trenching (that is, intrusive tracing of storm drain lines), if needed, would be conducted after the proposed 5-step alignment investigation and proposed soil sampling have been completed. Should the proposed alignment investigation and/or soil sample analysis indicate that a potential concern exists with regard to a specific line, further action will be taken as appropriate. Trenching to confirm the alignment or condition of a specific line segment may be a component of follow-up investigation. The decision whether to require or attempt intrusive tracing of lines outside the compressor station will be based on a weight-of-the-evidence approach to assess the level of uncertainty and associated level of concern. Factors that may be considered include the concentrations of contaminants upstream and/or downstream of the storm drain line, potential historic discharges to the storm drain line (that is, flow paths within the compressor station), and availability of data in the vicinity of the line.	DOI Response: Implementation of pipeline video and other remote methods should be used to identify potential pipe breaks that could have resulted in release of contamination along storm drain alignments. PG&E should explore the full range of available technologies for conducting pipeline video and remote surveying before concluding such work is infeasible. PG&E Response: The full range of technologies for conducting pipeline video and remote surveying will be explored before work is dismissed as infeasible. DOI Response: Resolved
262	114	Appendix D Storm Drain Investigation Program, 1.4.2.1 Record Search	DTSC	DTSC has station HWBP maps (1999 with up to 2004 updates) that show storm drains. Catchment basins are identified that have not been included on Figure D-1 of the Work Plan. PG&E should utilize the information on these maps and revise the Work Plan accordingly. DTSC can provide copies of these maps if PG&E does not have them already.	PG&E appreciates DTSC's willingness to share information and will request copies of the maps if they cannot be located within station files.	DTSC Response: Resolved
263	115	Appendix D Storm Drain Investigation Program, 1.4.2.2 Visual Field Verification	DTSC	DTSC suggests that most, if not all, catch basin sediments be analyzed for the TAL/TCL list due to the low number of samples involved.	See response to Comment 265 (DOI #86) below.	DTSC Response: DTSC request that at least half of the catch basins be analyzed for the TAL/TCL list if sufficient sample volume allows due to the potential for undisclosed, miscellaneous discharges from across the site. PG&E Response: TAL/TCL analysis throughout the Topock RFI/RI soil investigation has been limited to 10 % of the samples collected for a given area. Therefore, 10 % of the catch basin samples, if sufficient quantity is present, will be analyzed for TAL/TCL. See revised response for Comment 265. DTSC Response: DTSC recommends that at least half of all the catch basins be analyzed instead of 10%. PG&E Response: TAL/TCL samples will be collected from half of the catch basins, if sufficient volume is available.

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Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
						DTSC Response: Resolved
264	DOI #85	Appendix D, Section 1.4.2.2 Visual Field Verification second paragraph second sentence Page D-1-4	DOI	How would this be determined if the catch basin had a soil bottom? Please describe the nature of the identified catch basins.	PG&E is not aware of any catch basins with soil bottoms. Even if soil completely covers the bottom of a catch basin, visual inspection would not be sufficient to determine whether this is simply accumulated soil due to surface runoff or whether the soil surface is in fact the bottom of the catch basin. During the field reconnaissance of the catch basins, PG&E will attempt to characterize the bottoms of all catch basins with complete soil coverage to determine whether the catch basin has a hard bottom or not. This may include probing the soil and/or hand excavating soil in the bottom of the catch basin.	DOI Response: Resolved
265	DOI #86	Appendix D, Section 1.4.2.2 Visual Field Verification second paragraph last two sentences Page D-1-4	DOI	At least one catch basin sample should be analyzed for TAL/TCL, and the sample should be selected based on the nature of the containment basins (i.e., from a basin(s) with potential for association with a broader suite of contaminants, if possible).	Fifty percent of the samples collected from a catch basins will be analyzed for the TAL/TCL suite, provided there is at least one catch basin with sufficient soil accumulation to provide adequate sample mass. If multiple catch basins appear to contain sufficient sample mass, the samples from the catch basins potentially receiving the greatest variety of constituent will be analyzed for the full TAL/TCL suite.	DOI Response: Resolved DTSC Response: Resolved, see response to Comment 263.
266	116	Appendix D Storm Drain Investigation Program, 1.4.2.3 Geophysical Investigation	DTSC	The Work Plan should be revised to indicate that terminating the geophysical survey or video camera survey early can only be done after obtaining DTSC approval.	PG&E will consult with agencies before terminating the video or geophysical surveys.	DOI Response: Resolved DTSC Response: Please ensure the PG&E response is included in the revised work plan. PG&E Response: The statement was added to the revised work plan. DTSC Response: Resolved
267	DOI #87	Appendix D, Section 1.4.2.3, page D-1-4	DOI	See previous comments on Section 2.2.4 (main body of work plan) regarding Geophysical Surveys.	Please see response to Absolute Comment 34 (DOI comment 4).	DOI Response: Resolved
268	DOI #88	Appendix D, Section 1.4.2.3 Geophysical Investigation second paragraph Page D-1-4	DOI	DOI/DTSC consultation and concurrence with this decision is necessary.	PG&E will consult with agencies before terminating the video or geophysical surveys.	DOI Response: Resolved DTSC Response: See response to Comment 266. PG&E Response: See response to Comment 266. DTSC Response: Resolved
269	117	Appendix D Storm Drain Investigation Program, 1.4.2.4 Flow Testing	DTSC	DTSC recommends collecting all dye flow test discharge from outfalls.	If dye testing is required, PG&E will work with DTSC, DOI, and the Tribes to either identify a dye that may be used and discharged or to determine an appropriate means of collecting water used in dye tests. PG&E anticipates that only a small portion of the flow testing (if any) may require dye testing.	DTSC Response: Resolved
270	Specific 57	APPENDIX D – p. D-1-5, para. 4 (Flow Testing)	FMIT	The use of dyes to test the flow of water in storm drains introduces another potentially unacceptable impact to the environment. Just water should be used in the proposed alignment testing prior to invasive testing.	See response to Comment 269 (DTSC 117), above.	
271	DOI #90	Appendix D, Section 1.4.2.4, page D-1-5	DOI	This section discusses flow testing and sampling of discharge water from these tests. The last paragraph notes that it may be presumed that storm drains are contaminated if sampling results indicate elevated concentrations of COPCs in the discharge water. PG&E should have a proposed response to address contaminated storm drain lines as this is operational consideration.	See response to Comments 253, 256, and 258.	DOI: Resolved pending receipt of the Hazardous Materials Business Plan and the Spill Prevention, Control, and Countermeasure Plan. PG&E Response: The Hazardous Materials

Response to Comments on the

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Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
						Business Plan and the Spill Prevention, Control, and Countermeasure Plan were submitted to DOI and DTSC on December 8, 2011.
272	DOI #91	Appendix D, Section 1.4.2.4 Title Flow Testing third paragraph first sentence Page D-1-5	DOI	Please clarify if the intent is to capture and analyze all test water discharged from the storm drains.	A water sample will be collected from each storm drain outfall. The water entering the storm drains will be allowed to discharge as it would if it were rainwater.	DOI Response: Resolved
273	DOI #92	Appendix D, Section 1.4.2.4 Title Flow Testing third paragraph third sentence Page D-1-5	DOI	Typographical error "will also be analyzed **it** for…"	The typographical error was corrected.	DOI Response: Resolved
274	DOI #93	Appendix D, Section 1.4.2.5 Video Camera Tracing first paragraph last sentence Page D-1-5	DOI	Typographical error. "extremely slopes" Also, alternative camera equipment should be considered that can be used in the steeply dipping pipe segments.	The typographical error was corrected. Each accessible segment of the storm drain lines will be viewed by panning and tilting a CCTV camera so that sags, connections, breaks, and potential accumulated soil material are clearly shown. To optimize the usefulness of the inspection, it will be conducted during dry weather only. The self-propelled camera will not be able to operate on the extremely steep slopes outside the fence line, so the self-propelled camera will not be used to complete the CCTV investigation for storm drain lines on the slopes outside the compressor station. Instead, the camera will be attached to a draw wire that will be strung through the storm drain lines located on steep slopes. This method will be limited to those storm drain lines free of obstructions.	DOI Response: Resolved
275	118	Appendix D Storm Drain Investigation Program, 1.4.2.5 Video Camera Tracing	DTSC	DTSC requests that drain lines along slopes also be investigated. Perhaps tethering the video camera will allow adequate camera operation.	Please see response to comment 274.	DOI and DTSC Response: Resolved
276	DOI #94	Appendix D, Section 1.4.2.5 Video Camera Tracing third paragraph Page D-1-6	DOI	DOI/DTSC consultation and concurrence with this decision is necessary.	PG&E will consult with agencies before terminating the video or geophysical surveys.	DOI Response: Resolved DTSC Response: Please ensure the PG&E response is included in the revised work plan. PG&E Response: The statement was added to the revised work plan.
277	119	Appendix D Storm Drain Investigation Program, 1.4.2.5 Video Camera Tracing, Page D-1-6, Paragraph 3	DTSC	The section states, "Information on identified defects will be retained by PG&E to assist with future maintenance and engineering activities as well as remediation to be conducted following closure of the compressor station." Depending on the outcome of the storm drain investigation, DTSC may request action by PG&E prior to closure of the site. The Work Plan should be revised to reflect this issue.	Comment noted. The text was revised to reflect this issue.	DTSC Response: The work plan should be revised to address the comment. PG&E Response: Response revised DTSC Response: Resolved pending review of revised work plan.
278	120	Appendix D Storm Drain Investigation Program, 1.4.2.5 Video Camera Tracing	DTSC	DTSC requests that unedited television inspection logs, photographs, and DVD recordings be included in the report or addendum to the report.	The unedited information will be provided separately, as it is likely to be voluminous, even on DVD.	DTSC Response: Resolved, but see DOI response to Comment 280.

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279	DOI #95	Appendix D, Section 1.4.2.5 Video Camera Tracing "Photographs" Page D-1-6	DOI	Is the intent to provide a separate still photograph of these areas?	Photographs will be taken at each of these locations. These photographs will be made available to the stakeholders.	DOI Response: Resolved
280	DOI #96	Appendix D, Section 1.4.2.5 Video Camera Tracing "DVD Recordings" Page D-1-6	DOI	Does this suggest that the DVDs will be edited to show only the problem areas encountered?	Due to the anticipated duration of the recording, it is considered preferable to provide views only of the problem areas. However, unedited footage can be provided if desired.	DOI Response: Unedited footage should be included in the record. Still shots should be used for problem areas. PG&E Response: Comment noted.
281	DOI #97	Appendix D, Appendix D, Section 1.4.2.6 Storm Drain Alignment Map first paragraph second to last sentence Page D-1-7	DOI	The term "captured" should be "documented".	The text was revised as requested.	DOI Response: Resolved
282	DOI #98	Appendix D, Section 1.4.2.6 Storm Drain Alignment Map first paragraph last sentence Page D-1-7	DOI	The text "will be conducted" should say "is not planned". This has yet to be determined based on the results of the preliminary steps.	See response to Comment 260.	DOI Response: Resolved DTSC Response: See DTSC response to Comment 260. PG&E Response: See PG&E response to Comment 260.
283	Specific 58	APPENDIX D – p. D-1-7 (Storm Drain Soil Investigation)	FMIT	Proposed sampling after the alignment phase includes potential sample locations both at the storm drain outfall as well as along the storm drain path. The outfall area is the most likely to have received contamination and therefore should be sampled first. On the other hand, there may be evidence of ponding or sedimentation that would indicate a more likely location of accumulation of contaminants.	Comment noted. PG&E was directed by DTSC to sample along the storm drain alignment as potential for leakage exists as well as at the outfalls.	DTSC Response: Please modify the PG&E response as indicated. PG&E Response: Response revised FMIT Response: The Tribe does not agree with the manner in which the DQOs are driving the extent of soil sampling. The level of needed resolution of DQO questions is not specified and much of the proposed sampling and the associated disturbance will be determined to be unnecessary in the Corrective Measures Study for soils. Please see FMIT letter November 30, 2012, appended below.
284	DOI #89	Appendix D, Section 1.4.3	DOI	A significant effort has been made by the agencies to reduce the amount of intrusive activities during the soil investigation. It is suggested that PG&E follow through with this effort by discussing a reduction of the number of storm drain samples through elimination of redundant samples associated with the other portions of the Part A, Part B and Perimeter investigations.	PG&E has already reviewed the sample locations to minimize the number of locations and has located several samples to satisfy data needs for both Perimeter Area as well as storm drain outfall areas PA-06, SD-5, SD-6, and AOC10a-3 all provide data to address storm drain outfalls (including areas downslope of the outfalls) as well as the perimeter area. No perimeter area samples are proposed in areas where there is AOC-related investigation near the fence line (that is, at AOC 7, AOC 9, and AOC 22). In addition, erosion and subsequent backfill has made sample collection of SD-14 impossible, and sample PA03 is located in the clean fill—both have been eliminated. Sample location PA-06 is nearly collocated with sample location SD-17 and have been eliminated.	DOI Response: Resolved

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285	DOI #99	Appendix D, Section 1.4.3 Storm Drain Soil Investigation first paragraph second to last sentence Page D-1-7	DOI	This rationale of sampling from the surface to one foot warrants further discussion with DOI/DTSC.	The sampling depth interval of 0.0 to 1 bgs in areas that show erosion is consistent with the February 22, 2011 technical memorandum entitled *Final Data Quality Objectives Steps 1 through 5, Part B Soil Investigation at the Pacific Gas and Electric Company Topock Compressor Station, Needles, California* (Section 2.1.7, page 8). The greater sample collection range was specifically made in response to DTSC Comment 9 on the Draft Data Quality Objectives for the Part B Soil Investigation ("DTSC Comments on the October 5, 2010 document Draft Data Quality Objectives Steps 1 through 5 Part B Soil Investigation at the Pacific Gas and Electric Company Topock Compressor Station, Needles, California," dated November 1, 2010).	DOI Response: Resolved
286	DOI #100	Appendix D, Section 1.4.3 Storm Drain Soil Investigation second paragraph second to last sentence Page D-1-7	DOI	Unless the topography suggests sampling on only one side is appropriate.	The text was revised to read: "Samples along the storm drain lines will be collected from alternating sides of the pipes unless topographical or other considerations indicate that sampling only along one side is more appropriate."	DOI Response: Resolved
287	DOI #101	Appendix D, Section 1.4.3 Storm Drain Soil Investigation third paragraph last sentence Page D-1-7	DOI	Should say "is planned". This has yet to be determined based on the results of the preliminary steps.	See response to Comment 260.	DOI Response: Resolved DTSC Response: See DTSC response to Comment 260. PG&E Response: See PG&E response to Comment 260.
288	122	Appendix D, page D-1-7, Section 1.4.3, Storm Drain Soil Investigation	DTSC	The report states that "Sampling below each storm drain outfall will consist of one sample location immediately below (downslope of) the outfall and lateral/downslope samples. The lateral/downslope sample locations are designed to evaluate soil conditions in the expected flow path from the storm drain to the bottom of the slope". Figure D-1, Proposed Storm Drain Soil Sample Locations, shows proposed sample locations for the storm drain sampling. It is difficult to determine from the figure which samples are associated with the storm drain outfalls. For example Storm Drain Line 1 has an associated terminus sample identified as SD-1. However identification of associated lateral samples cannot be assumed. The only sample that may be a lateral sample associated with SD-1 is AOC9-15, but the numbering does not suggest a correlation. The down slope sampling from the storm water outfalls need to be delineated on a figure relative to each of the outfalls. DTSC assumes that additional sample locations will be proposed if warranted based on the findings of the video/photograph survey and any other survey techniques used to identify storm drain pipes and breaks of those lines. DTSC recommends including SVOCs as part of the storm drain analytical suite.	Specifically, for SD-1 this is a subsurface storm drain line and outfall (that is, underground leach field) no downslope or lateral samples are proposed for this storm drain line. A separate figure was prepared to show only storm drains and their associated proposed sample locations. The need for additional sample locations along the storm drain lines inside the compressor fence line will be assessed after the implementation of the storm drain sampling investigation program. The work plan was modified to reflect that sampling of storm drains inside the fence line may occur. *PG&E Response:* PAH analysis, (a subset of SVOCs) has been proposed for all storm drain samples. Ten percent of all storm drain samples and 50% of the storm drain catch basins will also be analyzed for the full TAL/TCL suite. PG&E believes that the nature and extent of SVOCs will be sufficiently assessed with the sampling plan as proposed. If SVOCs are detected above screening levels in storm drain samples being analyzed for TAL/TCL, SVOCs analysis may be added to remaining storm drain soil samples.	DTSC Response: Resolved pending review of revised work plan.
289	121	Appendix D Storm Drain Investigation Program, 2.1 Samples at Outfalls and Associated Lateral/Downslope Samples	DTSC	The Work Plan indicates that sample data will be combined with data from the closest downslope AOC. The Work Plan should be revised as this action may be inappropriate (For example, two separate contaminant plumes may exist with two different types of remedial action).	See response to Comment 64 (DOI #24).	DTSC Response: See DTSC response to Comment 64. PG&E Response: See PG&E response to Comment 64.
290	DOI #102	Appendix D, Section 2.1 Samples at Outfalls and Associated Lateral/Downslope Samples	DOI	This rationale for combining the data from the closest downslope AOC warrants further discussion with DOI/DTSC.	See response to Comment 64.	DTSC Response: See DTSC response to Comment 64. PG&E Response: See PG&E response to

Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
		first sentence Page D-2-1				Comment 64.
291	DOI #103	Appendix D, Sections 2.1 and 2.2	DOI	While combining the data from the outfall investigation with the closest or “appropriate” Part A or Part B AOC/SWMU may generally be appropriate, there may be instances where it is best to assess the location in and of itself or as an indicator of another source. Please discuss the steps for evaluating combining the information from this investigation with the Part A or Part B sites. See comment Section 2.2; page C-2-1 from above.	See response to Comment 64.	DTSC Response: See DTSC response to Comment 64. PG&E Response: See PG&E response to Comment 64.
292	DOI #104	Appendix D, Section 2.3	DOI	See comment on Appendix D, Section 1.3 regarding the operating facility.	See response to Comment 256.	
293	Specific 59	APPENDIX D – Table D2	FMIT	Opportunities for collecting fewer, more strategically-located samples. For example, by focusing on sources and outfalls, eliminate SD9 and collect SD10; eliminate SD8 and collect SD7; eliminate SD14 and 16 and collect SD 15; eliminate SD 17 and 19 and collect SD 18. Perhaps other storm drains can be sampled at the ends-of-pipes prior to determining if additional samples are needed or in areas of obvious ponding or sedimentation as discussed above. Also, how will the results of SD12 be interpreted when that sample is proposed for collection in an area already investigated and known to be contaminated. If the alignment study shows that the drainage is intact, and drains into an already contaminated area, then no samples of the drain pathway are needed. This is the same issue for SD13.	The proposed storm drain sample locations were evaluated and locations were optimized during the December 15, 2011 site walk with all stakeholders.	
294	DOI #105	Appendix D, Table D-2 SD-1	DOI	Please explain the basis for the location of this sample shown on Figure D-1.	Sample SD-1 is designed to capture any potential impacts associated with a subsurface outfall area believed to have been constructed to receive the discharge from Storm Drain Line 1. Anecdotal reports from facility staff indicate that a portion of the road in this area may be have been excavated and filled with coarse gravel to receive the discharge from the storm drain.	DOI Response: Resolved
295	DOI #106	Appendix D, Table D-2 SD-8 (now SD-9)	DOI	Please explain the basis for this location. No storm drain is shown on Figure D-1 at this location.	The location of SD-9 is approximate. Storm Drain Line 7 enters the vegetation at the top of the slope in this area, but it is not certain how far the line extends. The line is on an extremely steep slope, which would be difficult to access for sampling. SD-9 is located in the drainage channel below the apparent location of the storm drain line. The location was selected because it is accessible on foot and would be likely to capture all flow from Storm Drain Line 7.	DOI Response: Resolved
296	DOI #107	Appendix D, Table D-2 SD-9 (now SD-10)	DOI	Please explain the basis for the location of this sample shown on Figure D-1.	SD-10 is located adjacent to a visible storm drain in an area that is moderately accessible, given the extremely steep slopes in this area.	DOI Response: Resolved
297	DOI #108	Appendix D, Table D-2 SD-16	DOI	Typographical error “drownslope”	The table was corrected.	DOI Response: Resolved
298	DOI #109	Appendix D, Table D-2 SD-19	DOI	Typographical error “drownslope”	The table was corrected.	DOI Response: Resolved
299	DOI #110	Figure D-1	DOI	It is assumed that the storm drain alignments shown are operational. The figure should also include historical storm drains that have been abandoned as determined through employee interviews and record searches.	All known storm drain lines (both active and abandoned) are shown on the figure. Based on anecdotal information from former employees, storm drain lines that became clogged or were no longer needed were generally abandoned in place rather than removed. Traces of most of these storm drain lines are visible outside the compressor station. additional storm drain lines (either active or abandoned) be identified during the	DOI Response: Resolved DTSC Response: Suggest color coding active versus inactive storm drain lines if any inactive lines are currently known to exist. PG&E Response: Known inactive storm

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				Samples PA03/SD-14 and PA06/SD-17 appear to be collocated. The rationale for each should be clearly stated otherwise redundant sampling should be minimized.	storm drain investigation, were added to the figure. The storm drain investigation will also attempt to clarify which lines are active and which lines are abandoned. As described in response to Comment 284 (DOI Comment 89), former sample SD-14 was removed. Storm drain sample locations were renumbered to include the former PA sample locations. The old sample PA06 was deleted.	drain lines were noted by a different color on the figure. DOI Response: Resolved DTSC Response: See comment balloon for Comment 284. PG&E Response: Comment Noted. DTSC will have the opportunity to view the area to see which site appears to be the better sample location.
		APPENDIX F	DOI	**Appendix F**		
300	DOI #111	Appendix F, Summary Proposed Sampling Program	DOI	DOI does not agree that PCBs should only be analyzed in the 0 and 2 ‘ bgs sampling intervals in the BCW sediment samples (AOC1-BCW8 through BCW30). Please include PCBs in the 5’ and 9’ bgs intervals as well.	To better characterize the area, PCBs will be collected from the same samples as those proposed for dioxin/furan analysis (see response to Comment 114 (Comment DOI #46)	DOI Response: Resolved DTSC Response: Pending resolution of Comment 114.
		APPENDIX G		**APPENDIX G -- STANDARD OPERATING PROCEDURES**		
301	Specific 60	N/A	FMIT	A standard operating procedure (SOP) is needed to address the interface between PG&E field personnel and Tribal Monitors and Tribal Cultural Experts. Attached is a proposed draft of such an SOP for consideration. Obviously, this draft may benefit from further review by members of other affected tribes. Additionally, further consideration is needed to proceduralize the stockpiling of excavated soils, drill cuttings, and cores for potential future repatriation at the site as well as further discussion on abandonment of boreholes, wells, and excavations. The Tribe offers to assist PG&E in preparing such SOP drafts.	*DOI and DTSC Response*: The PA establishes archaeological and tribal monitor protocol for use at the Topock site. This protocol provides guidance for monitoring activities specifically related to the Topock Remediation Project. No additional Standard Operating Procedure is necessary. A task group has been set up to address the development of a plan for handling and disposition of investigation-derived soil and encourages tribal participation in this group.	FMIT Response: The Tribe requires that Tribal Monitors be present during any activity that would disturb soil, vegetation, or might uncover artifacts or any site surveys designed to identify such activities. Please see FMIT letter November 30, 2012, appended below.
		APPENDIX H	DOI	**Appendix H --**		
302	Specific 4	Appendix H, Quality Assurance Project Plan	HUALAPAI	Holding times for soil samples are not described. Holding times may vary for different analyses; however, all soil samples should be archived for possible future analyses, where testing of archived core samples would be preferred over new boreholes near sacred cultural features.	Samples will be archived for possible future analysis, where testing of archived samples would be preferred over new boreholes near sacred features. Additional analyses requested outside the USEPA-established holding times would only be performed at the direction of the agencies. Holding times for soil samples are presented in Appendix H, Table 4-1.	
303	DOI #112	Appendix H, Addendum to the PG&E Program Quality Assurance Project Plan for the RCRA Facility Investigation/ Remedial Investigation for Soil, Section 4.1	DOI	The QAPP Addendum for soil should only reference the QAPP Addendum for dioxins and furans. The current text implies that confirmation results are the same for dioxins and furans as for the other constituents. Alternatively, the two addenda could be combined with a specific section addressing dioxins and furans.	The text was revised to reference the QAPP Addendum for dioxins and furans.	DOI Response: Resolved
		Sediment Sampling – East Ravine	DOI	**Sediment Sampling – East Ravine**		
304	DOI #113	Not currently in work plan.	DOI	There is currently no sediment or pore water sampling in the area of discharge from East Ravine. DOI believes that characterization of sediment and pore water at the river interface is necessary to confirm that unacceptable risk from Cr (VI) does not occur. DOI requests further discuss with PG&E, the agencies and stakeholders to determine the path forward for inclusion of this sampling effort in the work plan.	The sampling approach near the mouth of East Ravine has been submitted for agency approval and is incorporated into the revised work plan (see Appendix A, Subappendix C4, Attachment 1).	DOI Response: Resolved pending review of revised work plan.
305	17	Appendix A Part A Data Gaps Investigation Program	DTSC	East Ravine - There is currently no sediment or pore water sampling in the area of discharge from East Ravine. DTSC believes that characterization of sediment and pore	Please see response to Comment 304 (DOI Specific Comment 113.)	DTSC Response: Resolved pending review of revised work plan.

Response to Comments on the

***Soil RCRA Facility Investigation/Remedial Investigation Work Plan, Pacific Gas and Electric Company (PG&E) Topock Compressor Station, Needles, California,* Issued May 2011**

From

Combined United States Department of the Interior (DOI), California Department of Toxic Substances Control (DTSC), Fort Mojave Indian Tribe (FMIT) and Hualapai Comments

Absolute Comment No.	Agency/Tribe Comment No.	Comment Location (Section/Page)	Commenter	Comment	Response [a]	Comment Resolution
				water at the river interface is necessary to confirm that unacceptable risk from COCs does not occur. This issue has been brought up in past meetings with the agencies, PG&E, tribes and stakeholders. DTSC requests further discussion to determine the path forward for inclusion of this sampling effort in the revised Work Plan.		

Note:

[a] Comment response is PG&E unless noted otherwise

Table 1
DOI Working Information Provided to Assist Resolving Discrepancies'
Not Verified as Comprehensive- Indicative Not definitive

Comparison of DOI/DTSC February 25, 2011 Directive Letter with
RFI/RI WP Appendix A Tables and Appendix F

Terms Used:
1) **Feb 25, 2011 Directive** = DOI /DTCS letter to PG&E Response: Direction - Proposed Sample Locations (Attachment 1 of Appendix A RFI/RI WP)
2) **Crosswalk** = PG&E's Amendment to Feb 25, 2011 with Renumbered Location IDs.
3) **Table CX-YZ** = Table(s) in Soil RFI/RI Work Plan Appendix A corresponding to the AOC/SWMU-specific Proposed Phase 2 Soil Sampling Locations (e.g., Table C3-16 corresponds to Table AOC 9 Proposed Soil Sample Locations.
4) **Appendix F** =Planned Sample Table in the Soil RFI/RI Work Plan Appendix F

Track: via:
February 25, 2011 > Crosswalk > Table CX-YZ > Appendix F

Tracking Discrepancies Only

AOC/SWMU	Crosswalk Reference	Deviation from Attachment 1 (Feb 25, 2011 Directive)	Appendix F Planned Sample Table
SWMU 1 (Table C1-14)	SWMU1-20	Remove PCBs at depths greater than 0 to 2 feet bgs.	
	SWMU1-21	Remove PCBs at depths greater than 0 to 2 feet bgs.	
	SWMU1-22		SPLP is listed for this location in the cross walk table, but Appendix F does not identify SPLP as an analysis
	SWMU1-23		SPLP is listed for this location in the cross walk table, but Appendix F does not identify SPLP as an analysis
	SWMU1-24		SPLP is listed for this location in the cross walk table, but Appendix F does not identify SPLP as an analysis
AOC 1 (Table C2-19)	AOC1-4 (Former AOC 1-14 contingent)	This location has been moved about 25 feet north from its location on the original map.	
	AOC1-T5d	-	Missing soil physical parameters
	AOC1-T6d (new point)	-	Missing soil physical parameters
	AOC1-BCW7 through AOC1 BCW 30 (All Tamarisk Area Samples) (new point)	For all Tamarisk area sampling points, FMIT had asked that pathway be staggered to prevent a straight line of flood flow. The assumption used elsewhere that PCBs deposited on surface would not migrate downward more than 2 feet does not hold for Tamarisk area where successive layers of contaminated surface deposition may be buried by later deposits. PCBs must be sampled for all depths in Tamarisk area. Remove note [a]	Missing metals and PAHs, also missing soil physical parameters
AOC 9 (Table C3-16)	AOC 10a-2	Pesticides and PCB missing	Pesticides and PCBs missing
	AOC 10a-3	Pesticides and PCBs missing	Pesticides and PCBs missing
	AOC 9-16	-	Soil physical parameters missing
	AOC 9-19 (Former 9-21)	-	Soil physical parameters missing

AOC/SWMU	Crosswalk Reference	Deviation from Attachment 1 (Feb 25, 2011 Directive)	Appendix F Planned Sample Table
	AOC 9-20 (Former 9-22)	-	Soil physical parameters missing
AOC 10 (Table C4-18)	AOC 10-11 (Former AOC 10-13)	-	Soil physical parameters missing
	AOC 10-15 (Former AOC10-17)	PAHs, TPH, SVOC, dioxin/furan, PCBs added	PAHs, TPH, SVOC, dioxin/furan, PCBs added
	AOC 10-16 (Former AOC 10-19)	PAHs, TPH, SVOC, dioxin/furan, PCBs added	PAHs, TPH, SVOC, dioxin/furan, PCBs added
	AOC 10-18 0 and 2[a] Sample mistakenly deleted. Note AOC 10-18 was original Feb 25, 2011 Directive sample number.	Cr(VI), Title 22 metals, PAHs	Add Cr(VI), Title 22 metals, PAHs to table
	AOC10c-6 14 To Groundwater Sample mistakenly deleted The DOI/DTSC revision table original (Feb 25, 2011 Directive) only changed the depth to specify that it extend to groundwater. (AOC 10c -6 was the original sample number)	Cr(VI), Cr(T)	Add Cr(VI), Cr(T)
	Assorted debris locations	Asbestos-containing materials, XRF screen	Appendix F does not include this debris sampling
AOC 11 (Table C5-19)			Appendix F has several out-of-order entries that make it appear as if there are more samples than are really planned (for example, 11c-3 and 11e-5).
	AOC 11c-3	PAHs missing	PAHs missing
	AOC 11-2 (Former AOC 11-3)	PCBs missing	PCBs missing
	AOC 11-3 (Former AOC 11-4)	PCBs missing	PCBs missing
AOC 14 C7-15	AOC 14-15 (former AOC 14-21)	-	Soil physical parameters missing
	AOC 14-21	Dioxins/furans	Dioxins/furans Soil physical parameters missing
	AOC 14-18 to 43	Samples 18 through 43 were not specified in the DOI/DTSC table. Please explain their origin.	
AOC 4 Table C10-15	AOC4 BCW1	Cr(VI) missing PAHs missing Please add PAHs	Cr(VI) missing PAHs missing Please add PAHs
	AOC4 BCW2 (Former BCW 3)	Cr(VI) missing PAHs missing Please add PAHs	Cr(VI) missing PAHs missing Please add PAHs
	AOC4 BCW3 (Former BCW 4)	Cr(VI) missing PAHs missing Please add PAHs	Cr(VI) missing PAHs missing Please add PAHs

AOC/SWMU	Crosswalk Reference	Deviation from Attachment 1 (Feb 25, 2011 Directive)	Appendix F Planned Sample Table
	AOC4 BCW 4 (Former BCW 5)	Cr(VI) missing PAHs missing Please add PAHs	Cr(VI) missing PAHs missing Please add PAHs
	AOC4 BCW 5 (Former BCW 6)	Cr(VI) missing PAHs missing Please add PAHs	Cr(VI) missing PAHs missing Please add PAHs
	AOC4 BCW 6 (Former BCW 7)	Cr(VI) missing PAHs missing Please add PAHs	Cr(VI) missing PAHs missing Please add PAHs
	AOC 4-17 through 28	Locations NOT ON February 25, 2011 memo. Rationales vary, as do analytes specifications.	

AHAMAKAV CULTURAL SOCIETY

Fort Mojave Indian Tribe

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July 23, 2012

Mr. Aaron Yue, Project Manager
DEPARTMENT OF TOXIC SUBSTANCES CONTROL
5796 Corporate Avenue
Cypress, California 90630

Ms. Pamela S. Innis
Topock Remedial Project Manager
Office of Environmental Policy and Compliance
U.S. DEPARTMENT OF THE INTERIOR
P.O. Box 25007 (D-108)
Denver, Colorado 80225-007

Re: Fort Mojave Indian Tribe Issues with Response-to-Comments Process and Request for Clarification Regarding Land Jurisdiction

Dear Mr. Yue and Ms. Innis:
These comments are submitted on behalf of the Fort Mojave Indian Tribe. The Tribe was represented by Drs. Michael Sullivan and Leo Leonhart on the June 15, 2012 teleconference with DTSC and DOI regarding the Response-to-Comments (RTC) on the Soils Investigation Work Plans. The outcome of that teleconference and the subsequent publication of the final RTC have raised concerns that must be addressed.

Concern #1: The RTC process does not fully incorporate Tribal concerns and it by-passes the required Tribal consultation process with DOI.
In reviewing the RTC, it was discovered that many responses to Tribal comments were classified by DOI as resolved, yet the resolution was not stated, nor was it indicated whether the Tribal position was accepted or otherwise mentioned in the RTC table. The Tribe does not believe that it is forthright to characterize issues that remain contentious or a concern from the Tribe's perspective to be characterized as "resolved." A proper presentation of such issues should at least present the nature of the dissent by the Tribe. Therefore, in order to ensure that Tribal concerns are fully documented and in the readily available project record, the Tribes request that the final RTC table be edited to add a column where Tribal concerns can be recorded. Attached, for your convenience, is a Table of Tribal concerns over the Soil Investigation Work Plans that must become part of the permanent project record.

The Table presents examples of DOI's concluding that an issue is resolved not only when the outcome is contrary to the Tribal position but also when the determination was reached without final consultation with the Tribes prior to "resolution". This is not in keeping the intent and spirit of the DOI/BLM-Tribal consultation process or the Secretary of Interior's Order NO. 3317 (Department of the Interior Policy on Consultation with Indian Tribes); a copy of which is attached to this letter. The Tribes are thereby being forced to rely upon DOI to represent their interests in project meetings; it is our view that another government cannot adequately represent the Tribe's concerns relative to this project.

Moreover, the Tribe expects DOI to seriously consider and correctly state Tribal positions. When the Tribes submit comments on documents, it is expected that, if DOI is not supportive of some issues, the consultation process shall be initiated so DOI and the Tribes can try to resolve these issues prior to RTC issuance. At a minimum, the Tribal concerns must be permanently recorded in the RTC table to record the nature of the Tribe's dissent with the final decision along with the issues of other stakeholders.

Concern #2: The Tribes request a clarification of federal land-jurisdiction in terms of oversight agencies. During the recent teleconference on the Soils Investigation Work Plans RTC, DOI responded to a Tribal inquiry by stating that the impact of DOI's decision on residential future land use was limited to the AOC at the mouth of Bat Cave Wash. This area was represented by DOI as the only area under DOI jurisdiction (See response to absolute comment #2 in the Table). If this were correct, then why has the DOI position for future residential land use been adopted by DTSC and applied across the entire project area? Why has DTSC apparently relied upon the DOI position, which relates to a small portion of the project, and applied the position to the entire project area? The Tribe has stated numerous times that the decision regarding future land use is of the utmost importance to the Tribe because of the land disturbance being caused by potentially unnecessary sampling as well as potential future impacts due to unnecessary cleanup. If the DOI indeed has jurisdiction of only limited project areas on certain federal lands, then the question of characterization and future land use, and the basis for this decision, must be re-evaluated and thoroughly justified in writing prior to approval of the soil work plan.

The issues discussed in this letter are of crucial importance to the Fort Mojave Indian Tribe. Additionally, we believe that, if unaddressed, set forth precedents that are detrimental to Tribal cultural values that may be carried out throughout this process. Therefore, we request a meeting with DTSC and DOI to discuss both the RTC process as well as the decision regarding future land use in light of federal land jurisdiction.

Sincerely,

Linda Otero

Linda Otero, Director
Ahamakav Cultural Society
Fort Mojave Indian Tribe

Cc: Timothy Williams, Chairman FMIT
Tribal Governments, Chemehuevi Tribe, CRIT, Cocopah Tribe, Hualapai Tribe, Yavapai-Prescott Tribe, Quechan Tribe
Technical Review Committee
Kimber Liebhauser, Field Manager LHFO

Table of Fort Mojave Indian Tribe Concerns Not Addressed in the RTC for the Soils Investigation Work Plans

Absolute Comment # (From RTC Table)	Original Tribe Comment	RTC Table Response (Yellow highlight added for emphasis.)	**Additional Tribal Comment**
1 (and Comment #20)	The Work Plan is quite voluminous with its many maps and appendices. As such it was difficult to review in its entirety and to efficiently coordinate the various sections and appendices. Some of the appendices had their own appendices, which were identified the same as the major appendices. For example, Appendix A has its own appendices A through F. It would have been helpful to have a better, more complete presentation of the contents.	Comment noted. Rather than restructure the entire Soil Part Data Summary Report, which had previously been released in draft form, PG&E retained the existing format (this document became Appendix A) and developed a parallel structure for the Soil Part B (Appendix B), Perimeter Area (Appendix C), and Storm Drain Investigations (Appendix D).	**Comment not resolved. While a single map showing all proposed sample locations has been provided, the fundamental issue is not fixed. The original comment included the issue that the site is artificially segregated into areas where soil samples proposed for different purposes overlap. The report format makes it difficult to determine the location of all sample locations. A key issue for the Tribe. This issue is not fully addressed in the response. The Tribes expect that data reports on soil characterization be integrated and not follow this disjointed format.**
2	The series of Technical Working Group (TWG) meetings held during the Work Plan's preparation, which focused on the implementation of the plan components based on Data Quality Objectives (DQOs), was helpful in understanding the general rationale underlying the sampling strategy. As stated in the Tribe's prior comment letters on these earlier work plan components, the Tribe notes that PG&E and the agencies believe there may be a tradeoff between sampling	*DOI Response*: As discussed in DOI's September 29, 2011 letter to Tribal leaders, for the purposes of the ongoing soil investigation and the baseline risk assessment, the future land use assumptions for United States Fish and Wildlife Service (USFWS)-managed refuge will be limited to recreational and tribal uses. The future land use assumptions for BLM-managed land should remain conservative and reflect a residential scenario. In the future, however, institutional controls will appropriately	**Comment not resolved. FMIT's position is that the appropriate future land use for consideration in all phases of the project (characterization and cleanup) is Tribal, not residential. The DOI response is erroneous in that their own risk assessor has acknowledged in meetings with the Tribe that the residential future use assumption does increase the number of collected samples.**

	details (i.e., numbers, locations, methods, etc.) and the eventual extent of remedy implementation. Nevertheless, the Tribe remains concerned over various assumptions that have been made in this process that will result in unnecessary intrusion and damage to its sacred grounds.	be considered in evaluating the remedial alternatives. As DOI has noted on in previous discussions, the use of the residential land use assumption for BLM-managed land has not been a significant driver of sampling activities. *DTSC Response*: DTSC defers to DOI regarding the BLM-managed lands. See DOI's response above.	**DOI has responded that their position only affects sampling at the mouth of Bat Cave Wash. If this is true, then is DOI willing to support the Tribal position that only Tribal land use is the appropriate scenario in other project areas?**
	In particular, the Tribe disagrees with assuming future risk scenarios based on residential use. This is inconsistent with the Bureau of Land Management's (BLM) Lake Havasu Field Office's (LHFO) May 2007 document titled, ROD/Approved Resource Management Plan, Cultural Resource Management (see p. 26-30). This document assigns this area's land use as "Traditional Land Use." Under Cultural Resource Management the BLM LHFO must adhere to the specifications defined by the categories within the Land Use Allocation, Desired Future Condition and Management Actions. The assumption of future residential risk will potentially affect the level of information required to support decisions on the Corrective Measures Study/ Feasibility Study report. Embankment modifications, trenches, potholes, and drilling are all considered to be significant intrusions in addition to the incursions	The Draft Soil RCRA Facility Investigation/Remedial Investigation Work Plan (Draft Soil RFI/RI Work Plan) is intended to cover soils for the entire PG&E Topock Compressor Station project. The storm drain and perimeter area sampling are necessary to address the areas that may not be covered by the previously separated sampling programs (within the fence line and outside of the fence line). *PG&E Response*: At the direction of DOI, the BLM land will include a residential receptor in the human health risk assessment. As described in the Risk Assessment Work Plan (RAWP), the tribal use scenario will also be considered in the human health risk assessment for soil contact, using all the available data collected. The results of that risk evaluation will provide information to agency risk managers for their use in risk management decisions based on the findings of the corrective measures study/feasibility	

	necessary to perform these activities. These concerns are further discussed in comments that follow.	study (CMS/FS) documents. Please note that, in general, the current recommendations for additional sample collection are not being led by screening levels based on human health risk for potential future residents. Most often, the recommendation for additional sampling is being driven by background values or ecological screening levels.	
5	Mitigation measures for cultural features should be part of the discussion (the sooner the better). However, mitigation measures are already being discussed regarding the impacts of the groundwater remediation. Mitigation measures should be combined to include the total cumulative impacts; therefore, the groundwater and soil programs should be combined.	*DOI Response:* It is anticipated that the Cultural Historic Properties Management Plan (CHPMP) will, at some point, address mitigation measures for both soil and groundwater. *DTSC Response*: Currently, the soil and groundwater portions of the project are on separate tracks and separate schedules. The soil portion is still in the site characterization (RFI/RI) phase while the groundwater portion is in the remedial design phase. Combining the two would result in significantly delaying the groundwater portion for several years in order for the soil portion to complete the site characterization, CMS/FS, and catch up to the remedial design phase. DTSC is currently preparing a California Environmental Quality Act (CEQA) initial study to evaluate if there are new or significant impacts from the proposed soil investigation activities that have not yet been evaluated in the Final Environmental Impact Report (FEIR), dated	**Comment not resolved. Two important issues: 1- that when reasonable mitigation measures are found they should be (formally or informally) applied to the entire project. And 2-the DTSC/DOI separation of the project into GW and soil is artificial, the independent and cumulative impacts must be considered. While the soils part of the project lags behind the groundwater, there are impacts from the soils investigation that must be addressed and eliminated or mitigated.**

		January 2011. Ultimately, all applicable mitigation measures, including those for cultural resources, will be implemented prior to and/or during the soil investigation work plan field implementation.	
6	In the HDCR December 3, 2010, review of the draft Soil Work Plan, suggestions were made to perform additional soil leaching tests (e.g. SPLP, which uses deionized water as the leachate). Leaching tests can help describe the threat to groundwater from contaminated soils; however, additional SPLP analyses were not described in the May 2011 Soil Work Plan.	Synthetic precipitation leaching procedure (SPLP) analyses are included as part of the analytical program to address DQO Decision 4 for the Soil Part A Investigation and DQO Decision 5 for the Soil Part B investigation.	**Comment Not Resolved. The issue of soil concentrations that pose a risk to groundwater through leaching contributes to the number characterization samples and potentially soil cleanup volumes. A more sophisticated model to better understand this issue is recommended to evaluate this issue now and not at a later time in the project, especially after unnecessary soil samples have been collected.**
46	The Tribe believes that a strategy involving the use of confirmation sampling to address data gaps should be considered and discussed in the Work Plan. The table does not present information on the extent of sampling (i.e., numbers, depths, types, etc.) in each area.	*DOI and DTSC Response*: The DQO-based approach is intended to develop data to support four specific decisions, as discussed in Table 4-1. The approach was developed by PG&E, DOI, DTSC, with input from the Tribes and includes a prominent confirmation sampling component. Most of the samples identified later in Appendix C of the Part A Data Gaps report were driven by the need to obtain confirmation data on whether the nature and extent of contamination indicated by the Phase 1 data had been satisfactorily identified. If the nature and extent of contamination indicated by the Phase 1 data	**Comment not Resolved. In seeking a balance between information and uncertainty in regards to soil sampling, as has been explained many times, the Tribe prefers to err on the side of uncertainty and collect fewer samples now in areas that are likely to be subject to cleanup. Confirmation samples can be used during the cleanup process to address this uncertainty. During discussions at the station and in the field, no proposed samples were postponed to the confirmation phase.** **The use of the DQO as the authoritative project**

	In regard to Decision 3 (Potential Impacts to Groundwater) – The Tribe has previously commented about the simplicity/conservativeness of the modeling performed on soil concentrations and the need to perform additional sampling to further understand these potential impacts. The Tribe's position is that this additional sampling should only be based on both: 1) more advanced/less conservative modeling, and 2) evaluation of site data where soil contamination exists but groundwater contamination has not been detected. It seems that this Data Quality Objective (DQO) criterion is based on the same modeling that was presented in the prior draft/proposed sampling.	was not satisfactorily identified, a Decision 1 data gap (nature and extent) was identified. Identification of a Decision 1 data gap often resulted in the need for confirmation sampling data. The predominance of Decision 1 nature and extent rationale is evidenced in Table 4-1. Section 4.0, and specifically Table 4-1, is a summary of data gaps in the Part A, Phase 1 data. It is intended to familiarize the reader with how the existing Phase 1 and pending Phase 2 data are related. Information on the extent of sampling (that is, numbers, depths, types, etc.) in the Phase 1 database, as well as proposed for Phase 2, is provided in the various sub sections of Appendix C of the Part A Data Gaps report. DOI and DTSC have carefully considered the Tribe's comments on the application of the models used to evaluate Decision 3 (Potential Soil Impacts to Groundwater) and respectfully disagree with the Tribe's position. As has been explained on several occasions, DOI and DTSC believe the use of conservative screening tools as a first-tier assessment for the potential for impacts to groundwater from soil contamination is appropriate and necessary. As has also been explained on several occasions, the use of the conservative screening tool has not been a significant driver of sampling activities.	**document to address needed samples is an incorrect use of the DQO. The DQO is a tool, not a policy. It is designed to assist the sampling team in their quest to collect the needed samples. However, it also includes the consideration of project limitations or boundaries, which must include the Tribes' desire to minimize sampling and utilize confirmation sampling when possible.** **Comment Not Resolved. It is not a requirement to use a stepped approach to characterization (screening followed by more robust) especially since this adds additional sample locations and site disturbance. As a strategy, the agencies should adopt a more sophisticated approach to not rely upon screening techniques.**

		Use of the planned tiered approach for assessment of potential impacts to groundwater, as laid out in the DQOs for the project, allows for more site-specific assessment tools in the event that potential impacts to groundwater are identified with the conservative first-tier screening approach.	
62	The criteria for sufficient information to plan the CMS/FS should be specified in general so the reader (without having to read the entire appendices) can understand the level of certainty needed for this criterion. For example, is an estimate of soil volume within 10-fold (an order of magnitude) sufficient? More detail is needed here.	As presented in the Part B DQO Technical Memorandum, the purpose of Decision 5 is to determine the site-specific soil property, contaminant distribution, and transport pathway information required to support development of the CMS/FS, remedial design, and Interim Measures, if required. If full determination of site-specific soil property, contaminant distribution, and transport pathway information based on sample data is not feasible, the impediments will be documented, and uncertainties will be addressed in the risk assessment and/or CMS/FS or Interim Measures. This detail will be added to Section 4.4 for clarity. Specific guidance dictating accuracy for soil volume estimates in the CMS/FS does not exist. Engineers rely on best judgment to assess whether or not sufficient data have been collected to calculate soil volume estimates to be used in assessing the various remedial alternatives in the	**Comment Not Resolved. The response does not address the comment. There is always uncertainty in soil volume calculations and the engineers should know what uncertainty is generally acceptable and that uncertainty should be considered in the decision for further sampling. For example, if the current samples result in a soil volume of X and additional sampling will not change X beyond the acceptable engineering uncertainty then no additional sampling is necessary.**

		CMS/FS. The Topock Soil RFI/RI Program has accounted for limiting uncertainties by following the Part A and Part B DQO Technical Memoranda. Uncertainties in soil volume estimates will be reduced if Part A and Part B DQO Decision 1 – Nature and Extent are satisfied.	
80	This section lists multiple comparison criteria that are used to determine if additional sampling is needed. With the exception of ecologically-based screening criteria, none of the other risk-based criteria are relevant to the areas of this project. Many areas of the site are drainages and will not be developed into residential areas (the underlying basis for these criteria). In addition, upland areas are sacred Tribal land and should be left undeveloped and available for Tribal use. Therefore, the only appropriate human health-based comparison criteria are related to Tribal land uses. A preferred approach would be to calculate these values and use them as comparison criteria. This would reduce the number of needed samples. An alternative approach would be to acknowledge that these Tribal-based land use criteria are more relevant than the listed comparison values and consider this when deciding on the need to collect additional samples.	*DOI Response:* DOI Response: As discussed in DOI's September 29, 2011 letter to Tribe leaders, for the purposes of the ongoing soil investigation and the baseline risk assessment, the future land use assumptions for USFWS-managed refuge will be limited to recreational and tribal uses. The future land use assumptions for BLM-managed land should remain conservative and reflect a residential scenario. In the future, however, institutional controls will appropriately be considered in evaluating the remedial alternatives. The agencies respectfully disagree with this position. Appropriate soil screening levels to be used in the assessment were selected based on discussions among the agencies, PG&E, the Tribes, and stakeholders that occurred over many months. There are other land use considerations beyond tribal use such as residential use of limited areas, ecological use, and industrial use that apply for the site. As discussed above, the agencies welcome further discussions with the Tribes about the details of	**Comment Not Resolved. Because of the sacredness of this area, the goal of appropriate characterization and cleanup can be achieved by procedures that are not just 'guidance-driven' but instead utilize the experience and knowledge of the project team (including the Tribe). Inappropriate future land use assumptions, e.g., residential use of land in Bat Cave Wash, add no value to the project and result in impacts that are unacceptable to the Tribe. It is unclear why DTSC and DOI will not apply realistic assumptions to achieve the project goal.**

		anticipated tribal uses; however, we continue to believe that the current screening criteria proposed in the work plan best reflect the range of potential uses and impacts for the site. *PG&E Response:* This discussion of comparison values is presented as part of Decision 1 for nature and extent. Sample collection needs are based not only on land use considerations (that is, tribal vs. potential residential) but also on adequate lateral and vertical characterization of the nature and extent of contamination. Nature and extent adequacy has been determined by the agencies to be at or near background when background is below human health-based criteria. Background threshold values are the first comparison value listed in this section. Background levels for most metals (the driving compounds for the locations outside the fence line subject to traditional tribal use in Part A areas) are typically below human health-based criteria, making background the most frequent driver for additional soil sample collection. A notable exception to this general rule is arsenic. See also response to Comment 2 (FMIT General Comment 2).	

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
FISH AND WILDLIFE SERVICE
BUREAU OF RECLAMATION

ELECTRONIC SUBMISSION

August 31, 2012

Linda Otero
Ahamakav Cultural Society
Fort Mojave Indian Tribe
P.O. Box 5990
Mojave Valley, Arizona 86440

Dear Ms. Otero:

Subject: Response to FMIT re Response-to-Comment Process and Land Jurisdiction

The Department of the Interior, on behalf of itself and the Bureau of Land Management (BLM), the U.S. Fish and Wildlife Service, and the Bureau of Reclamation (collectively referred to as "DOI") and the Department of Toxic Substances Control (DTSC) are writing in response to correspondence dated July 23, 2012 regarding the response-to-comment (RTC) process on the draft *Soil RCRA Facility Investigation/Remedial Investigation Work Plan (Work Plan), PG&E Topock Compressor Station, Needles, California* and your request for clarification regarding land jurisdiction. As requested in your letter, we would like to meet with you to talk about these issues and hope the information below will be useful in addressing your concerns.

In response to your first concern (Concern #1) regarding the last column in the RTC table, we feel that there may be a misunderstanding with regard to this column. This column represents the agencies' understanding as to whether or not we believe that it is possible to move forward with finalizing the work plan. It is not meant to infer that we have resolved these issues with the Tribes. The agencies recognize that there are several unresolved issues remaining regarding the Topock Compressor Station Remediation Project (the Project) as we move through the cleanup process including future land use, data synthesis for the investigation report and risk assessment, and mitigation measures. DOI will request that PG&E remove this notation in the last column in this table from all Tribal comments to minimize further misunderstandings.

To continue with your first concern, DOI recognizes its responsibility to engage in meaningful and timely consultation with the tribes regarding the Topock Project. It is our responsibility to engage in dialogue and consider carefully all of the information provided during Tribal consultation meetings in making our decisions regarding direction to PG&E in implementing work on the Project. These meetings have resulted in many modifications to investigation and remediation work plans that have lessened the impacts and potential impacts of the Project and we look forward to continued benefits from these discussions.

Your letter requests clarification regarding federal land jurisdiction and assumptions made concerning foreseeable future use of federal land (Concern #2). As discussed in the letter to Tribal leaders referenced in RTC Absolute Comment #2, the remedial investigation adopts a residential scenario as the future land use assumption for the portion of the Project site that comprises BLM-managed land. BLM-managed lands are located north of Interstate 40 (see attached map); therefore the only waste site on BLM-managed land under current investigation is the northern portion of Area of Concern 1, referred to as the mouth of Bat Cave Wash. This future land use assumption was adopted specifically for use in the development of the baseline risk assessment. Following completion of the baseline risk assessment, other land use scenarios and institutional controls will be considered in evaluating remedial alternatives and selecting a preferred remedy, if required. DOI and its bureaus look forward to future consultation meetings with the Tribes as the evaluation of remedial alternatives to address soil contamination moves forward.

DTSC's requirement for PG&E to consider residential/unrestricted land use for the project area at this time is based on state and federal laws which require that remedies protect human health and the environment, that this protection be maintained over time, and that selected remedies minimize untreated waste and residual risks. It is DTSC's policy that cleanup alternatives include unrestricted use as part of the analysis of options for all remediation projects (see enclosed Management Memo: #EO-02-002MM). DTSC's process is essentially the same as that used in the risk assessment for BLM-managed land outlined above. After completion of the remedial investigation and health risk assessment, development and evaluation of alternatives for remediation may include alternatives that will allow unrestricted use, alternatives that will require land-use restrictions coupled with active remediation, and in very limited cases, alternatives that rely solely on land-use restrictions. However, it is DTSC policy that land use-restrictions should not be used to provide protection except in very limited, site-specific instances. Any selected remedy must be protective of human health and the environment and maintain protection over time. In addition, DTSC does give consideration to the land owner's preference for future land use. In this case, DOI has informed us that residential land use is considered to be a reasonably anticipated future use of BLM-managed lands near the Topock Compressor Station. DTSC will continue to coordinate with DOI, Tribal Nations, and PG&E on this issue.

In addition to these issues, the agencies would like to discuss each of the RTC comments included in your letter at the upcoming meeting. Your letter and our response will be included in the Administrative Records for the Project.

If you have any questions, please contact me at (303) 445-2502 at your convenience. Karen Baker will be out of the office until October 5, 2012. If you have any questions for DTSC, please contact Jose Marcos (DTSC) at (714) 484-5492 in her absence.

Sincerely,

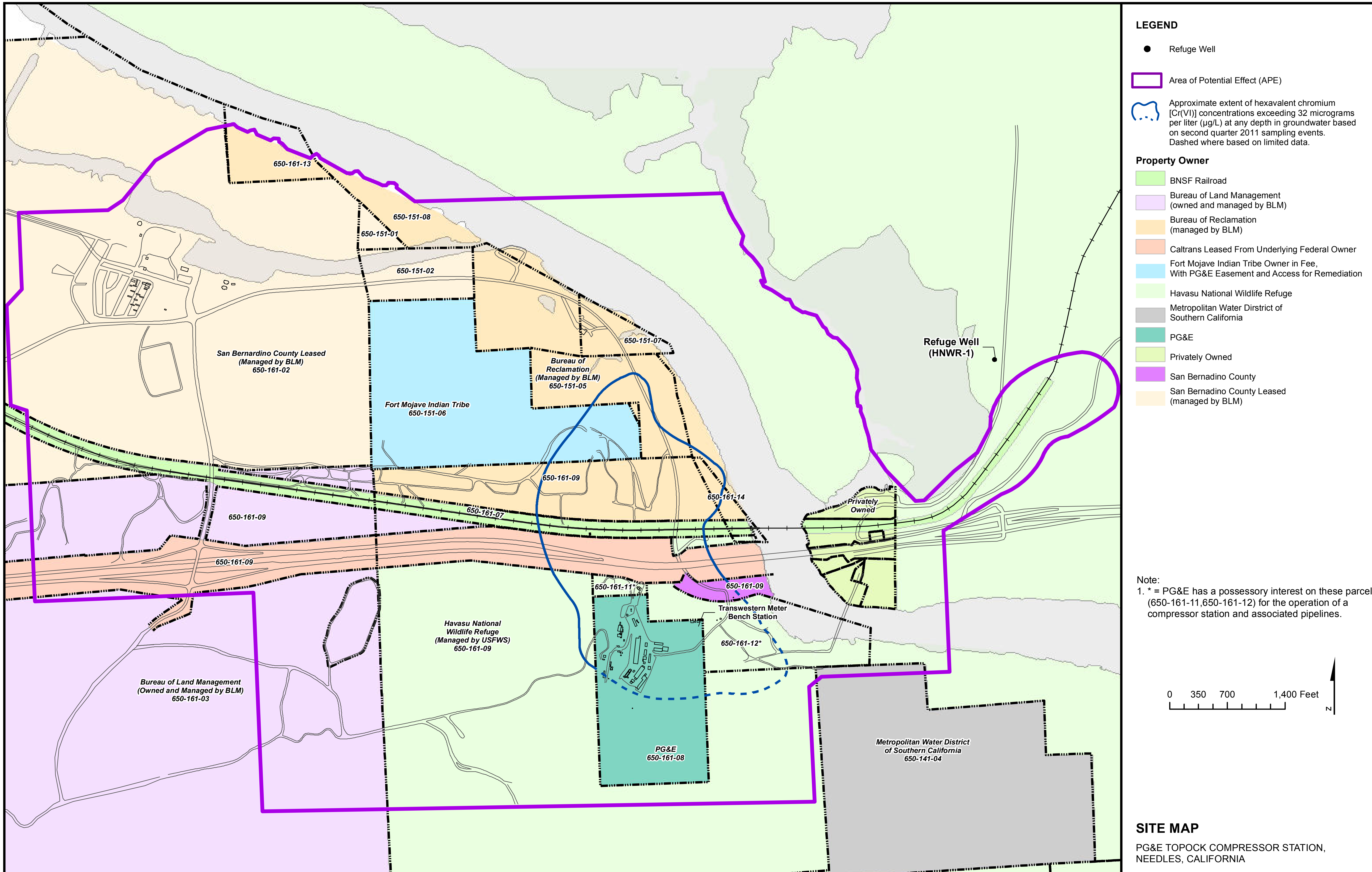
Pamela S. Innis

Pamela S. Innis
DOI Topock Remedial Project Manager

Karen Baker

Karen Baker, CHG, CEG
Performance Manager, Office of Geology
California Department of Toxic Substances Control

cc: Timothy Williams, Chairman FMIT
Nora McDowell-Antone, Ahamakav Cultural Society
Courtney Coyle, Council for FMIT
Leo Leonhart, Consultant to FMIT
Michael Sullivan, Consultant to FMIT
Ron Escobar, Chemehuevi Tribe
Thomas Pradetto, Chemehuevi Tribe
Douglas F. Bonamici, Colorado River Indian Tribes
Wilene Fisher-Holt, Colorado River Indian Tribes
Jill McCormick, Cocopah Indian Tribe
Loretta Jackson-Kelly, Hualapai Indian Tribe
Dawn Hubbs, Hualapai Indian Tribe
John P. Bathke, Quechan Indian Nation
Greg Glassco, Yavapai-Prescott Tribe
Topock Technical Review Committee
Aaron Yue, DTSC
Jose Marcos, DTSC
Casey S. Padgett – DOI Assistant Solicitor
Cathy Wolff-White – BLM
Carrie Marr – FWS
Jeff Smith - BOR
Yvonne Meeks – PG&E



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SITE MITIGATION AND BROWNFIELDS REUSE PROGRAM MANAGEMENT MEMO

MANAGEMENT MEMO: # EO-02-002-MM

TITLE: Response Actions for Sites Where Future Use May Include Sensitive Uses

AFFECTED PROGRAMS: Site Mitigation and Brownfields Reuse Program
Hazardous Waste Management Program

PURPOSE: This management memorandum provides guidance for Department of Toxic Substances Control (DTSC) staff in establishing remedial action objectives and the use of institutional controls as part of the remedy. It is primarily intended to apply at sites where sensitive uses do not currently exist, but are reasonably anticipated in the future. It is DTSC's goal that sites requiring response actions, where sensitive land uses are anticipated, be remediated to the degree that allows unrestricted use. In very limited, site-specific circumstances, exceptions to this goal may be acceptable with the approval of the appropriate Branch Chief in consultation with his/her Division Chief and Deputy Director.

This document is intended as guidance only. The applicable statutes and regulations control decisions concerning establishing remedial action objectives and institutional controls for response actions at hazardous waste, hazardous substance, and hazardous materials sites.

BACKGROUND: The California Health and Safety Code, Sections 25356, 25200.10, and 25187, gives DTSC the authority to require response actions or corrective measures for hazardous substance/hazardous waste releases, including those at hazardous waste facilities. The basis for DTSC's goal of remediation, to the extent that allows unrestricted use, derives from the National Contingency Plan's program goal [300.430(a)(1)(i)], remedy alternatives evaluation criteria [300.430(e)(7)(i), and 300.430(e)(9)(iii)(C)]. The program goal and evaluation schemes emphasize the selection of remedies that protect human health and the environment, maintain protection over time, minimize untreated waste and residual risks, and afford long-term protection, effectiveness, and permanence. In addition, California Education Code sections 17072.18, 17210, 17210.1, 17213.1, and 17213.2 give DTSC the authority to ensure that proposed school properties do not contain hazardous materials or that they have been appropriately remediated.

The site mitigation and corrective action processes include development and evaluation of alternatives for remediation or corrective measures. These alternatives may include cleanup that will allow unrestricted use, partial cleanup coupled with land use-restricting covenants, and, in very limited cases, no cleanup with land use-restricting covenants constituting the entire remedial action. Any alternatives that include leaving contaminants at levels that are not suitable for unrestricted use are expected to include institutional controls, such as deed restrictions, in the form of land use-restricting covenants [40CFR300.430(a)(1)(iii)(D)]. Any selected remedy must protect human health and the environment and maintain protection over time [40CFR300.430(a)(1)(i)]. For the purposes of this guidance, sensitive land uses include, but are not limited to, residences, schools, day care facilities, hospitals, and hospices.

Remediation to levels that allow all sensitive uses of the land is always protective of human health and the environment, is most reliable over time, and provides the highest level of long-term protection, effectiveness, and permanence. Land use-restricting covenants should not be used to provide protection, except in very limited, site-specific instances. Sensitive land uses are generally not compatible with land use-restricting covenants because of the difficulty of monitoring the restrictions and the sensitive nature of the population associated with these uses. The better remedy is the one that provides the most protection, effectiveness, and permanence.

At some sites it may not be possible to implement a remedy that both protects human health and the environment and achieves protection for sensitive uses without the use of land use-restricting covenants. Caution must be exercised when considering a remedy in which the possibility of exposure to unacceptable levels of contaminants remains, no matter how improbable. The use of land use-restricting covenants to legally limit the exposure is required. The implementation of other protective measures that adequately reduce the likelihood of violation of the land use-restricting covenants needs to be included as part of the remedy as appropriate. In each and every case, the remedy, which includes any appropriate land use-restricting covenants, must protect human health and the environment, taking into account the possible future uses and misuses.

Evaluation of remedial alternatives provides a means to compare alternatives, such as remediation for unrestricted use and partial remediation with land use-restricting covenants. The alternative of unrestricted use cleanup should be included as part of the analysis of options for all response actions. The analysis of partial remediation alternatives should include the basis for, and provide the documentation to support, the claim of the technical impracticability of meeting the unrestricted-use scenario. Alternatives that propose leaving contaminants at levels that are not protective of the unrestricted-use scenario, and thus trigger the need for land use-restricting covenants, should, among other things, account for the loss in value of the site due to the limitations on use. The amount of the loss in value is the difference between the value of the completely remediated property and the value if partial or no remediation is completed. This can be documented by either decreasing the cost of the unrestricted use remedy or increasing the cost of the partial-remediation alternative by the difference in value. The life cycle costs associated with implementing and maintaining land use-restricting covenants should also be evaluated.

ROLES AND RESPONSIBILITIES

Proiect Manaaers and Unit Chiefs

- Require adequate data collection, health and environmental risk assessments, and compilation of engineering controls, administrative controls, and remedial or corrective action components into remedial action alternatives that will protect human health and the environment.

- Ensure that the alternative of cleanup to unrestricted use be developed and evatuated. This alternative should include treatment or removal of all contaminants that present any current or potential health or environmental risks, whether the exposure pathway is or is not complete. The analysis of this alternative should also describe the basis for, and provide the documentation that supports, the claim of the technical impracticability of meeting the unrestricted-use scenario.

- Ensure that any response action alternatives that propose leaving contaminants above levels acceptable for unrestricted use contain land use-restricting covenants and long-term management components that ensure adequate protection for both present and possible future uses. The difference in property value between partial and complete remediation should be accounted for in the alternatives analysis. Additionally, the life cycle costs of ***implementing and maintaining*** land use-restricting covenants should also be'evaluated.

- Any recommendation for exception to the preferred cleanup approach presented in this memorandum must be adequately supported and based upon the technical impracticability of achieving remediation to unrestricted levels. Every remedial alternative must adequately protect human health and the environment and be reliable over time.

MANAGEMENT MEMO # EO-02-002-MM
Response Actions for Sites Where Future Use May Include Sensitive Uses

Branch Chief

The Branch Chief has approval authority for decision documents, such as Remedial Action Plans, Records of Decision, Corrective Measures, and Land Use-Restricting Covenants. In the case where the remedy proposed for selection incorporates institutional controls, including land use-restricting covenants, for a site where future use may include sensitive uses, the Branch Chief shall consult with the appropriate Division Chief(s) and the Deputy Director concerning the decision.

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Office of Military Facilities Division
Site Mitigation and Brownfields Reuse Program
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July 10 2002
DATE

Edwin F. Lowry
Edwin F. Lowry
Director

Department of Toxic Substances Control

Matthew Rodriquez
Secretary for
Environmental Protection

Deborah O. Raphael, Director
5796 Corporate Avenue
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Edmund G. Brown Jr.
Governor

Sent Via Electronic Mail

October 29, 2012

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Parker, Arizona 85344

Ms. Dawn Hubbs
Hualapai Department of Cultural Resources
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Ms. Nora McDowell-Antone
Fort Mojave Indian Tribe
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Ms. Kendra Morton
Cocopah Indian Tribe
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Somerton, Arizona 85350

RESPONSE TO COMMENTS PROCESS – PACIFIC GAS AND ELECTRIC COMPANY (PG&E) TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA (EPA ID NO. CAT080011729)

Dear Mr. Bonamici, Ms. Hubbs, Ms. McDowell-Antone and Ms. Morton:

The Department of Toxic Substances Control (DTSC) would like to express our appreciation to the Cocopah Indian Tribe, Colorado River Indian Tribes, Fort Mojave Indian Tribe and Hualapai Indian Tribe (jointly referred, henceforth, as “Tribal Nations”) for initiating a meeting with representatives from DTSC and the Department of the Interior (DOI) on October 16, 2012 in Yuma, Arizona. The meeting facilitated understanding between the participants of the concern raised by the Fort Mojave Indian

Tribe (FMIT) in their July 23, 2012 letter to the DOI and DTSC regarding the documentation of unresolved opinions during the response to comments (RTCs) process for the PG&E Topock Compressor Station investigation and cleanup project.

As a result of the meeting, DTSC, DOI and Tribal Nations agreed to revise the response to comments process to document any dissenting opinions for the record. The agreed upon steps, as discussed in the meeting and outlined below, would create an opportunity for commenters to record issues that remain unresolved and/or agreed to disagree with the agencies. It is DTSC's hope that by revising the process, all parties will gain trust at the same time improving the administrative records of decisions on this project. Please note that DTSC has issued these instructions, in an electronic correspondence, to PG&E on October 22, 2012 to implement these procedures. We are also attaching the sign-in sheet for the October 16, 2012 meeting for your records.

Summary of Revised Response to Comments Procedures from the October 16, 2012 meeting:

1. The agencies (DTSC and DOI) and Tribes agree to meet and discuss the agencies' and Tribes' comments soon after all the comments are submitted for the subject document. The purpose of the meeting will be to provide clarification of any comments received. (For the Draft Soil RFI/RI Investigation Workplan, the agencies, Hualapai and FMIT met in Henderson on September 15, 2011).

2. The RTCs table will be prepared in the usual manner (PG&E will consolidate all the comments from the agencies, Tribes and stakeholders into one table) for discussion prior to finalization.

3. After comments and response to comments on the RTCs table are discussed between the agencies, Tribes and PG&E, if the Tribes believe that any of their comments are still not adequately addressed, the Tribes will submit a letter to document their dissenting position on the specific comments. The Tribes will notify agencies and PG&E if a letter is being prepared within one week of the RTCs discussion meeting, and the Tribes will strive to submit a written letter within two weeks of the meeting. (For the Draft Soil RFI/RI Investigation Workplan, the FMIT submitted a letter dated July 23, 2012, which DOI and DTSC responded to in a joint letter dated August 31, 2012. For the Displaced Material Protocol, the FMIT submitted a letter dated September 7, 2012, which DTSC responded to on September 18, 2012).

4. The letter from the Tribe and agency response letter, will be appended to the end of the RTCs table. In addition, for the specific comments identified on the Tribe's letter, the last column of the RTCs table (Comment Resolution/Status) will indicate: "The Tribe believes that this item has not yet been adequately addressed. The Tribe's position on this item is documented in the letter attached to the RTCs table. The agency response letter is also attached".

5. Remove all "Resolved" notations and other statements from the last column of the RTCs table (Comment Resolution/Status) for all comments originating from the Tribes, with the exception of comments identified in the Tribal letter (see #4).

DTSC appreciates your continued participation in the PG&E Topock Project. If you have any questions, please feel free to contact me at (714) 484-5492.

Sincerely,

Jmarcos

Jose Marcos, PG
Engineering Geologist
Department of Toxic Substances Control

Attachment: October 16, 2012 Meeting Sign-in Sheet

cc: PG&E Topock Consultative Workgroup Members – Via e-mail
PG&E Topock Geo/Hydro Technical Workgroup Members – Via e-mail
Tribal Representatives in PG&E Contact List – Via e-mail
Technical Review Committee – Via e-mail

PG&E Topock Project
Meeting - Response to Comments Process
Yuma, Arizona
October 16, 2012 3PM-4PM

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~~Karen Baker~~	DTSC	Karen.baker@dtsc.ca.gov 714.484.5423
Aaron Yue	DTSC	Aaron.yue@dtsc.ca.gov 714.484.5439
Pam Innis	DOI	Pamela_Innis@ios.doi.gov 303.445.2502
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ON THE PHONE:		
Chris Guerre	DTSC	
Rick Newill	For DOI	

November 30, 2012

Mr. Aaron Yue, Project Manager
DEPARTMENT OF TOXIC SUBSTANCES CONTROL
5796 Corporate Avenue
Cypress, California 90630

Ms. Pamela S. Innis
Topock Remedial Project Manager
Office of Environmental Policy and Compliance
U.S. DEPARTMENT OF THE INTERIOR
P.O. Box 25007 (D-108)
Denver, Colorado 80225-007

Re: Fort Mojave Indian Tribe Comments on the Soils Work Plan Response-to-Comments

Dear Mr. Yue and Ms. Innis:

On behalf of my client, the Fort Mojave Indian Tribe (the Tribe), I have reviewed the published Response to Comments (RTC) for the 2012 Soils Work Plan (the Work Plan) for the Topock Compressor Station. Additionally, I have completed a focused review of the entire Work Plan. The purpose of the RTC is to document comments on the original version of the report and how these comments have been addressed in this final version. The Tribe's position is that some of its original comments have not been adequately addressed.

As a result of an October 16, 2012 meeting between the agencies and several Tribes regarding the RTC process, it was agreed that, when an original comment is not resolved to the satisfaction of a Tribe, the RTC would document this issue. This agreement is documented in an email from Jose Marcos to the Tribes dated October 22, 2012. This letter and the attached table are provided to serve as an attachment to the final RTC for the 2012 Soils Work Plan. In addition this letter provides recommended language for insertion into the RTC explaining the Tribe's issue with specific responses.

General Issues

There are four overarching issues that, in addition to having comment-specific language for the RTC provided in the table below, are important enough to warrant mention here.

1. Document format [RTC comments #1 and #239]: The overall format and organization of the 2012 Soils Work Plan remains un-integrated in terms of the various proposed soil investigation programs. The lack of integration increases the difficulty in performing a comprehensive review of the document for the purposes of balancing the need for soil samples and the need to minimize site disturbance. Future documents, for example the soils RI/RFI report, should make an effort towards enhanced integration in order to facilitate data review.

2. Future land use [RTC comments #2 and #80]: The Tribe believes that the actual future land use for Tribal activities should be the basis for the characterization (i.e., the number and location of soil samples) of the soil contamination. The continued use of the hypothetical future residential land use not only perpetuates a mistaken assumption but it fails to acknowledge the sacredness of this area and the need to protect it and set it aside only for Tribal uses.

3. Incorporation of the Procedure for handling displaced soils [RTC comments #30 and #101]: The Procedure for handling displaced soils must be referenced as an authoritative procedure in all project documents that result in any disturbance of site soils. In addition, the Procedure should also be an attachment to any document which outlines actions that could result in displaced soil.

4. The lack of a comprehensive evaluation of site disturbances from the sampling activities and how these impacts will be addressed [RTC comment #67]: The disturbances to site soil from the sampling activities described in this Work Plan have not been comprehensively evaluated in terms of how they will be minimized and corrected. Any preliminary evaluations based on previous versions of this work plan are inadequate in that the overall scope of the soil characterization has significantly increased. A complete evaluation, reflecting past, current and future potential work and which includes Tribal participation, must be completed prior to the approval and implementation of any additional soil sampling.

Per the previously mentioned agreement, the Fort Mojave Indian Tribe believes that the project record must document our position on these important issues that affect the Topock site. Therefore, the Tribe requests that the RTC be reissued as noted herein and this letter attached. Thank you for your attention to these matters.

Sincerely,

Michael Sullivan, Ph.D., CIH
Consultant to Fort Mojave Indian Tribe

Specific Language to be Inserted into the RTC Table to Reflect Tribal Position

RTC Comment Number	Source of Original Comment	Summary of Original Comment	**Language for Inclusion in the RTC to Document Fort Mojave Indian Tribal Concerns over the Issue Resolution**
1	FMIT	Document is poorly organized and multiple sections must be accessed to understand sampling in a given area.	**The Tribe disagrees with the report organization and format that result in a non-integrated presentation of the proposed soil sampling.**
2	FMIT	The future land use, and therefore the focus of any soil sampling, should be Tribal land use, not residential.	**The Tribe believes that the cleanup of the site should be based on future Tribal land uses.**
30	FMIT	Procedure needed for handling displaced site soils-cite new procedure	**The Tribe requires that the Procedure to address displaced site soils must be referenced as an authoritative procedure in any work plan where site soil may be disturbed.**
36	FMIT	Inclusion of Tribal Monitors in any decisions regarding plant removal	**The Tribe requires that Tribal Monitors be present during any activity that would disturb soil, vegetation or might uncover artifacts or any site surveys designed to identify such activities.**
43	FMIT	Concern over plant-disturbed areas (e.g., mouth of Bat Cave Wash)	**The Tribe requires that any person entering the area for the purpose of the cleanup project be appropriately trained in relation to minimizing site disturbances while performing their responsibilities.**
46	FMIT	Strategies to limit sampling and site disturbance.	**The Tribe does not agree with the manner in which the DQOs are driving the extent of soil sampling. The level of needed resolution of DQO questions is not specified and much of the proposed sampling and the associated disturbance will be determined to be unnecessary in the Corrective Measures Study for soils.**
62	FMIT	Needed level of detail for the CMS	**The Tribe does not agree with the manner in which the DQOs are driving the extent of soil sampling. The level of needed resolution of DQO questions is not specified and**

			much of the proposed sampling and the associated disturbance will be determined to be unnecessary in the Corrective Measures Study for soils.
67	FMIT	Citing the Groundwater CEQA in the Soil Work Plan	**The Tribe believes that the disturbances to site soil from the sampling activities described in this Work Plan have not been comprehensively evaluated in terms of how they will be minimized and corrected. A complete evaluation, which includes Tribal participation, must be completed prior to the approval and implementation of any additional soil sampling.**
72	FMIT	Tribal participation in archaeological surveys	**The Tribe requires that Tribal Monitors be present during any activity that would disturb soil, vegetation or might uncover artifacts or any site surveys designed to identify such activities.**
80	FMIT	Appropriate future Tribal land use-based criteria should be used.	**The Tribe believes that the cleanup of the site should be based on future Tribal land uses.**
91	FMIT	Needed level of detail for the CMS	**The does not agree with the manner in which the DQOs are driving the extent of soil sampling. The level of needed resolution of DQO questions is not specified and much of the proposed sampling and the associated disturbance will be determined to be unnecessary in the Corrective Measures Study for soils.**
101	FMIT	Handling of displaced soils	**The Tribe requires that the Procedure to address displaced site soils must be referenced as an authoritative procedure in any work plan where site soil may be disturbed.**
239	FMIT	Decrease document complexity by including perimeter samples in Part A Work Plan	**The Tribe disagrees with the report organization and format that results in a non-integrated presentation of the proposed soil sampling.**
283	FMIT	Reduce the number of storm water drainage samples by focusing on outfalls first and then, as needed, drainage	**The Tribe does not agree with the manner in which the DQOs are driving the extent of soil sampling. The level of needed resolution of**

		lines	**DQO questions is not specified and much of the proposed sampling and the associated disturbance will be determined to be un-necessary in the Corrective Measures Study for soils.**
301	FMIT	Develop a SOP for interaction of Tribal Monitors and field staff.	**The Tribe requires that Tribal Monitors be present during any activity that would disturb soil, vegetation or might uncover artifacts or any site surveys designed to identify such activities.**

Department of Toxic Substances Control

Matthew Rodriquez
Secretary for
Environmental Protection

Deborah O. Raphael, Director
5796 Corporate Avenue
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Edmund G. Brown Jr.
Governor

Sent Via Electronic Mail

January 7, 2013

Ms. Nora McDowell-Antone
Project Manager
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Dr. Michael Sullivan, PhD, CIH
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Northridge, California 91330

RESPONSE TO NOVEMBER 30, 2012 FMIT LETTER REGARDING SOIL WORK PLAN RTC, PACIFIC GAS AND ELECTRIC COMPANY (PG&E), TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA

Dear Ms. McDowell-Antone and Dr. Sullivan:

The Department of Toxic Substances Control (DTSC) and the Department of the Interior is in receipt of your letter dated November 30, 2012, pertaining to the Fort Mojave Indian Tribe's (FMIT) concerns over the Response to Comments (RTCs) for the draft *"Soil RCRA Facility Investigation/Remedial Investigation Work Plan, PG&E Topock Compressor Station, Needles, California"* (Work Plan). Your letter was transmitted to DTSC and DOI by your consultant, Dr. Michael Sullivan, via electronic mail on November 30, 2012.

According to your letter, the FMIT believes that some of the FMIT's comments on the draft soil Work Plan have not yet been adequately addressed, and the intent of the letter is to document your position, and also provides language for insertion in the RTCs for the soil Work Plan explaining the FMIT's issues.

Comments identified in your November 30, 2012 letter are similar to the comments the FMIT previously provided in a July 23, 2012 letter. At that time, our understanding was that the comments presented in your July 23, 2012 letter would be used to indicate the FMIT's position on those specific items and the letter would be attached to the RTC's for the soil Work Plan. These items are documented in DTSC's letter dated October 29, 2012, which also states that DTSC already instructed PG&E to revise the RTCs to document the FMIT's position and to include your July 23, 2012 letter in the RTC's. Furthermore, all of the comments have also been previously responded to by DOI, DTSC and PG&E in the RTCs table and formal written correspondence from the agencies dated August 31, 2012. The response to comment format, land use, handling of displace soils and reducing site disturbances have all been covered in previous discussions in various Technical Working Group meetings and separate meetings between the FMIT and the regulatory agencies. We understand, however, that the FMIT may not agree with the resolution to some of these issues, and would like to further document your position on these matters.

As agreed upon during the October 16, 2012 meeting (summarized in DTSC's letter dated October 29, 2012) between the regulatory agencies and the Tribal Nations, the FMIT's position on specific comments identified in your letter are documented in the soil Work Plan RTCs table and your letters dated July 23, 2012 and November 30, 2012, along with the respective response letters from the regulatory agencies, have been included as attachments to the RTCs for the soil Work Plan.

If you have any questions, please contact me at (714) 484-5439. If you have questions for DOI, please contact Ms. Pamela Innis at (303) 445-2502.

Sincerely,

Aaron Yue
DTSC Project Manager

Pamela S. Innis

Pamela S. Innis
DOI Topock Remedial Project Manager

cc: PG&E Technical Working Group

Comment No.	Location in September 2012 Soil RFI/RI Work Plan	Reference Text	DTSC Comment	PG&E Response
1.	Main Text, Page 1-2		Add AOC 26 to the list.	Area of concern (AOC) 26 has been added to the list.
2.	Main Text, Page 1-2	“The Volume 3 RFI/RI Report will document the new units (SWMU 11, AOCs 21 through 33, and any other units that may be identified as a result of this soil investigation)”	Add also in RFI Volume 1 Addendum.	An addendum to the Topock RFI/RI Volume 1 Report will be prepared and submitted along with the Topock RFI/RI Volume 3 Report. The addendum will include a listing of the new investigation units added since the approval of the Topock RFI/RI Volume 1 Report, and a description of the historical use/operation for each new unit.
3.	Main Text, Page 1-4	“… MW-20 Bench, and AOC 31 – Teapot Dome Oil Pit. There are no or only very limited data for these units.”	Clarify what data has been collected for MW-20 Bench.	PG&E will prepare a write-up for MW-20 Bench similar to those presented in the Soil RFI/RI Work Plan for individual investigation units. The write-up will include unit location, historical use/operations, and data collected for MW-20 Bench. The write-up will be submitted to DTSC by the end of January 2013.
4.	Main Text, Page 1-5	“Sampling at AOC 29 – Interim Measure No. 3 Treatment Plant and AOC 30 – MW-20 Bench is not proposed in this appendix. Investigation of these AOCs will be conducted as part of the decommissioning and removal activities for these areas, as proposed in the forthcoming Interim Measures No. 3 Decommissioning, Removal, and Restoration Work Plan, and as part of the baseline sampling during the Topock groundwater remedy system installation, as proposed in the forthcoming Groundwater Remedy Implementation – Baseline Sampling and Analysis Plan. A portion of AOC 30 MW-20 Bench will be used to support the groundwater remedy, so this AOC will not be fully investigated until groundwater remedy decommissioning sampling is conducted.”	Concern exists that since MW-20 Bench is planned by PG&E to be utilized long term, there may be need to fully characterize the area to manage soil and protect workers and environment. DTSC would like to discuss the need to assess site conditions prior to utilizing the area for the groundwater remedy. Please include the AOC 30 background information, data gap evaluation, and any associated sampling as part of the Interim Measure closure plan. DTSC recommends investigating the entire AOC as part of this plan.	Soil sampling is proposed within the MW-20 Bench area as part of the forthcoming Groundwater Remedy Implementation – Baseline Sampling and Analysis Plan. The groundwater remedy team and soil team will continue to coordinate as the remedy design progresses, and will continue to share information with the agencies about which existing facilities will be reused for the groundwater remedy. Baseline soil sampling will occur on the MW-20 Bench prior to or during the installation of groundwater remedy pipelines, buildings, and other support structures. Soil sampling is proposed every 200 linear feet along proposed pipeline alignments and on a 25-foot grid within proposed building/support structure footprints. In addition, soil samples are proposed to be collected on a 50-foot grid within the MW-20 Bench area as part of the forthcoming Interim Measures No. 3 Decommissioning Work Plan. The

Comment No.	Location in September 2012 Soil RFI/RI Work Plan	Reference Text	DTSC Comment	PG&E Response
			Clarify which area of the AOC will not be investigated until the groundwater remedy is completed. What is the rationale for not investigating the entire AOC prior to groundwater remedy decommissioning.	Decommissioning Work Plan will contain AOC 30 background information, and an assessment of data gaps. DTSC will have an opportunity to review and comment on the baseline sampling and analysis plan and decommissioning work plan. Soil sampling will not be conducted beneath existing IM-3 facilities that will be reused for the groundwater remedy. These areas will be investigated after completion of the groundwater remedy.
5.	Main Text, Page 1-6	"AOC 24 – Stained Area Associated and Former API Oil/Water Separator"	Delete "Associated"	"Associated" has been deleted from the name of AOC 24
6.	Main Text, Page 1-9	"In addition, to satisfy Part A and Part B DQO Decision 1, data are needed to characterize potential discharges from storm drains to soil….. The primary transport pathway associated with the storm drain system would be discharge of contaminants into the storm drains, followed by runoff from the storm drains to areas outside the fence line…."	Decision 3 –Threat to groundwater from residual soil concentrations must also be stated as a potential concern. Text should be modified that leaks along any length of the storm drain are a potential concern. If storm drains leaked underground, then contaminants could reside there and would be leached faster to groundwater than at other areas on the facility due to periodic flushing events with rainwater or facility generated fluids.	The following text has been added after the reference sentence on page 1-9 of the main text and in Appendix D, Section 1.3, page D-1-2: "It is possible that constituents were released to soil within the fence line at poor joints or breaks in the storm drain lines. These constituents in soil could be leached to groundwater more quickly than at other areas of the facility to due to periodic flushing events with rain or facility generated fluids. "
7.	Main Text, Page 1-9	1.2 Objectives	For clarity, the objectives section should state that additional data gap analysis will take place and that another phase of sampling is possible.	Section 1.2 will read as follows – with the addition of the last sentence: "Data collected from implementation of this work plan will be combined with the existing data set to use as inputs to DQO decisions and conduct a data gaps analysis, or confirm unit closure. Additional sampling may be necessary if data gaps are identified."
8.	Main Text, Page 1-11	Appendix J, Displaced Soil and Hazardous Waste Management Procedures	Update: Include most recent draft in the final document – hopefully the final.	The most recent draft of the Displaced Soil Technical Memorandum has been included in Appendix J of the work plan.

Comment No.	Location in September 2012 Soil RFI/RI Work Plan	Reference Text	DTSC Comment	PG&E Response
9.	Main Text, Page 2-2	"An asbestos survey will be performed by State of California-certified asbestos professional in the AOC 27 – MW-24 Bench area. The survey will include a visual inspection of surface materials and debris and collection of material and debris samples to determine asbestos content and friability."	As asbestos is the principal contaminant of concern at UA-1, it is requested that the health and safety plan for the geophysical survey address screening for asbestos material and debris at this area. Potential asbestos waste has been noted at the surface of UA-1.	The health and safety plan will include screening for asbestos material and debris in UA-1 prior to the geophysical survey. The screening may include sampling of asbestos material or debris found at the surface.
10.	Main Text, Page 2-3/Figure 2-1	2.1.3 Site Access and Demarcation	The routes on Figure 2-1 are not complete, and therefore, Figure 2-1 should be revised.	Figure 2-1 has been revised to show the route to access the mouth of Bat Cave Wash.
11.	Main Text, Page 2-3/Figure 2-2	2.1.4 Staging Areas	As previously reported to PG&E, an incorrect Figure 2-2 was included in the September 2012 Work Plan. PG&E has prepared a revised figure that now corresponds with text in section 2.1.4. This revised figure needs to be included in the revised Work Plan.	The revised Figure 2-2 has been included in the work plan.
12.	Main Text, Page 2-11	"In addition, a visual inspection will be conducted between boring locations to determine whether decontamination is necessary. Decontamination will be accomplished by steam cleaning or pressure-washing the core barrel, drill stem, drive casing, and back of the drilling rig. "	Decontamination of drill stem, etc. is mandatory between borings. Please revise or clarify.	The text has been revised as follows: "In addition, downhole drilling tools, excavator and backhoe buckets, core barrel, drill stem, and drive casings will be decontaminated between boring locations. Decontamination will be accomplished by steam cleaning or pressure-washing the equipment, and back of the drilling rig."
13.	Main Text, Page 3-1	"The QAPP, Revision 1 (CH2M HILL, 2008) is currently being revised and will be finalized prior to implementation of this work plan. The revised QAPP will be used."	Include new QAPP. Revise text.	The revised PG&E Program Quality Assurance Project Plan (QAPP) has been included in the work plan. The text has been revised as follows: "The QAPP, Revision 2 is included in Appendix H."
14.	Main Text, Page 5-3	Project activities will not occur within the Topock Marsh or Colorado River, where these species reside…. …Therefore, no impacts to sensitive habitats will occur as a result of the soil investigation activities.	Revise as project activities will occur on the river (porewater and sediment sampling near East Ravine).	The referenced text has been replaced with the following: "Project activities will occur along the western shore of the Colorado River in the vicinity of the East Ravine, within potential habitat for sensitive species. Work activities will result in pruning riparian vegetation for access to sampling sites, and temporary disturbance of the shoreline for collection of sediment and pore-water samples. Work activities will be similar to the 2005 pore-water study that was issued a no effect determination by the USFWS."

Comment No.	Location in September 2012 Soil RFI/RI Work Plan	Reference Text	DTSC Comment	PG&E Response
15.	Main Text, Page 5-5	**Razorback sucker**: This action will have no effect upon this species. The project will not occur within the Colorado River or affect the bed and bank of the river; therefore, any potential direct and indirect effects to this species will be avoided. This determination is within the context of the PBA. **Bonytail chub**: This action will have no effect upon this species. The project will not occur within the Colorado River or affect the bed and bank of the river; therefore, any potential direct and indirect effects to this species will be avoided. This determination is within the context of the PBA.	See above.	The referenced text has been replaced by the following: "Razorback sucker: This action will have no effect upon this species. Although work will occur along the shoreline of the Colorado River, samples will not be collected from gravel or cobble areas and resuspension of bottom sediments will be minimized. Conservation Measures in the PBA, including seasonal restrictions of work between February 1 and May 31 will be implemented; therefore, any potential direct and indirect effects to these species will be avoided. This determination is within the context of the PBA. Bonytail chub: This action will have no effect upon this species. Although work will occur along the shoreline of the Colorado River, samples will not be collected from gravel or cobble areas and resuspension of bottom sediments will be minimized. Conservation Measures in the PBA, including seasonal restrictions of work between February 1 and May 31 will be implemented; therefore, any potential direct and indirect effects to these species will be avoided. This determination is within the context of the PBA."
16.	Figure 1-4	All Proposed Sampling Locations	This figure was omitted from the plan and will need to be included in the final. The TRC would each like a hard copy of this figure.	Figure 1-4 has been added to the work plan, and the TRC will be provided with hard copies as requested. The following text was added to Main Text, Page 1-10: "All proposed sampling locations are shown in Figure 1-4."
17.	Appendix A, Main Text, Page 1-3	"MW-20 Bench will be used for the groundwater remedy, so this AOC will not be fully investigated until the groundwater remedy decommissioning sampling is conducted."	Not clear why the AOC should not be fully investigated. Should we characterize now to ensure unacceptable risk does not occur in the area where construction will occur and people will be frequenting? Suggest summarizing existing data to assess current conditions. See related comment above.	Please see responses to Comments 3 and 4.
18.	Appendix A, Main Text, Page 1-11	Appendix J, Displaced Soil and Hazardous Waste Management Procedures	Update: Include most recent draft in the final document – hopefully the final.	Please see response to Comment 8.

Comment No.	Location in September 2012 Soil RFI/RI Work Plan	Reference Text	DTSC Comment	PG&E Response
19.	Appendix A, Main Text, Page 5-2	"The preliminary conclusions regarding the threat to groundwater are based on available data and will be revisited in the Volume 3 RFI/RI Report."	Clarifying text needed. Want PG&E to assess groundwater threats and inform agency prior to receiving a Volume 3 Report. What if data gaps still exist? Please incorporate this concept as text in the Workplan.	The reference text has been replaced by the following: The preliminary conclusions regarding the threat to groundwater are based on available data and will be revisited after the implementation of the soil investigation. The combined data set will then be evaluated for data gaps, and further conclusions regarding the threat to groundwater will be provided to the agencies and stakeholders for review prior to submittal of the RFI/RI Volume 3.
20.	Appendix A, Subappendix C, Page C-11	"Lead and PAHs are found primarily in the surface and shallow soil samples, and exceedances in soil are not consistent with the conceptual site models developed for these sites (that is, these exceedances are not found in areas where other elevated COPCs/COPECs are found or in areas with known or suspected contamination)."	Section C.3 should be modified to note that PAHs and lead might be expected from facility operations. PAH generation may be associated with the large compressor engines that have operated since 1951. PG&E also periodically blasts/purges pipeline contents high into the air during maintenance. Conceptually, these activities would disperse contents to surface soils in the vicinity of the station. Lead may also have been used at the site to paint pipelines and other structures and, therefore, could be dispersed throughout the area. DTSC is concerned that the subsection does not acknowledge or stress enough that PAHs and Pb might be related to compressor station activities. Certainly some scenarios exist where these COCs could be sourced from the station (e.g., PAHs in burn waste). It must be acknowledged that these COCs might or might not be related to the station, but that this assessment will be conducted after characterizing the site, especially areas within or adjacent to the station.	Natural gas compressor engine exhaust and pipeline purges are not expected to be a significant source of PAHs. Lead-based paint was likely used on facility structures and pipelines. Therefore, it is possible that the compressor station may be a contributing source of lead in shallow soils of low lying areas that have received runoff from the station. Text in the final paragraph of Section C.3 has been modified as follows: Although lead and PAH detection distribution in soil are generally not consistent with the conceptual site models developed for the site and may or may not be the result of activities related to the compressor station, soil samples collected during the Part A Phase 2 soil investigation will be analyzed for lead and PAHs in AOC 9, AOC 10, and AOC 11, and for PAHs in AOC 4 and AOC 14, since data gaps have been identified in these AOCs (Subappendices C3 through C5, C7, and C10).

Comment No.	Location in September 2012 Soil RFI/RI Work Plan	Reference Text	DTSC Comment	PG&E Response
21.	Appendix A, Subappendix C, Page C-11	"Topock background samples were collected from areas away from the compressor station, Interstate 40, former Route 66, and the Burlington Northern Santa Fe railroad tracks—all of which are potential sources of PAHs."	Modify text to indicate that some background soil samples were collected adjacent to the old highway. Additional modification is needed to indicate that some of the background samples are located in the vicinity of the railroad and freeway.	The following text has been added to this section: Two background samples (BKG-13 and BKG-17) are located in the vicinity (20 to 30 feet away) of old Route 66. Both are located 5 to 10 feet higher than the former road surface, so would not encounter runoff from the previous road surface. The closest any of the background samples come to the railroad is 500 feet away) and I-40 freeway is 750 feet away, with most samples much further away.
22.	Appendix A, Subappendix C, Page C-12	"….is needed to resolve Decision 3. Additional evaluations will be performed as appropriate as data are collected to resolve Decision 1. The preliminary conclusions regarding the potential threat to groundwater are based on available data and will be revisited in the Volume 3 RFI/RI Report."	Same issue as above - Clarifying text requested. Want PG&E to assess groundwater threats and inform agency prior to receiving a Volume 3 Report. What if data gaps still exist? This issue is repeated throughout the work plan.	Please see response to Comment 19. The reference text has been replaced in this text and the following sections: - Appendix A, Subappendix C1, Page C1-14 - Appendix A, Subappendix C2, Page C2-16 - Appendix A, Subappendix C3, Page C3-12 - Appendix A, Subappendix C4, Page C4-15 - Appendix A, Subappendix C5, Page C5-13 - Appendix A, Subappendix C6, Page C6-7 - Appendix A, Subappendix C7, Page C7-15 - Appendix A, Subappendix C9, Page C9-8
23.	Subappendix C1, Page C1-14	"Based on the initial screening model, the potential for hexavalent chromium and molybdenum to leach to groundwater was ruled out. Consequently, based on existing data, it appears that none of the metals detected in soil in subarea SWMU 1/AOC 1 South presents a potential threat to current or future groundwater, and no further sampling is required to address Decision 3 for SWMU 1 / AOC 1 South."	As deep borings are being added in this area to address a vertical delineation data gap, it is suggested that text be added to explain this including the rationale for the deep borings Please incorporate this concept as text in the Workplan..	The following text has been added to the comment reference text: Data that is being collected to satisfy Decision 1 – Nature and Extent evaluation will be used to provide the final representative data set that will be used to assess the potential threat to groundwater.
24.	Subappendix C1, Page C1-16	**"Decision 3 (Potential Threat to Groundwater from Residual Soil Concentrations).** Data Gap #3 – Vertical extent of contamination to support refinement of the vadose leaching zone model"	This summary conclusion does not seem to agree with the Decision 3 text.	Please see response to Comment 23.

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25.	Table C1-14	Deep borings SWMU1-18 to 21	These deep borings should be evaluated in the context of the groundwater remedy to determine if any should be completed as monitoring wells for the remedy.	The groundwater remedy team and soil team will continue to coordinate as the remedy design/monitoring plan progresses. The teams will evaluate the potential for co-locating deep borings in SWMU1 and remedy monitoring wells.
26.	Subappendix C5, Page C5-1	“A historical engineering drawing shows that some cooling water blowdown may initially have been discharged AOC 11 via the storm drain system (PG&E, 1957).”	Clarify and illustrate which storm drains would have been used. Please evaluate all historic and recently discovered engineering drawings (if this evaluation has not already been performed), to ensure that all historic storm drains are accounted for in the Workplan. In addition, storm drains that are suspected of historically conveying potentially hazardous substances should be identified.	Engineer drawing 481785[CHANGE22], included in Appendix K of the work plan shows the blowdown line in Cooling Tower B. Existing and historical storm drains are shown on Figure D-1. Additional lines discovered during the engineering drawings review have been added to Figure D-1, and other applicable figures. In addition, the text has been changed as follows: - Subappendix C5, Page C5-1: “A historical engineering drawing shows that some cooling water blowdown may have initially been discharged to AOC 11 via Storm Drain 9 (PG&E, 1957).” - Subappendix B7, Page B7-3: “Engineering drawings also indicate that some of the blowdown from AOC 5 may have initially been discharged to the western edge of the station via Storm Drain 11 (PG&E, 1957). “ - Subappendix B8, Page B-3: “Engineering drawings also indicate that some of the blowdown from AOC 6 may have initially been discharged to Bat Cave Wash (west of AOC 6) and the eastern edge of the station (AOC 11) via Storm Drain 9…”
27.	Subappendix C10, Page C10-13 &14 (AOC 4)	**4.0 Decision 3 – Potential Threat to Groundwater from Residual Soil Concentrations** “The screening level model was able to rule out the threat to groundwater from hexavalent chromium and cobalt. The potential for vanadium to leach to groundwater could not be ruled out based on the screening level model.”	It is suggested that the section be modified to incorporate new TCS groundwater well data including contamination, geologic, and hydrogeologic conditions - e.g., Site 4, Site J, etc. As there is groundwater contamination in the vicinity of AOC 4, additional discussion is warranted.	Two monitoring wells (Site 4 and Site J) have been installed near AOC 4 as part of the East Ravine Investigation. These monitoring wells are closer to AOC 4 than MW-10 and MW-11. Eight vanadium groundwater results are available for Site 4, and two vanadium groundwater results are available for Site J. The maximum detected concentration of vanadium at Site 4 is 5.2 micrograms per liter (µg/L) and at Site J is 5.3 µg/L. These maximum

Comment No.	Location in September 2012 Soil RFI/RI Work Plan	Reference Text	DTSC Comment	PG&E Response
		"Monitoring wells MW-10 and MW-11 have one sample each (out of 22 and 13 total samples, respectively) that had vanadium detections above the UTL, which is within the statistical limits of the UTL."		concentrations of vanadium are well below the background upper tolerance limit of 59.9 µg/L. The results from the closer monitoring wells do not change the conclusions that were made in this section. The groundwater data along with a detailed discussion of the contamination, geologic, and hydrogeologic conditions will be presented in the forthcoming East Ravine Investigation Report (submitted on November 15, 2012).
28.	Subappendix C11, Page C11-1 (AOC 27)	In January 2008, during trenching activities in AOC 27 associated with installation of a control panel related to the upland in situ pilot test, debris consisting mostly of treated wood, concrete, and scrap steel/tin (including a possible fragment of a storage tank) were encountered at a depth of approximately 3 feet below ground surface (bgs).	Reinsert "(including a possible fragment of a storage tank)" back into the section.	The requested text has been reinserted.
29.	Subappendix C12, Page C12-1 (AOC 28)	**1.1 Background**	State the age of each drip leg in the document.	The following text has been added: The 300A pipeline drip legs AOC 28a and AOC 28b, were installed in the early 1950s. The drip leg associated with AOC 28c: 300B Pipeline Drip East of Compressor Station was installed the mid-1950s, and the drip leg associated with AOC 28d: 300B Drip in Bat Cave Wash was installed in the late 1990s.
30.	Subappendix C12, Page C12-1 (AOC 28)	"No PCBs have been detected coming into the compressor station through those…"	Please include the range of detection limits achieved.	Detection limits for the available PCB data ranged from 0.005 to 5 milligrams per kilograms. This information has been added to the text.
31.	Appendix B, Page 1-4	"Data from these opportunistic soil sampling events will be reported at least once a year or provided upon agency request."	Modify as indicated.	The text has been modified as suggested.

Comment No.	Location in September 2012 Soil RFI/RI Work Plan	Reference Text	DTSC Comment	PG&E Response
32.	Appendix B, Page 1-4	"To minimize the number of samples and disturbances to sensitive resources, the Part B supplemental soil investigation program may be conducted in two phases, if needed. Proposed sampling for Phase 1 is described in this work plan. The proposed sampling is designed to collect sufficient information to address Decisions 1 through 5 as defined in the Part B Data Quality Objectives Tech Memo (CH2M HILL 2010a). Following completion of Phase 1 sampling, the newly collected and existing data will be combined and evaluated to determine the need for any further (Phase 2) sampling. Phase 2 sampling will only be necessary where data gaps are identified after evaluation of the combined soil data set (existing data and supplemental Phase 1 data)."	The cited text was deleted from the latest plan. It seems appropriate. Was it reinserted elsewhere?	The text was deleted from the September 2012 Soil RFI/RI Work Plan because the phased sampling approach was modified from the approach cited in the original text during the RTC process. The phased-sampling approach is now described in Section 4 of Appendix B.
33.	Appendix B, Page 2-2	"For constituents where the detected concentrations exceed the SSLs, vadose zone modeling may be conducted to further evaluate the potential threat to groundwater."	The section was modified to "may" from "will" in the previous version. Why the change?	The modification was made to allow for flexibility in the decision on whether or not to conduct vadose zone modeling. Type of compound, factors of exceedence, and the location of the unit need to be factored into the decision to further evaluate the potential threat to groundwater.
34.	Appendix B, Page 2-11 & 12	If samples concentrations are above SSLs, the data will be evaluated to assess whether the sample results indicated a potential current threat to groundwater. A potential current threat to groundwater exists if one or both of the following conditions are present: - Vertical concentration of COPC increase or remain elevated with depth. - Soil data indicate elevated concentrations of compounds (as compared to the BTVs) in samples throughout the boring *and* at the depth of the soil/groundwater interface. If there are insufficient data to complete this step, a data gap will be identified and assessed. Additionally, if the data show a potential concern for transport of COPCs in soil to groundwater, ~~the~~ existing groundwater monitoring well data in the vicinity (if available) will be reviewed to assess whether there is a potential link	Reinsert deleted text and incorporate suggested edits.	The deleted text and suggested edits were incorporated into the work plan.

Comment No.	Location in September 2012 Soil RFI/RI Work Plan	Reference Text	DTSC Comment	PG&E Response
		between the constituents found at the given unit/area and known groundwater contamination. If the evaluation does not indicate a potential current threat to groundwater, then the evaluation will continue with Step 3.		
35.	Appendix B, Page 2-20	**"Decision 1**: Additional sampling to more precisely delineate the nature and extent of COPCs/COPECs is proposed at 25 of the 27 SWMUs, AOCs, and units included in this work plan. No additional sampling is proposed at AOC 25 – Compressor and Generator Engines and Basements because of access restrictions. Sampling for AOC 33 is encompassed in the investigation for AOC 17."	Add text clarifying which two AOCs are not being sampled specifically (AOC 25 and 32), but that sampling associated with these two AOCs are included with AOC 13.	The text has been revised as follows: "No sampling is proposed at AOC 25 – Compressor and Generator Engines and Basements or AOC 32 - Oil Storage Tanks and Waste Sump because of access restrictions; however, soil and soil vapor samples will be collected near these AOCs as part of the AOC 13 sampling program."
36.	Appendix B, Page 3-2, Figure B-3	"Color code orange: Covered operational structure or area of thick concrete. No sampling is feasible at this time."	Figure B-3 should be modified to use the definition for code orange found in the text.	The definition for code orange on the figure was revised to match the text.
37.	Appendix B, Page 4-1	"As discussed in Section 3.0, the sampling program for the area within the fence line recognizes that some portions of the station cannot be sampled until the station is decommissioned or at some time in the future."	Modify as requested.	The text was revised as requested.
38.	Appendix B, Figure B3-3	Figure B3-3	SWMUS 5 to 9 have moved significantly from the previous draft work plan. The placement of the SWMUs (5 to 9) appear appropriate, but are still slightly misplotted. Review of old aerial photographs (especially photo "1967c" that used to be on a ftp site) indicate that the sludge bed was parallel to the old, long secondary containment structure still present in figure B3-3. Figure B3-3 should be revised as the sampling points for the "Units" as well as AOC-21 may be affected.	The footprints of SWMUs 5 and 9 were adjusted based on the 1967c aerial photograph, and the sample locations were adjusted as appropriate.
39.	Appendix B, Page B7-1	"A separate hot water basin for the closed loop lubricating-oil cooling system was located to the south of Cooling Tower A."	South or north? Can you locate this area on the figures for AOCs 5 and 6. Please clarify if the AOC5 and AOC 6 figures have been updated to identify these areas.	The hot water basin for the closed loop lubricating oil cooling system was located on the north side of Cooling Tower A. The work plan was corrected and AOC5 and AOC 6 figures have been updated..

Comment No.	Location in September 2012 Soil RFI/RI Work Plan	Reference Text	DTSC Comment	PG&E Response
40.	Appendix B, Page B8-2	"A separate hot-water basin for the closed-loop lubricating-oil cooling system was located to the south of Cooling Tower ~~A~~ B." "At Cooling Tower ~~A~~ B, these tanks were located at the at the southern end of the cooling tower until 2012"	See edits to left.	The first edit was incorporated into the work plan. The text pertaining to the portable chemical storage tanks at Cooling Tower B was corrected to read as follows: "At Cooling Tower B, these tanks were located east of the cooling tower until 2012 and are now located in newly constructed secondary containment on the south side of the AOC."
41.	Appendix B, Page B11-4	**3.0 AOC 13 Nature and Extent Data Gaps Evaluation**	The data gap section has been changed from the previous version of the work plan. The determination of lateral and vertical extent of contamination has changed from "has not" to "has been" determined for a number of constituents. As certain AOC 13 samples are targeting specific areas/sources, it is premature to make these conclusions. This is especially true as some AOC 13 data will also be used to assess offsite threats using noncommercial screening values. Revised language will need to be inserted into the document.	The data gap section has been revised to the previous version of the work plan.
42.	Appendix B, Page B15-5	"Samples will be collected at 12 locations: AOC 18-1 through AOC 18-12. Proposed samples for nearby AOCs will also be used to characterize soil for this unit, as shown on Figure B15-3. Because of limited access and extensive subsurface features, only hand tools can be used to collect samples in AOC 18; therefore, samples will be collected at the surface (0 to 0.5 or 1 foot bgs). If possible, deeper samples will be collected at 2 to 3 and 5 to 6 feet bgs in accordance with the phased sampling protocol. Where the area of sampling is covered with concrete or asphalt, the surface sampling interval will begin at the bottom of the concrete/asphalt or gravel subbase. In most cases, this first interval will be from 0.5 to 1 foot below the pavement."	The language in this section does not appear to have been updated as done in other sections to describe deeper sampling with the hydrovac. Please revise.	The text was revised as follows: "Samples will be collected at 12 locations: AOC 18-1 through AOC 18-12. For locations associated with former pipelines, samples are proposed to be collected at the surface (0 to 1 feet bgs) and from 2 to 3 feet bgs, in accordance with the phased sampling protocol. In addition, samples will be collected below the former pipe invert/maximum depth of soil removal if known, or 5 to 6 feet bgs to ensure that samples are collected beneath the invert of the former pipelines. For locations associated with existing pipelines, samples will initially be collected at the surface (0 to 1 bgs) and from below the pipeline invert. Proposed samples for nearby AOCs will also be used to characterize soil for this unit, as shown on Figure B15-3. Where

Comment No.	Location in September 2012 Soil RFI/RI Work Plan	Reference Text	DTSC Comment	PG&E Response
				the area of sampling is covered with concrete or asphalt, the surface sampling interval will begin at the bottom of the concrete/asphalt or gravel sub-base. In most cases, this first interval will be from 0.5 to 1 foot below the pavement."
43.	Appendix B18	AOC 21	Increase the depth of the lone boring at AOC-21 to 6 ft bgs if discolored/waste materials are not encountered to 3 feet bgs (include contingent to go deeper due to potential grading and backfilling in the area).	The depth of the AOC 21 boring has been extended to 6 feet below ground surface (bgs).
44.	Appendix B, Page B21-3	**3.3 AOC 24 Proposed Sampling**	Move boring location AOC24-2 to the stained zone plotted on figure B21-3 and have it go to ~10 feet bgs in an attempt to intercept impacted soils that may have since been buried.	Boring location AOC24-2 was moved as requested and will extend to 10 feet bgs.
45.	Appendix B, Page B22-5	"However, given that any potential releases to soil at this AOC are completely covered by building foundations~~, and there is no infiltration driving a vertical pathway,~~ potential migration of constituents from this AOC to areas outside the fence line is not considered a data gap."	Please delete the recently inserted language cited as documented steam cleaning and the oil itself could periodically act as driving head for vertical movement.	PG&E does not agree that steam cleaning and oils could act as drivers for contaminant migration through the foundation concrete in this area. The basements are equipped with two drains; therefore, liquids do not pool in the basements. However, as requested by DTSC, the language has been deleted as requested.
46.		Soil Vapor Sampling	Please ensure that the work plan calls out several rounds of soil vapor sampling. One round is called out at AOC 26	Two rounds (summer and winter) of soil vapor sampling will be conducted. This information has been added to the work plan.
47.	**Typos** Main Text, Page 1-1 Main Text, Page 5-1 Appendix A, Main Text, Page 1-1 Appendix A, Main Text, Page 1-3 Appendix A, Main Text, Page 3-2	**Typos** …provided, table format in and… Change to "provided in table format and…" Approval from the DTSC is subject to with a review pursuant to the California Environmental Quality Act. "initially" repeated AOCs outside the fence line (see,… Delete "see" Delete "because"		The typos have been corrected.

Comment No.	Location in September 2012 Soil RFI/RI Work Plan	Reference Text	DTSC Comment	PG&E Response
	Appendix A, Main Text, Page 3-4	Identifying newly detected compounds (note that these constituent~~s~~ chemicals have…		
	Appendix A, Subappendix C, Page C-1	PG&E will continue to collect~~ion of~~		
	Subappendix C4, Page C4-3	Change "run ff" to "run off"		
	Subappendix C10, Page C10-3	…material)~~,~~ and residuals…		
	Appendix B, Page 4-1	…soil sample locations currently proposed.		
	Appendix B, Page B7-2	Change "completed" to "completely"		

Appendix J
Displaced Soil and Hazardous Waste Management Procedures

Contents

Figure

Acronyms and Abbreviations

AOC	Area of Concern
APE	Area of Potential Effect
B(a)P	benzo(a)pyrene
CCR	California Code of Regulations
CFR	Code of Federal Regulations
cy	cubic yard
DDE	dichlorodiphenyldichloroethylene
DDT	dichlorodiphenyltrichloroethane
DOT	United States Department of Transportation
DTSC	California Environmental Protection Agency, Department of Toxic Substances Control
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PG&E	Pacific Gas and Electric Company
RCRA	Resource Conservation and Recovery Act
RFI	RCRA facility investigation
RI	remedial investigation
STLC	soluble threshold limit concentration
SVOC	semivolatile organic compound
SWMU	solid waste management unit
TPH	total petroleum hydrocarbons
UA	Undesignated Area
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound

1.0 Displaced Soil and Hazardous Waste Management Procedures

This appendix presents the displaced soil and hazardous waste management procedures for soil that is displaced during the soil Resource Conservation and Recovery Act (RCRA) facility investigation/remedial investigation (RFI/RI) at the Pacific Gas and Electric Company (PG&E) Topock Compressor Station in Needles, California.

1.1 Displaced Soil and Hazardous Waste Procedures Purpose and Objectives

The purpose and objectives of this appendix are as follows:

1. Ensure that displaced soil generated during drilling, hand sampling, and hydrovac/ potholing/trenching activities associated with the soil RFI/RI investigation is handled in a manner that is protective of human health and the environment within the framework of appropriate federal, state, and local requirements and consistent with United States Environmental Protection Agency (USEPA) guidance.
2. Maximize onsite reuse of soil that was displaced during drilling, hand sampling, and hydrovac/potholing/trenching activities associated with the soil RFI/RI investigation, following guidelines and protocols of the *Management Protocol for Handling and Disposition of Displaced Site Material, Topock Remediation Project, Needles, California* (PG&E, 2012), see Attachment 1.
3. Minimize offsite transportation and disposal of soil that was displaced drilling, hand sampling, and hydrovac/potholing/trenching activities associated with the soil RFI/RI investigation.
4. Collect data to help guide future decision-making regarding the disposition of displaced soil material.

1.2 Appendix Organization

This appendix is organized into the following sections:

- Section 1.1 contains purpose and objectives of the displaced soil and hazardous waste management procedures.
- Section 1.2 present appendix organization.
- Section 1.3 presents details the process for soil characterization; soil screening; and classification, handling, and storage of soil at the site.

- Section 1.4 describes storage methods, labeling requirements and inspection of soil storage areas.
- Section 1.5 summarizes the employee training required for hazardous waste soil management at the site.
- Section 1.6 describes hazardous waste profiling, transportation, and disposal of the various waste streams.
- Section 1.7 describes waste disposal for RCRA or non-RCRA hazardous waste.
- Section 1.8 summarizes the records and documents that should be maintained at the site.
- Section 1.9 presents a list of references used in the preparation of these procedures.

1.3 Soil and Waste Characterization

Soil that may be displaced during drilling, hand sampling, and hydrovac/potholing/trenching activities associated with the soil RFI/RI investigation will be characterized according to the processes described in this appendix.

1.3.1 Field Segregation

Field segregation is a key step in the process of management of displaced soil in any ground-disturbing activities. As soil is displaced, it will be segregated by soil originating from within the compressor station fence line and soil originating from outside the fence line. The soil will be further segregated based on visual observation into the following potential categories:

- Visually contaminated soil
- Visually uncontaminated soil

1.3.2 Soil and Waste Characterization Process

Soil generated during the soil RFI/RI investigation will be placed in 55-gallon United States Department of Transportation (DOT) drums or lined rolloff bins at the work site, if practicable, or onsite in a temporary storage area designated by PG&E until they have been characterized. Representative sample profile results and knowledge of the area history will be used to evaluate waste classification for displaced soil. In general, the number of representative soil samples to be collected for waste characterization will be as follows unless otherwise directed by the disposal facility:

Waste Stream Volume	Frequency
0 to 500 cy	Four-point composite per 250 cy
500 to 1,500 cy	Four-point composite per 500 cy
1,500+ cy	Four-point composite per 1,500 cy

Source:

Alisto et al., 2009.
cy = cubic yard

The waste characterization soil samples will be analyzed for the applicable soil RFI/RI investigation area analytical suite presented in Tables J-1 and J-2. Analytical results will be screened according to the procedure listed in Section 1.3.3 to classify the soil for handling, storage, and disposal purposes.

1.3.3 Screening and Classification of Soil

The following process for screening and classification of displaced soil is based on the *Management Protocol for Handling and Disposition of Displaced Site Material, Topock Remediation Project, Needles, California* (PG&E, 2012), see Attachment 1 .

Analytical results from the waste characterization soil samples will be used to determine whether displaced soil is suitable for retention onsite for eventual return, reuse, or replacement, or if the soil must be removed from the site for disposal in accordance with applicable state and federal laws and regulations. Analytes detected in the waste characterization soil samples above laboratory detection limits will be screened against the screening values presented in the *Management Protocol for Handling and Disposition of Displaced Site Material, Topock Remediation Project, Needles, California* (PG&E, 2012), see Attachment 1 These screening values include the following:

- **Interim Screening Levels**– The screening levels for metals are predominantly Topock-specific soil background values. However, if a background value is not available, then the lesser of the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC) residential California human health screening level or the ecological comparison value is used. If a California human health screening level is not available, then the lesser of the USEPA residential regional screening level or the ecological comparison value is used. These levels are the most conservative, and it is assumed that the project-specific soil cleanup goal will be equal to or greater than these levels.

- **Hazardous Waste Toxicity Characteristic Levels** – These values will be used to determine if the soil should be classified as a nonhazardous waste, a state (non-RCRA California) hazardous waste, or a federal (RCRA) hazardous waste. Specifically, total constituent concentrations expressed in milligrams per kilogram will be compared to the hazardous waste characteristic levels and will be evaluated as follows:

  - **Step 1 –** If the total constituent concentration exceeds the total threshold limit concentration, the soil represented by the sample will be classified as a non-RCRA hazardous waste. Additional evaluation of the soluble threshold limit concentration (STLC), as described in Step 3 below, will not be performed.

  - **Step 2 –** If the total constituent concentration exceeds the numeric value of the RCRA toxicity characteristic level by about 20 times or more, the toxicity characteristic leaching procedure will be performed. If the constituent concentration in the toxicity characteristic leaching procedure leachate exceeds the toxicity characteristic level, the soil represented by the sample will be classified as a RCRA hazardous waste. Additional evaluation of the STLC, as described in Step 3 below, will not be performed.

- **Step 3 –** If the sample has not been classified as hazardous waste in Steps 1 or 2, the total constituent concentration will be compared to the STLC. If the total constituent concentration exceeds the numeric value of the STLC by 10 times or more, the California Waste Extraction Test will be performed. If the constituent concentration in the California Waste Extraction Test exceeds the STLC, the soil represented by the sample will be classified as a non-RCRA hazardous waste.

- **Step 4 –** If the sample has not been classified as a hazardous waste in Steps 1, 2, or 3, the soil represented by the sample will be not be classified or managed as hazardous waste.

Subsequent to screening, the displaced soil will be classified into three categories and will be managed as follows:

- **RCRA and non-RCRA hazardous waste –** The waste will be removed from the site within 90 days of generation and disposed of offsite in accordance with applicable laws and regulations. It is imperative to coordinate with the waste hauler and disposal facility to ensure proper completion of the waste profile and to avoid unnecessary delays in acceptance of a waste to a specific facility, as discussed in Section 1.6.

- **Nonhazardous clean soil –** Soil that is not classified as a hazardous waste and is equal to or below the interim screening level is suitable for immediate return, reuse, or replacement onsite, as discussed in Section 1.3.4.

- **Nonhazardous soil for long-term storage –** Soil that is not classified as a hazardous waste and is greater than the interim screening level will be stored onsite until the project-specific cleanup goals are established. Until these goals are established, soil that falls into this intermediate category will be retained onsite for long-term storage, as discussed in Section 1.3.5.

1.3.4 Handling and Short-term Storage of Nonhazardous Clean Soil

Clean soil that was removed during potholes/trenches or excavations will be reused as backfill into the same pothole/trench or excavation area, if practicable. Clean soil that was removed from boreholes cannot be used to backfill the borehole. Clean soil that cannot be immediately used as backfill may be reused in other areas within the Area of Potential Effect (APE) or left in the drums or rolloff bins for future reuse within the APE. Storage area(s) for clean soil may include all staging areas shown on Figure J-1.

1.3.5 Long-term Storage of Nonhazardous Soil

Displaced soil that is nonhazardous but is unsuitable for final disposition onsite because contaminants are present above the interim screening level cannot be reused until project-specific soil cleanup goals are finalized and must be stored onsite. Once final project specific cleanup goals are established, the contamination will be re-assessed based on existing data or additional data, as determined necessary, to determine final disposition (that is, transportation to offsite disposal facility or reuse within the APE).

Two areas have been selected for long-term storage: (1) the Topock Compressor Station parcel for displaced soil that originated from inside the compressor station fence line, and (2) the New Evaporation Ponds area for displaced soil that originated from outside the compressor station fence line. The staging areas shown on Figure J-1 include the identified long-term storage areas.

1.4 Soil Storage

This section describes the storage procedures for soil displaced during the soil RFI/RI investigation activities at the site. Displaced soil will be segregated into the following waste streams:

- RCRA hazardous waste
- Non-RCRA hazardous waste
- Nonhazardous waste
  - Clean soil
  - Soil for long-term storage

1.4.1 Methods to Store Soil

Soil will be stored in 55-gallon drums/small containers or rolloff bins. Soil that is classified as hazardous waste and placed in containers must comply with Title 22 of the California Code of Regulations (CCR) Div. 4.5, Chapter 15, Article 9 (Container Management); Article 27, Article 28, and Article 28.5 (Air Emission Standards); and with 22 CCR Div. 4.5, Chapter 14, Article 9 (Container Management). Best management practices for each method of soil storage are described below; these best management practices must be followed to comply with mandatory regulatory requirements.

1.4.2 Drums/Small Containers

- Only DOT-specification containers will be used for soil accumulation.
- Drums will be inspected and inventoried upon arrival onsite for signs of contamination and/or deterioration.
- Drums and small containers will be transported to the temporary accumulation areas on wood pallets and will be secured together with nonmetallic banding.
- Drums will be placed within a bermed and lined area or otherwise will be provided with secondary containment.
- Adequate aisle space (for example, 36 inches) will be provided for containers such as 55-gallon drums to allow the unobstructed movement of personnel and equipment. Drums will be placed with no more than two drums per row. The column length must fit within the lined, bermed area.
- Each drum will be provided with its own label, and labels will be visible for inspection purposes.
- Drums will remain closed except when removing or adding soil to the drum. Closed means that the lid and securing ring must be on and securely tightened.

- Drums will be disposed of with the contents. If the contents are removed from the drums for offsite transportation and treatment or disposal, the drums will be reused only for compatible soil and waste streams.

1.4.3 Rolloff Bins

- Rolloff bins will be inspected upon arrival onsite. Any rolloff containers arriving with contents, residual contamination, or deterioration will be rejected. Existing damage (dings, significant paint scratches, broken wheels, etc.), if not significant enough to result in rejection, will be documented upon arrival of the bin using photos and written documentation.
- Rolloff bins will be provided with covers and disposable liners.
- Covers will be properly secured, except when adding or removing soil.
- Old labels will be removed, and each bin will be provided with its own label. Labels will be visible.
- Rolloff bins will be inspected by the transporter after removal of the liner and will be decontaminated in the event of evidence of liner failure.

1.4.4 Hazardous Waste Soil Storage Time Limit

In compliance with 22 CCR 66262.34, non-RCRA and RCRA hazardous wastes will be removed from the site within 90 days from date of generation. The date of generation is the day that a waste is first placed in a container (that is, drum or rolloff bin). Accumulation start date for containers is documented on the hazardous waste label. A log or other record shall be used to document the accumulation start date for stockpiles.

1.4.5 Labeling

This section describes the labeling of waste containers.

1.4.5.1 Hazardous Waste Soil

Labeling for hazardous waste soil and soil pending characterization that could potentially be classified as hazardous will be in accordance with 22 CCR, Division 4.5, Chapter 12 and 49 Code of Federal Regulations (CFR) 172, 173, and 178. Labels will include the type of waste, location from which the waste was generated, and accumulation start date. Drums or rolloff bins used to store/accumulate hazardous will be labeled with a preprinted "Hazardous Waste" label specific to California, with the following information:

- Accumulation start date
- Generator name
- USEPA ID number
- Waste codes
- Description of waste, including hazardous properties and physical state
- DOT shipping description

Prior to transport, the manifest number will be added to each label. Soil pending characterization that could potentially be classified as hazardous will be labeled with the hazardous waste label described above, except that the waste codes and DOT shipping description will not be entered until the analytical results are received. An "Analysis Pending" or "Waste Material" label, which is a temporary or handwritten label, will be placed next to the hazardous waste label until analytical results are received and reviewed. This label will include generator information, type and location of waste, and the accumulation start date. The waste codes and DOT shipping description must be entered on the Hazardous Waste label, and the Analysis Pending label must be removed, within 10 days of receipt of the analytical results.

The appropriate DOT hazard-class label will also be placed on the container prior to loading onto the transport vehicle.

1.4.5.2 Nonhazardous Soil

Drums or rolloff bins used to store/accumulate nonhazardous soil will be labeled as follows:

- Place a "Nonhazardous Clean Soil" label on drums or rolloff bins containing soil determined to be suitable for onsite reuse. This is a handwritten label with the following information:
  - Material origin – Specific location of the site
  - Material description (for example, soil, rock, etc.)
  - Date(s) of displacement or accumulation
  - Generating activity (for example, drilling, excavation, etc.)
- Place a "Nonhazardous Soil for Long-term Storage" label on drums or rolloff bins containing soil identified for long-term storage pending development of project-specific cleanup goals. This is a handwritten label with the following information:
  - Material origin – Specific location of the site
  - Material description (for example, soil, rock, etc.)
  - Date(s) of displacement or accumulation
  - Generating activity (for example, drilling, excavation, etc.)

1.4.6 Inspections

In compliance with 22 CCR 66264.15, soil accumulation or storage areas will be inspected at a minimum weekly for malfunctions, deterioration, discharges, and leaks that could result in a release.

- Drums or rolloff containers will be inspected for proper closure, leaks, signs of corrosion, or signs of general deterioration, proper labeling, and accumulation time.
- All areas will be inspected to ensure that good housekeeping practices are maintained.

Any deficiencies observed during inspection will be corrected, and corrective measures will be documented. Appropriate measures may include transfer of waste from leaking container to new container, replacement of liner or cover, or repair of containment berm. Copies of inspection reports and corrective measures will be maintained onsite and will be available for review.

1.4.7 Security/Emergency Response

In compliance with 22 CCR 66264.14, a barrier, such as temporary fencing, will be provided for soil accumulation areas that are otherwise accessible to the general public. Hazardous waste soil accumulation areas will also have signs that provide 24-hour emergency contacts and telephone numbers.

Soil accumulation areas will contain emergency response equipment appropriate to applicable waste hazards. The project-specific health and safety plans will identify the project emergency response procedures and equipment, including emergency response contacts and phone numbers.

In addition to the project-specific health and safety plans procedures, hazardous waste accumulation areas will be provided with fire extinguishers, decontamination equipment including an eye wash station, and an alarm system (if radio equipment is not available to all staff working in accumulation area).

1.5 Employee Training for Waste Soil Management

In compliance with 22 CCR 66264.16, field personnel that will manage hazardous or potentially hazardous waste soil will obtain:

- Waste management training, including Occupational Health and Safety Administration 1910.120 Hazardous Waste Operations and Emergency Response Annual 8-Hour Refresher
- On-the-job training (as applicable to the job description), including:
  - Project-specific health and safety plans review that requires each site worker and guests to review and sign the plan
  - Activity hazard analysis and daily “tailgate” meetings
  - Project-specific work plan review
  - DOT hazardous material training (49 CFR 172.704)

Training documentation will be maintained and will include the job title for each position involving hazardous waste soil management and the name of the person filling the job, written job description including skills and required qualifications, description of type and amount of continuing training given, and records that document training or job experience.

1.6 Hazardous Waste Profiling, Transportation, and Disposal

This section describes guidelines for waste profiling, transportation for offsite disposal, and disposal of displaced soil that is classified as a hazardous waste. The previously established practice at the site is that transportation within the plume boundary is considered to be onsite transportation. Consistent with this practice, transportation of soil within the project’s APE is considered to be onsite transportation for purposes of complying with hazardous waste requirements.

1.6.1 Hazardous Waste Profiling

As discussed in Section 1.3, displaced soil will be classified to determine whether it is hazardous using prior knowledge of the soil and sample analytical results. However, in some cases, offsite disposal facilities may require additional analyses to evaluate the soil waste stream prior to acceptance. The purpose of predisposal profiling of the hazardous waste soil identified for offsite disposal is to characterize it to determine the appropriate disposal method and location.

Ultimately, the profile of the waste must meet the acceptance criteria of the disposal facility and be in compliance with all pertinent federal, state, and local regulations. Characterization will be documented on a waste profile form provided by the offsite treatment or disposal facility as part of the waste acceptance process. An approved copy of the waste profile will be received prior to offsite transportation of the material.

1.6.2 Manifests/Shipping Documentation

In compliance with 22 CCR 66262.20 and 66262.22, each load of soil classified as hazardous waste will be manifested prior to leaving the site. The hazardous waste manifest (USEPA Form 8700-22) is the shipping document for tracking shipments of hazardous waste from the site to the final disposal facility.

Additionally, each shipment of waste soil will also have a haul ticket. If the signed hazardous waste manifest from the designated offsite facility is not received within 35 days, PG&E will contact the transporter or the designated facility to determine the status of the waste. All communications will be documented. If the signed hazardous waste manifest has not been received within 45 days, PG&E will prepare an exception report and submit it to the State of California, as required under 22 CCR 66262.42.

1.6.3 Department of Transportation Requirements

Requirements under 49 CFR 171-178 (DOT) and 22 CCR 66262.30 through 66262.33 will apply to all offsite shipments of soil that is classified as hazardous waste. The information contained in this section is provided as a general guide. Requirements specific to each hazardous waste will be determined in the field. It is the responsibility of a DOT-trained individual to ensure that the requirements of 49 CFR 171-178 are met.

1.6.3.1 Shipping Name

Each shipment will be properly classified using the Hazardous Materials Table in 49 CFR 172.101. All determinations will be made by DOT-trained personnel.

1.6.3.2 Packaging, Marking, and Labeling

The shipping name, hazard class, identification number, technical names (if applicable), USEPA markings and waste code numbers, and consignee/consignor designations will be marked on packages for shipment (49 CFR 172.301). Once a waste is characterized, reference will be made to the Hazardous Materials Table in 49 CFR 172.101 to determine the appropriate label.

1.6.3.3 Placards

Appropriate placards will be determined by DOT-trained personnel. Specific placard descriptions are found starting at 49 CFR 172.521. If a placard is required, it will be affixed on each side and each end of the vehicle. It is the shipper's responsibility to provide the proper placards for their shipment if the transporter does not have them.

1.6.4 California Transportation Requirements

California hazardous waste regulations (22 CCR Division 4.5, Chapter 13) require that anyone engaged in the transportation of hazardous waste within California must possess a valid hazardous waste hauler registration issued by DTSC.

1.6.5 Transporter Requirements

Each transportation vehicle and load of hazardous waste will be inspected before leaving the site and will be documented. A PG&E representative will verify that the driver has the appropriate class of driver's license with appropriate endorsements for the class of vehicle being driven before loading hazardous waste onto the vehicle. The quantities of hazardous waste leaving the site will be recorded on a transportation and disposal log. The transporter must be registered with DTSC as a hazardous waste hauler, have a USEPA Identification number, and must comply with transportation requirements outlined in 49 CFR 171-179 (DOT) and 22 CCR 66262.33.

The transporter will be responsible for ensuring that loaded trucks comply with all applicable weight limits. For each load of material, weight measurements will be obtained for each full and empty container and dump truck. Disposal quantities will be based on the difference of weight measurements between the full and empty container or dump truck. Weights will be recorded on the waste manifest and weight ticket by the disposal facility.

The transporter will observe the following practices when hauling and transporting hazardous waste offsite:

- Minimize impacts to general public traffic.
- Repair road damage caused by construction and/or hauling traffic.
- Trucks/trailers and rolloff bins used for hauling hazardous or regulated waste will be lined and covered with a tarp or ridged closure before transport to prevent spills or releases.
- Decontaminate exterior of vehicle as necessary prior to leaving the site.
- Wastes or materials from other projects may not be combined with wastes generated during this project.
- All personnel involved in offsite disposal activities will follow safety and spill response procedures outlined in project-specific health and safety plans.

1.6.6 Spill Reporting

In the event of a spill or release of hazardous waste, the transporter must immediately notify a PG&E representative**.** The following information about the spill will be reported and recorded:

- Type of material (for example, soil) and contaminant
- Location
- Estimated volume
- Media affected (for example, spilled on concrete pad or soil)
- Time of spill/release
- Final disposition of spilled material

The transporter will also report any spill or release of hazardous waste, as required by 49 CFR 171.15, to the National Response Center at 800/424-8802 or 202/426-2675. The transporter will also report, in writing, as required by 49 CFR 171.16, to the Director, Office of Hazardous Materials Regulations, Materials Transportation Bureau, Department of Transportation, Washington, D.C. 20590.

1.6.7 Spill Response

The transporter will clean up any spill or release of hazardous waste (including soil) that occurs during transportation or will take such action as may be required or approved by federal, state, or local officials. Spilled waste will be immediately cleaned up, including soils on the outside of the trucks, the truck and/or container, or road surface. Where appropriate, the spilled material will be returned to the original waste container. Regardless, the spilled material will be properly contained and disposed.

1.7 Waste Disposal

Soil classified as RCRA or non-RCRA hazardous waste will be disposed of at an appropriately permitted facility. In accordance with the requirements of the Model Consent Decree, prior to the first shipment of waste material offsite, PG&E will obtain written notice and approval for disposal of waste material at the listed facilities from appropriate state environmental official in each receiving facility's state and the United States Department of the Interior's project manager. PG&E will also obtain written notice and approval annually after the date of shipment of the first volume of waste material. The waste material will be stored onsite in accordance with this waste management plan until approval is received and the waste material is transported offsite.

1.8 Recordkeeping

Title 22 CCR 66262.40 requires that hazardous waste manifests, biennial reports, exception reports, and waste analysis and waste determination records be retained for 3 years. Further, 22 CCR 66262.41 requires large-quantity generators of RCRA hazardous waste to submit a biennial report to USEPA by March 1 of each even-numbered year that describes hazardous waste generated in the previous odd-numbered year. The following records and documents will be maintained:

- Transportation and offsite disposal records, including:
  - Profiles and associated characterization data.
  - Manifests, land disposal restriction notifications/certifications, bills of lading, and weight tickets.
  - Offsite facility waste receipts, certificates of disposal/destruction/recycle.
- Training records
- Inspection records
- Displaced Material Inventory, which will include:
  - Material origin – Specific location of the site.
  - Material description (for example, soil, rock, etc.).
  - Date(s) of displacement or accumulation.
  - Generating activity (for example, drilling, excavation, etc.).
  - Approximate volume of material stored.
  - Short-term storage mode and location – Type of storage (including container identification number, as applicable) and location of short-term storage pending soil characterization. In some cases, this information may need to be updated as containers are moved between areas of the site.
  - Characterization status – Characterization sample information (for example, date of submittal and laboratory used), date of receipt of results, and the contamination assessment based on comparison to screening criteria.
  - Long-term storage mode and location – Type of storage (including container identification number, as applicable) and location of long-term storage pending decision regarding final disposition. This information may need to be updated as containers are moved between areas of the site.
  - Final disposition information – Indication of the onsite or offsite final disposition action identified through discussion with the Tribe(s), agencies, and the affected land owner(s), as appropriate, based on review of material type and the contamination assessment.

1.9 References

Alisto, Arcadis, CH2M HILL, NES, and Turnkey. 2009. *Work Plan for Time-Critical Removal Action at AOC 4, Pacific Gas and Electric Company Topock Compressor Station, Needles, California.* December.

Pacific Gas and Electric Company. 2012. *Management Protocol for Handling and Disposition of Displaced Site Material, Topock Remediation Project, Needles, California*. October 3.

Attachment 1
Management Protocol for Handling and Disposition of Displaced Site Material, Topock Remediation Project, Needles, California

Management Protocol for Handling and Disposition of Displaced Site Material, Topock Remediation Project, Needles, California

PREPARED FOR: Topock Remediation Project Files

PREPARED BY: Pacific Gas and Electric Company

DATE: October 3, 2012

This document presents the general approach and management protocol required for the handling and disposition of soil and/or rock (referred to as "material" throughout the document) that is displaced as a result of past (as practical), present, and future activities associated with the Pacific Gas and Electric Company (PG&E) Topock Remediation Project, Needles, California. Specifically, this includes material removed from the Earth (i.e., displaced) as a result of drilling, excavation, sampling, testing, construction, grading, and other remedial activities. The management of material that may be disturbed as a result of remedial activities but not displaced from its natural location, such as soil disturbed by foot or vehicle traffic along a pathway, is not within the scope of this protocol. This protocol is applicable to the handling and disposition of displaced materials only. Further, materials that were not part of the natural site condition (e.g., building materials, equipment, waste, debris, or imported fill[1]) are not included in this protocol.

1.0 Introduction

PG&E carefully plans Topock Remediation Project activities to minimize both the disturbance and displacement of site material. The land and soils are to be handled and managed with care and respect. Therefore, the protocol established in this plan is intended to minimize the amount of displaced material that leaves the site and instead, provide for eventual return, reuse, or restoration of the material onto the lands from which it was displaced. Through the application of this protocol and its incorporation into future work plans involving material displacement, it is anticipated that the goal of careful and respectful handling of soil material will be fulfilled.

In addition to addressing Tribal requests, this protocol was developed to comply with Mitigation Measure CUL-1a-8 as set forth in the certified Environmental Impact Report (EIR) and Mitigation Monitoring and Reporting Plan (MMRP) adopted by the California Department of Toxic Substances Control (DTSC). This measure requires PG&E to develop a Cultural Impact Mitigation Program (CIMP) as part of the final design of the approved groundwater remedy, and specifically subparagraph (g) requires the CIMP to include protocols for handling soil cuttings[2]. DTSC adopted this measure following its determination that the project area is a significant historical resource for California Environmental Quality Act (CEQA) purposes (Final EIR, p. 4.4-57). Similarly, as part of the consultation process for the Programmatic Agreement (PA) under Section 106 of the National Historic Preservation Act (NHPA), the U.S. Bureau of Land Management (BLM) determined that a traditional cultural property (TCP) eligible for inclusion on the National Register of Historic Places exists within the Area of Potential Effect (APE). Throughout this document, the term "site" refers to the area within the APE.

[1] For the purpose of this protocol, imported fill is defined as unconsolidated mixtures of sand, silt, and gravel (engineered gradations, or otherwise) that were not originally derived from inside the defined project boundary. Specific examples of imported fill material may include road base material, shading material used in pipeline trenches, or crushed rock used for railroad ballast.

[2] Mitigation Measure CUL-1a-8(g) states the following: Protocols for the repatriation of clean soil cuttings generated during construction activities and during drilling associated with repair/replacement activities during operations and maintenance phases. The soil cuttings shall be managed in compliance with applicable laws and regulations on site.

2.0 Statement from Fort Mojave Indian Tribe

The following statement was made by the Fort Mojave Indian Tribe regarding the site background and cultural significance:

> *The Topock site and adjacent lands are part of a larger geographical area referred to as a Traditional Cultural Landscape (TCL). The TCL is the ancestral home of the Fort Mojave Indian Tribe and other Native American Tribes including the Hualapai Nation, Colorado River Indian Tribes, Quechan Nation, Cocopah Tribe, and Yavapai-Prescott Nation. This entire TCL is of tribal religious significance. In some areas and at certain times, tribal members carry out various cultural activities and religious ceremonies.*
>
> *The very nature of the remedial activities being performed at the Topock Compressor Station involve disturbance to the TCL. Such activities as drilling, soil sampling, excavation, construction, monitoring, testing, vehicle movement, foot traffic, geophysical and other surveys, emplacement of markers, and discharge of water, solids, and other material disturb the sanctity of the land that is held in the hearts of Native Americans.*
>
> *In particular, the removal and disturbance of soils, both surficially and from the subsurface, is of concern to the Tribes because such actions are regarded as profound disruptions of the sacred landscape. While the nature and significance of this concern is not easily understood by non-Native Americans, perhaps the following excerpt, attributed to the Duwamish Chief Sealth, begins to aid in the understanding:*
>
>> *Every part of this country is sacred to my people. Every hillside, every valley, every plain and grove has been hallowed by some fond memory or some sad experience of my tribe. Even the rocks that seem to lie dumb as they swelter in the sun along the silent seashore in solemn grandeur thrill with memories of past events connected with the fate of my people, and the very dust under your feet responds more lovingly to our footsteps than to yours, because it is the ashes of our ancestors, and our bare feet are conscious of the sympathetic touch, for the soil is rich with the life of our kindred. (Chief Sealth, 1854)*
>
> *The Pacific Gas & Electric Company (PG&E), in its implementation of the remedial actions required by the United States Department of the Interior (DOI) and the California Department of Toxic Substances Control (DTSC) must commit to performing these actions in a manner that is respectful of Native American values.*

3.0 General Protocol for Management of Displaced Material (Mitigation Measure: CUL-1a-8[g])

This section presents each element of the protocol for the management of displaced material, including work planning, handling and short-term storage, contamination assessment, long-term storage, and final disposition. A graphical presentation of key elements of this process, and associated decision points, is presented on Figure 1 at the end of this document.

3.1 Work Planning

PG&E is required to prepare a work plan whenever a field activity is performed at the Topock site in support of a regulatory requirement or action. Through the established federal regulatory review process, these work plans are made available for review by process stakeholders and by the governments of affected Native American Indian Tribes (referred to as “Tribes” throughout this document) via the consultation process set forth in the PA’s Consultation Protocol, consistent with Section 106 of the NHPA. In addition to the information describing the scope of work, field logistics and other implementation details, work plans that involve activities that displace site material also describe the process for the management and disposition of the materials. Work plans finalized subsequent to the development of this protocol will include specific description of the process for involving the input of Tribe(s) regarding the management of the material that will be displaced as a result of the work. Key procedural information to be included in the work plan will include, but not be limited to, the following:

- Summary of measures planned to minimize the amount of disturbance that will be incurred.
- Notification procedures to inform the Tribe(s), involved regulatory agencies, and affected land owner(s) regarding the proposed activities that will disturb/displace soil or other materials.
- The location of proposed disturbance activities (e.g. access pathways) and displacement activities (e.g. drilling or sampling locations), including maps.
- Estimation of the volume and type(s) of material that will be displaced.
- The location and methodology for short-term storage of displaced material (see Section 3.2).
- Methods that will be used to assess whether contaminants are present (see Section 3.3).
- Methods that will be used to minimize the volume of material that may require long-term storage (see Section 3.4).
- The location and methodology for long-term storage (see Section 3.4).
- The anticipated location and methodology for final on-site disposition (see Section 3.5).

3.2 Handling and Short-term Storage

Material that is displaced as a result of Topock Remediation Project activities including drilling, excavation, sample collection, testing, construction, grading, or other activities will be handled on-site in accordance with the project-specific work plan. Displaced material that must be characterized for key chemical properties prior to identifying the appropriate final disposition method will be stored for the short term. Short-term storage areas and the protocol for handing material in these areas may vary by project. Depending on the type and volume of material displaced, location, land owner considerations, and other pertinent factors, short-term storage methods may include storage devices (e.g. bins) or properly maintained stockpiles that prevent this material from commingling with other areas of the environment. In some cases, short-term storage for characterization may not be necessary. For example, displaced material that is pre-characterized or characterized rapidly as work is conducted will be managed directly for long-term storage or final disposition, as appropriate (see Sections 3.4 and 3.5, respectively).

Specific material handling and short-term storage details will be defined in the approved work plan for a given activity. Key details to be identified in the work plan include:

- The mode and location of short-term storage.
- The method of transfer from the point of origin to short-term staging area.
- Best management practices/regulatory requirements to prevent releases of the potentially contaminated material during transfer and storage.
- Best management practices to protect the material from weather, erosion, contamination, and vandalism while located in the short-term staging area(s).
- Method for segregation of soils based by location, as practicable and appropriate.

A key element of this handling protocol is the development of an inventory of all material displaced by Topock Remediation Project activities. Key information maintained in this inventory will include:

- Material displacement authorization – Specific work plan under which the work was conducted.
- Material origin – Specific location of the site.
- Material description (e.g., soil, rock, etc.).
- Date(s) of displacement or accumulation.

- Generating activity (e.g., drilling, excavation, etc.).
- Approximate volume of material stored.
- Short-term storage mode and location – Type of storage (including container identification number, as applicable) and location of short-term storage pending material characterization. In some cases, this information may need to be updated as containers are moved between areas of the site.
- Characterization status – Characterization sample information (e.g., date of submittal and laboratory used), date of receipt of results, and the contamination assessment based on comparison to screening criteria (see Section 3.3).
- Long-term storage mode and location – Type of storage (including container identification number, as applicable) and location of long-term storage pending decision regarding final disposition (see Section 3.4). In some cases, this information may need to be updated as containers are moved between areas of the site.
- Final disposition information – Indication of the on-site or off-site final disposition action identified through discussion with Tribe(s), agencies, and the affected land owner(s), as appropriate, based on review of material type and the contamination assessment (see Section 3.5).

Once the displaced material has been managed through final disposition, it will no longer be tracked in the displaced material inventory.

3.3 Contamination Assessment

Key chemical property information will be used to determine the final disposition method, and specifically, whether displaced material is suitable for retention on-site for eventual return, reuse, or replacement, or if the material must be removed from the site for disposal in accordance with applicable State and Federal laws and regulations. Key information that will be considered to assess whether the material is contaminated, and therefore, whether the material can remain on-site or not, includes:

- Existing information including knowledge of the history of an area, or laboratory analytical results collected during previous phases of work. Use of existing information may preclude the need for additional analytical testing. When available, this information will be included in the work plan.
- Results of characterization samples collected for laboratory analysis, and observation of the physical properties of the material (e.g., white powder, burned material, boulders, etc.), as defined in the approved work plan for a given activity.
- Screening values for various analytes identified for the purpose of determining the appropriate material disposition method. Tables 1 and 2 at the end of this document present a reference list of analytes and associated screening levels that may be applicable for making decisions related to disposition of displaced site materials. The specific analytes applicable for characterization of displaced material will be determined based on the origin of the material and potential disposition locations. Screening values included on Tables 1 and 2 are defined in the following bullets, which will be modified as screening levels are added to these tables:
  - **Interim Screening Levels (Table 1)** – This is predominantly the background value. However, if the background value is not available then the lesser of the DTSC residential California Human Health Screening Level (CHHSL) or the ecological comparison value is used. If a CHHSL is not available, it is the lesser of the United States Environmental Protection Agency (USEPA) residential regional screening level or the ecological comparison value. This value is the most conservative, and it is assumed that the project-specific cleanup goal and/or Tribal screening level will be equal to or greater than this value.

- **Hazardous Waste Toxicity Characteristic Levels (Table 2) –** These values are used to determine if the material should be classified as a State or Federal hazardous waste. Specifically, total constituent concentrations expressed in milligrams per kilogram (mg/kg) will be compared to the hazardous waste characteristic levels in Table 2, and will be evaluated as follows:

  1. If the total constituent concentration exceeds the total threshold limit concentration (TTLC), the soil represented by the sample will be classified as a non-RCRA California hazardous waste. Additional evaluation of the soluble threshold limit concentration (STLC), as described in step 3 below, will not be performed.
  2. If the total constituent concentration exceeds the numeric value of the RCRA toxicity characteristic (TC) level by about 20 times or more, the toxicity characteristic leaching procedure (TCLP) will be performed. If the constituent concentration in the TCLP leachate exceeds the TC level, the soil represented by the sample will be classified as a RCRA hazardous waste. Additional evaluation of the STLC, as described in step 3 below, will not be performed.
  3. If the sample has not been classified as hazardous waste in steps 1 or 2, the total constituent concentration will be compared to the STLC. If the total constituent concentration exceeds the numeric value of the STLC by about 10 times or more, the California Waste Extraction Test (WET) will be performed. If the constituent concentration in the WET exceeds the STLC, the soil represented by the sample will be classified as a non-RCRA California hazardous waste.
  4. If the sample has not been classified as a hazardous waste in steps 1, 2, or 3, or by other applicable hazardous waste standards, the soil represented by the sample will not be classified or managed as hazardous waste.

These values will be used to determine the final disposition of displaced material by comparing the representative concentration of a given volume of material to the screening values. The methodology for determining the representative concentration will be established in the project-specific work plan and should not be limited to a concentration-by-concentration comparison, but could include statistical estimates or averages based on multiple samples. Material that has a representative concentration that is equal to or below the interim screening level is suitable for return, reuse, or replacement on-site. Material that is characterized as hazardous waste must be disposed of off-site in accordance with applicable laws and regulations. Material that has a representative concentration that is greater than the interim screening level, but not classified as a hazardous waste, will be stored on-site until the project-specific cleanup goals are established. Until these goals are established, material that falls into this intermediate category will be retained on-site for “long-term storage” (see Section 3.4).

The screening levels included in Tables 1 and 2 must be updated as applicable regulations and project-specific decisions are made. PG&E will review this information as remediation work plans are developed and implemented. As changes are determined appropriate, PG&E will submit revisions to the regulatory agencies and Tribe(s) for review and comment. Only agency approved values will be utilized.

3.4 Long-Term Storage

Following contamination assessment, some material may be determined to be non-hazardous waste but unsuitable for final disposition on-site because contaminants are present above the interim screening level. Per DOI comment on this protocol (received in February 2012), this material cannot be returned to the land until project-specific cleanup goals are finalized in the Record of Decision (ROD) and may be stored until that time. Once these goals are established the contamination will be re-assessed based on existing data, or additional data as determined necessary, using the cleanup goals in place of the interim screening level to determine final disposition (see Section 3.5).

The long-term storage area(s) and the protocol for handling material in these areas may vary by project. Depending on the type and volume of material that must be stored, location, land owner considerations, and other pertinent information, long-term storage methods may include storage devices (e.g. bins) or contained stockpiles that prevent this material from migrating away from the designated storage area(s). Coordination with agencies, Tribe(s), and affected land owners regarding the acceptable mode and location of long-term storage is critical in design of the work plan. Further, specific measures should be incorporated into the implementation of the given work plan, such as field screening and material segregation strategies, to try and minimize the volume of material that may require long-term storage.

3.5 Final Disposition

Final disposition refers to the final action taken on behalf of the Topock Remediation Project as it relates to the management of material displaced during associated activities. This protocol has been designed with the purpose of minimizing the volume of material that is disposed of off-site. Material determined to have a representative concentration that is equal to or less than the project-specific cleanup goal will be retained on site for return, reuse, and/or restoration. Material determined to have a representative concentration that is greater than this value will be transported off site for disposal in accordance with applicable laws and regulations or treated on site if appropriate based on the selection of the final soil remedy. Material return, reuse, and/or restoration options associated with final disposition on site are discussed in Section 4.

4.0 Return, Reuse, and/or Restoration of Displaced Material

Final on-site disposition alternatives include the return, reuse, and/or restoration of the displaced material. The preferred disposition alternative(s) will be considered on a case-by-case basis with the regulatory agencies, Tribe(s), and affected land owner(s), as suitable material is identified. Material types may differ by physical or chemical properties, and therefore the preferred on-site disposition alternative may also vary. Alternatives that have been preliminarily identified include, but are not limited to:

- Replacement of material into original borings, trenches, or excavations, from which they were removed.
- Replacement of material into borings, trenches, or excavations other than those from which they were removed.
- Creation of topographical or landscape barriers to protect sensitive areas.
- Creation of berms or other structures (e.g., gabions) to prevent erosion.
- On-site road maintenance (this alternative may require sorting the material for different physical sizes).
- Stockpiling in designated areas.

The above list of final on-site disposition alternatives is preliminary, and should not be considered complete. Further, if material is found to contain concentrations of volatile organic compounds it may not be suitable for return, reuse, and/or restoration near buildings where vapor intrusion would be of concern. Coordination with agencies, Tribe(s), and affected land owners is critical in design of the work plan to identify the preferred on-site disposition alternative(s) and communication milestones, so the material can be efficiently managed.

Material displaced as part of past remediation project activities was managed in accordance with project-specific work plans. As a result, some material has been retained at the site because contaminant concentrations were below the Interim Screening Level (previously displaced material that has exceeded these levels was disposed off-site in accordance with the work plans). Therefore, previously displaced material is available for the return, reuse, and/or restoration alternatives included in the bullets above, or as additional uses are developed. As of June 2012, the estimated volume of material that has been retained and stockpiled through past remediation project activities is approximately 30 to 35 cubic yards.

PG&E TOPOCK COMPRESSOR STATION
COMBINED COMMENTS RECEVIED FROM: DOI, DTSC, FMIT, AND THE TRC
ON THE DRAFT (MAY 14, 2012) "MANAGEMENT PROTOCOL FOR HANDLING AND DISPOSITION OF DISPLACED SITE MATERIAL, TOPOCK REMEDIATION PROJECT, NEEDLES, CALIFORNIA" AND ASSOCIATED PG&E RESPONSES, FOR DISCUSSION

Absolute Comment No.	Agency Comment No.	Comment Location (Page)	Commenter	Reference Text	Comment	PG&E Response and/or Proposed Edits	Comment Status
1	In redline	Page 3, Handling and Short Term Storage First paragraph	DTSC	In some cases, short-term storage for characterization may not be necessary.	List some examples for clarity.	In situations where characterization data is available prior to disturbance, or is made available during disturbance (e.g. field screening or expedited laboratory analysis), short-term storage may not be necessary. Text will be revised to read as follows (changes in bold): "In some cases, short-term storage for characterization may not be necessary. **For example,** displaced material that is pre-characterized **or characterized rapidly as work is conducted** will be managed **directly** for long-term storage or final disposition, as appropriate (see Sections 3.4 and 3.5, respectively).	Resolved.
2	In redline	Page 3, Handling and Short Term Storage First paragraph	DTSC	Displaced material that is pre-characterized **per an agency approved work plan** will be managed for long-term storage or final disposition, as appropriate (see Sections 3.4 and 3.5, respectively)	Strike "per an agency approved work plan". Comment: Data may come from other sources (e.g., opportunistic samples). No need to limit available data.	Text will be deleted. See revised text in response to comment 1.	Resolved.
3	In redline	Page 4, Handling and Short Term Storage Final bullet	DTSC	Final disposition information – Indication of the **on-site** or off-site final disposition action identified through discussion with Tribe(s), agencies, and the affected land owner(s), as appropriate, based on review of material type and the contamination assessment (see Section 3.5).	Comment: Need to define "on-site/site/on site" used throughout the document to clearly understand where soil may end up.	The following statement has been added to the end of the second paragraph in Section 1.0: "Throughout this document, the term "site" refers to the area within the APE."	Resolved.
4	In redline	Page 4, Contamination Assessment First bullet	DTSC	Existing information including knowledge of the history of an area, or laboratory analytical results collected during previous phases of work. Use of existing information may preclude the need for additional analytical testing. When available, this information **should** be included in the work plan.	Replace "should" with "will".	Concur. The change has been incorporated.	Resolved.
5	In redline	Page 5, Contamination Assessment – (bullet) Hazardous Waste Toxicity Characteristic Levels Bullet 2	DTSC	If the total constituent concentration exceeds the numeric value of the RCRA toxicity characteristic (TC) level by **about** 20 times or more, the toxicity characteristic leaching procedure (TCLP) will be performed. If the constituent concentration in the TCLP leachate exceeds the TC level, the soil represented by the sample will be classified as a RCRA hazardous waste. Additional evaluation of the STLC, as described in step 3 below, will not be performed.	Add word "about". Comment: Adding flexibility to conduct leach tests if the dry values are in the neighborhood. Do this due to potential for soil to be heterogeneous.	Concur. The change has been incorporated.	Resolved.

Absolute Comment No.	Agency Comment No.	Comment Location (Page)	Commenter	Reference Text	Comment	PG&E Response and/or Proposed Edits	Comment Status
6	In redline	Page 5, Contamination Assessment – (bullet) Hazardous Waste Toxicity Characteristic Levels Bullet 3	DTSC	If the sample has not been classified as hazardous waste in steps 1 or 2, the total constituent concentration will be compared to the STLC. If the total constituent concentration exceeds the numeric value of the STLC by **about** 10 times or more, the California Waste Extraction Test (WET) will be performed. If the constituent concentration in the WET exceeds the STLC, the soil represented by the sample will be classified as a non-RCRA California hazardous waste.	Add word "about".	Concur. The change has been incorporated.	Resolved.
7	In redline	Page 5, Contamination Assessment Last paragraph, last sentence	DTSC	As changes are determined appropriate, PG&E will submit revisions to the regulatory agencies and Tribe(s) for review **and acceptance. Only agency approved values will be utilized.**	Add text in bold.	Concur. Final text based on discussion with DTSC: As changes are determined appropriate, PG&E will submit revisions to the regulatory agencies and Tribe(s) for review and comment. Only agency approved values will be utilized.	Resolved.
8	1	End of document Table 2	DTSC	None.	The document does not speak to inside the fence line versus outside the fence line. If we use the Interim Screening Levels identified in this document for displaced soils originating from inside the fence line, there is a potential that more soil will be stored unnecessarily as inside the fence line soils would probably exceed background levels.	The management protocol currently addresses all material, regardless of area of origin, in the same way. A screening level specific to material inside the fence line may be established at a later date. As discussed at the end of Section 3.3, this management protocol will be updated as applicable regulations and project-specific decisions are made.	Resolved.
9	2	End of document	DTSC	None.	Will inside the fence line soils versus outside the fence line soils be allowed to move back and forth? How does this tie into the on-site soil management plan (SMP) being developed by PG&E? Discuss components of the SMP in this protocol.	This management protocol will be applied to material displaced as a result of remediation project activities regardless of whether the material originated inside or outside the fence line. Therefore soils may move outside from inside, or potentially vice-versa depending on designated storage areas or reuse options. The SMP will mirror the concepts in this protocol. Because this document is the standard protocol and the SMP will be a standalone document as part of the operations and maintenance manual for the groundwater remedy, the SMP will reference this document and include additional detail, but we do not see a reason to reference the SMP in this protocol. Further, this management protocol will be updated as is determined necessary based on additional details included in the finalized SMP.	**Subsequent DTSC Comment:** The comment should be revised to clarify that the SMP is not limited to groundwater and is intended to ensure potentially contaminated soils are adequately identified and handled at the compressor station (inside the fence line). See absolute comment 154 from the RTC table (June 29, 2012) for the soils work plan. **PG&E Response:** The SMP is part of the final groundwater remedy design document, and therefore, is specific to groundwater. However, details regarding the management of potentially contaminated soils on the compressor station (inside the fence line) will be addressed in the Soil RFI/RI Work Plan (Appendix J – Displaced Soil and Hazardous Waste Management Procedures). Resolved.

Absolute Comment No.	Agency Comment No.	Comment Location (Page)	Commenter	Reference Text	Comment	PG&E Response and/or Proposed Edits	Comment Status
10	3	End of document Table 1	DTSC	None.	Interim Screening Level Source: Include soils screening levels for groundwater protection as screening criteria.	The Interim Screening Level represents the most conservative value, and are lower than the soil screening level for groundwater protection, with the exception of hexavalent chromium and molybdenum. The soil screening level for protection to groundwater for hexavalent chromium and molybdenum is below the background concentration for these metals. Final reuse decisions will be based on the more conservative Interim Screening Level or the project-specific clean up goal (or hazardous waste criteria), and therefore inclusion of soil screening levels for groundwater protection would not add a meaningful decision criteria to the protocol.	**Subsequent DTSC Comment:** Table 1 will need to be modified to identify that the soil screening level for molybdenum is below background. **PG&E Response:** Concur. The edit has been made. Resolved.
11	4	End of document Table 1	DTSC	None.	Interim Screening Level: The protocol should address screening criteria for vapor intrusion to indoor air, to ensure that vapor intrusion pathways will not be potentially created (e.g., do not place VOC impacted soil in areas that have, or likely to have enclosed structures such as MW-20 bench).	VOCs have not been detected in soils to date. Therefore there is no need to develop screening levels that are protective of indoor air from vapor intrusion pathways. However, the following statement will be added to second paragraph of Section 4.0: "Further, if material is found to contain concentrations of volatile organic compounds it may not be suitable for return, reuse, and/or restoration near buildings where vapor intrusion would be of concern."	Resolved.
12	5	End of document Table 1 - Notes	DTSC	None.	Include fluoride salts as they are COPC.	The note in Table 2 has been revised as discussed with DTSC.	Resolved.
13	6	End of document Table 2	DTSC	None.	Any listed wastes to be concerned with?	At this time we are not aware of any listed wastes that need to be considered for this management protocol. Additional soil data is pending collection as part of the soil investigation. As discussed at the end of Section 3.3, this management protocol will be updated as applicable regulations and project-specific decisions are made.	Resolved.
14	In redline	Figure 1	DTSC	**Agencies direct** PG&E to develop work plan based on regulatory requirement or action.	Revised text: PG&E to develop work plan based on regulatory requirement/action **or PG&E initiative**.	Concur. The change will be incorporated.	Resolved.
15	In redline	Figure 1	DTSC	PG&E begins work and generates material.	Revised text: PG&E begins work and generates material **and characterization data**.	To clarify, the word "additional" will be deleted from the decision box two levels below the box commented on, and the original box will not be edited.	**Subsequent DTSC Comment:** Edits were not completed as stated in text. Box 10: Add "characterization" in front of "data". Box 12: Delete "additional" as proposed. **PG&E Response:** Concur. The edits have been made. Resolved.
16	In redline	Figure 1	DTSC	Material is suitable for **on-site** return, reuse, and/or restoration alternatives.	Define "on-site".	The following note has been added to the figure: "Throughout this figure, the term "site" refers to the area within the Area of Potential Effect (APE)."	Resolved.

Absolute Comment No.	Agency Comment No.	Comment Location (Page)	Commenter	Reference Text	Comment	PG&E Response and/or Proposed Edits	Comment Status
17	In redline	Page 5, Contamination Assessment Last paragraph, last sentence	DOI	As changes are determined appropriate, PG&E will submit revisions to the regulatory agencies and Tribe(s) for review **and acceptance. Only agency approved values will be utilized.**	It is unclear what is meant by acceptance. (See also comment 7 [DTSC])	See response to comment 7 (DTSC).	Resolved.
18	In redline	Page 6, Long-term Storage First paragraph, second sentence	DOI	Per DOI comment on this protocol (received in February 2012), this material must remain on-site until project-specific cleanup goals are finalized.	For clarification, DOI stated that the material could not be returned to the land until cleanup criteria are finalized in the ROD and may be stored until that time.	To clarify, the text has been revised as follows: "Per DOI comment on this protocol (received in February 2012), this material cannot be returned to the land until cleanup criteria are finalized in the Record of Decision (ROD) and may be stored until that time."	Resolved.
19	1		FMIT	None.	The 5-14-12 draft protocol still does not address the matter of the existing inventory of displaced soils. It only looks forward to activities that will involve soil disturbance as part of future work plans. This comment has been made previously by FMIT, but the issue remains unaddressed. The existing inventory of displaced soils must be addressed in this protocol. It is not anticipated that the handling and disposition of the existing soil inventory would be different from procedures and policies for addressing future displaced soils. A section of this protocol must address disposition of the existing displaced soils inventory.	As stated in the first sentence of the document, the intent is for this management protocol to apply to material that is displaced as a result of past (as practical), present, and future activities associated with the Topock Remediation Project. To speak specifically to the inventory of previously displaced soils at the site, the following text has been added to the end of Section 4.0 (Return, Reuse, and/or Restoration of Displaced Site Material): "Material displaced as part of past remediation project activities was managed in accordance with project-specific work plans. As a result, some material has been retained at the site because contaminant concentrations were below the Interim Screening Level (previously displaced material that has exceeded these levels was disposed off-site in accordance with the work plans). Therefore, previously displaced material is available for the return, reuse, and/or restoration alternatives included in the bullets above, or as additional uses are developed. As of June 2012, the estimated volume of material that has been retained and stockpiled through past remediation project activities is approximately 30 to 35 cubic yards."	
20	2		FMIT	None.	The draft does not address soil disturbances associated with the soils investigation. It appears that only soils displaced as a result of the groundwater remedy activities are explicitly covered. Again, this point has been raised by FMIT but remains largely unaddressed. FMIT realizes the necessity and importance of PG&E's addressing the respective mitigation measure (CUL-1a-8[g]) but that measure does not exclude applying these procedures to all displaced soils. The issue of soil handling was initially raised by FMIT years ago, and was not intended to be limited to the fulfillment of a mitigation measure for, or the implementation of, the groundwater remedy. PG&E has apparently reframed the issue to limit the scope of the protocol, however, the FMIT is concerned with the disturbance and displacement of soils, regardless of the	Based on clarification received from FMIT during the June 15, 2012 call, the tribes want this protocol to be inclusive of all activities at the Topock Compressor Station. This topic has been tabled for future discussion with PG&E, and the protocol will not be modified at this time. DTSC comment from September 18, 2012 letter to FMIT in response to September 7, 2012 letter from FMIT: As indicated in the first paragraph of the Protocol, "*This document presents the general approach and management protocol required for the handling and disposition of soil and/or rock (referred to as "material" throughout the document) that is displaced as a result of past (as practical), present, and future activities*	The Tribe believes that this item has not yet been adequately addressed. The Tribe's position on this item is documented in the letter attached to the RTCs table. The agency response letter is also attached.

Absolute Comment No.	Agency Comment No.	Comment Location (Page)	Commenter	Reference Text	Comment	PG&E Response and/or Proposed Edits	Comment Status
					associated activity or remedial action at the Site, and expects the PG&E and the Agencies to examine and find solutions for the whole of the issue.	*associated with the Pacific Gas and Electric Company (PG&E) Topock Remediation Project, Needles, California. Specifically, this includes material removed from the Earth (i.e., displaced) as a result of drilling, excavation, sampling, testing, construction, grading, and other remedial activities*". As cited, DTSC does not interpret the Protocol to be limited only to soil displaced as a result of groundwater remedy implementation. On the contrary, the scope appears to be sufficiently broad to cover all aspects of the environmental project conducted under the oversight of DTSC and the US Department of the Interior. DTSC is aware, however, that this protocol, once developed, could be submitted by PG&E to comply with a portion of Mitigation Measure CUL-1a-8 of the certified Final Environmental Impact Report where PG&E is to develop a protocol for handling soil cuttings to be included in the Cultural Impact Mitigation Program as part of the final design of the approved groundwater remedy. Currently, DTSC is in the process of conducting a California Environmental Quality Act (CEQA) evaluation for the soil investigation work plan. Based on the results of the soil CEQA evaluation, the same mitigation measure may be found to be appropriate for the soil investigation activities. Note that displaced soils from soil investigation activities will not be generated until after the soil CEQA evaluation is completed and the soil investigation work plan is approved.	
21	3		FMIT	None.	There is no commitment to minimize disturbances that are not associated with the listed activities as a result of incidental or associated activities (e.g., vehicles, etc.). PG&E is directing this primarily at CUL-1a-8[g], however, FMIT again requests that these procedures be a broader statement of policy committing to minimization or disturbance for all Site activities. Other soil disturbing activities that PG&E might perform should also 'voluntarily' follow this protocol.	See response to comment 20 (FMIT). Per Aug-6, 2012 discussion, additional detail was added to the bullets in Section 3.1 regarding areas of disturbance and displacement.	
22	4		FMIT	None.	The application of soil criteria for the determination of reuse needs some additional flexibility. Since there will likely be (or should be) several discrete soil samples with chemical concentrations for a given amount of soil, it is the average of these values for that soil accumulation that should be used. This is justified because exposure occurs over an area and the soil will be further mixed when it is placed back on the site.	The specific process for characterization of displaced site material is an example of a detail that would be included in the project-specific work plan. DTSC comment from September 18, 2012 letter to FMIT in response to September 7, 2012 letter from FMIT: In addition to potential concentration-by-concentration comparison between the disturbed soil and screening criteria, DTSC does not object to considering other alternative methods as long as the methods will yield data that are representative of the material in question, are in accordance with waste classification regulations, and standard practice for classifying materials such as	As of the September 7, 2012 letter, the Tribe believes that this item has not yet been adequately addressed. The Tribe's position on this item is documented in the letter attached to the RTCs table. The agency response letter is also attached. The document has been revised per the direction in the September 18, 2012 letter in response to the September 7, 2012 letter (as detailed in the column to the left).

Absolute Comment No.	Agency Comment No.	Comment Location (Page)	Commenter	Reference Text	Comment	PG&E Response and/or Proposed Edits	Comment Status
						investigation derived soil cuttings for the purposes of determining proper disposal. DTSC concurs with the approach that additional details regarding this issue can be addressed in the individual work plans. PG&E Comment – The sixth paragraph on page 5 has been revised to read as follows (text additions are in **bold**): "These values will be used to determine the final disposition of displaced material **by comparing the representative concentration of a given volume of material to the screening values. The methodology for determining the representative concentration will be established in the project-specific work plan and should not be limited to a concentration-by-concentration comparison, but could include statistical estimates or averages based on multiple samples**. Material that **has a representative concentration that** is equal to or below the interim screening level is suitable for return, reuse, or replacement on-site. Material that is characterized as hazardous waste must be disposed of off-site in accordance with applicable laws and regulations. Material that **has a representative concentration that** is greater than the interim screening level, but not classified as a hazardous waste, will be stored on-site until the project-specific cleanup goals are established. Until these goals are established, material that falls into this intermediate category will be retained on-site for "long-term storage" (see Section 3.4)."	
23	5	Table 1	FMIT		Why is the "Project-specific Cleanup Goal" differentiated from the "Tribal Screening Level"? The Tribal land use scenario is the most appropriate future land use and the calculation of risk-based concentrations is a "Project-specific Cleanup Goal" and not a screening level.	Based on discussion during the June 15, 2012 call, it is premature to have the project-specific cleanup goals and the tribal screening levels included on Table 1 since they have yet to be determined. Therefore, these columns will be deleted from Table 1. As discussed at the end of Section 3.3, this management protocol will be updated as applicable regulations and project-specific decisions are made.	
24	6		FMIT		The overall logic that would set screening criteria according to the location of origin of the soil is flawed. Soil disturbances often involve commingling of soils to various depths, while the potential exposure scenarios usually relate to materials at or near the surface. The depth of soil placement/reuse should be considered in the decision for reuse.	Separation of displaced soil to this level of detail (shallow vs. deeper) greatly increases the level of complexity related to soil testing and management scenarios and could result in a larger storage footprint, but could be accomplished. However, current return, reuse, and/or restoration scenarios are not depth-specific, and deeper reuse scenarios may be limited. Variables like future erosion or change in regulations also complicate two-tier reuse scenarios. The document will be revised as additional screening levels are developed.	The Tribe believes that this item has not yet been adequately addressed. The Tribe's position on this item is documented in the letter attached to the RTCs table. The agency response letter is also attached.

Absolute Comment No.	Agency Comment No.	Comment Location (Page)	Commenter	Reference Text	Comment	PG&E Response and/or Proposed Edits	Comment Status
						DTSC comment from September 18, 2012 letter to FMIT in response to September 7, 2012 letter from FMIT: DTSC supports PG&E's response in the RTC summary table that separation of displaced soil to this level of detail (shallow vs. deep) greatly increases the level of complexity related to soil testing and management scenarios and could result in a larger storage footprint. The current return, reuse, and/or restoration scenarios are not depth-specific, and deeper reuse scenarios may be limited. Variables like future erosion or change in regulations also complicate two-tier reuse scenarios. More importantly, the decision to reuse soil that is above screening criteria regardless of depth ultimately rests on the respective land owners who own the land where the displaced soil will be reused. If potentially contaminated soils will be reused, the land owner must agree to a land use covenant restricting the use of their land after backfilling. DTSC believes that this issue cannot be managed at a global level since the decision is dependent on location, depth, concentration of material and landowner acceptance, DTSC believes that this issue can be deferred and handled on a case-by-case basis, potentially during the individual work plan, to first determine if there are potential locations that will require deep backfill, and more importantly, the individual land-owners preference on this issue. **PG&E comment – Additional detail regarding potential material reuse scenarios that are specific to a given work plan will be included in the individual work plans, as necessary.**	
25	7	Figure 1	FMIT		We suggest adding a number to each block in the diagram for clarity. In the "second to the last block" it says "Material must be managed offsite." If contaminant concentrations are less than or equal to (<) project-specific cleanup goal, why couldn't they be treated onsite if appropriate and feasible?	Numbers will be added to flow chart boxes. The text in the "second to last block" will be modified to read as follows: "Material will be managed off site, or treated on site if appropriate based on the selection of the final soil remedy." Additional text has also been added to Section 3.5.	
26	1	Page 4, Contamination Assessment	Hualapai / TRC		Key information that will be used in assessing whether the displaced material is contaminated is discussed in Section 3.3 Contamination Assessment. Within this section it is stated that contamination determinations of displaced materials can be based on "existing information including knowledge of the history of an area" and "observation of the physical properties of the material". It is unclear however, how physical observation or historical knowledge of an area can be used in comparisons against the quantitative interim screening values provided in	Examples of key physical properties have been added to the second bullet in Section 3.3, and now reads as follows: "Results of characterization samples collected for laboratory analysis, and observation of the physical properties of the material (e.g., white powder, burned material, boulders, etc.), as defined in the approved work plan for a given activity." Regarding "existing information/history of an area", see response to comment 27 (Hualapai/TRC).	

Absolute Comment No.	Agency Comment No.	Comment Location (Page)	Commenter	Reference Text	Comment	PG&E Response and/or Proposed Edits	Comment Status
					Tables 1 and 2.		
27	2	Page 4, Contamination Assessment Third bullet.	Hualapai / TRC	The specific analytes and interim screening levels applicable for characterization of displaced material will be determined based on the origin of the material and potential disposition locations.	Section 3.3 Contamination Assessment states that "the specific analytes and interim screening levels applicable for characterization of displaced material will be determined based on the origin of the material and potential disposition locations." This statement appears to suggest that the interim soil screening levels that are provided in Tables 1 and 2 are not to be consistently applied to all displaced soils but rather the origin and fate of the displaced soil will dictate which analyte will be evaluated and what interim threshold value is used. This is unclear and could use additional clarification.	The screening levels included on Tables 1 and 2 will be applied uniformly to all analytes included on the table. To clarify, the text "**and screening levels**" will be deleted from the statement. Regarding specific analytes, the protocol provides flexibility such that a subset of analytes included on Table 1 may be used to characterize displaced material, as determined appropriate. For example, material that is generated from an area not suspected of dioxin/furan contamination may not need to be characterized for dioxin/furan concentrations prior determining the appropriate disposition alternative.	
28	3		Hualapai / TRC		Interim screening values should not be based on background values. The use of background is unnecessarily over-conservative, the background data are based on a small yet variable group of samples, and use of the background threshold value will inevitably result in long term stockpiling of soils with no associated risk. Until a Tribal Screening level is developed it can still be safely assumed that the use of a CHHSL interim screening value will be equal to or greater than the Tribal Screening level and should be used in place of the background screening level.	The use of background is purposefully conservative until project-specific cleanup goals are established. While it is correct that this may result in long term storage of soils that are later determined to have no associated risk, agency input and concurrence is required if less conservative values are to be used.	
29	4		Hualapai / TRC		The use of ecological screening values (ECVs) should only occur in situations were displaced soils would be returned to surface locations. Most of the developed ECVs were developed based on exposures to terrestrial receptors which would not come into contact with subsurface soils. Clearly no significant pathway of exposure for ecological receptors exists for soils removed and replaced into deep boreholes. Therefore if ECVs are to be used it is suggested that there use be limited to the screening of only surface related soils.	See response to comment 24 (FMIT) and 28 (Hualapai/TRC).	

Absolute Comment No.	Agency Comment No.	Comment Location (Page)	Commenter	Reference Text	Comment	PG&E Response and/or Proposed Edits	Comment Status
30	5		Hualapai / TRC		It was clearly stated in the Technical Memorandum 3: Ecological Comparison Values for Metals and Polycyclic Aromatic Hydrocarbons in Soil that "the ECVs, while based on information developed during the ecological risk assessment (ERA) scoping, are to be applied only to soil investigation planning in conjunction with background values. Specifically, the ECVs are not intended for use as either cleanup goals or as screening levels to eliminate COPECs." Furthermore within the Revised Addendum to the Revised Human Health and Ecological Risk Assessment Work Plan (August 2008) PG&E states that "ECVs were developed to support the soil investigation data gaps assessment". Therefore it appears that the use of ECVs as interim screening levels for the determination of soil cleanup is outside of the scope of which these values were developed.	ECVs are only included on Table 1 for select analytes as the Interim Screening Level (see notes). However, the Interim Screening Level is not used for the determination of soil clean-up. The Interim Screening Level is used as the most conservative screening level to determine if the material is suitable for on-site return, reuse, and/or restoration alternatives. As presented on Figure 1, if the material contains contaminant concentrations greater than the Interim Screening Level (and below hazardous waste criteria), then it must stored until project-specific clean-up goals are established.	
31	6		Hualapai / TRC		There may be a need for rapid field analyses in order to, for example, place cuttings materials back down a bore hole or to work in very sensitive areas. Selected elements and possible field methods need to be discussed as part of the process to define screening levels.	It is conceivable that rapid field screening or laboratory analytical data may be necessary to make expeditious decisions related to the characterization of displaced material. However, these operational details are deferred to the project-specific work plan, where all details related to the implementation of the scope of work can be fully considered. The reference list of potentially applicable analytes and associated screening levels (Table 1) is being developed based on past operation information available for the Site, and therefore, is inclusive of all analytes of potential concern. However, this list is not dependant on the types of analytical methods (field or fixed-base laboratory) used for characterization of displaced site material.	
32	7		Hualapai / TRC		Other details were not presented in the report. For example, composite samples may be collected and analyzed in order to categorize a batch of soils. A displaced material tracking data base may be necessary in order to catalog the site locations, depths, methods of displacement, etc.	Many operational details, such as the method(s) for characterizing soils that are displaced as a result of Topock Remediation Project activities, are deferred to the project-specific work plan. See also the response to comment 22 (FMIT). Please refer to Section 3.2 (Handling and Short-term Storage) regarding plans to build an inventory of all material displaced by Topock Remediation Project activities.	

HARGIS + ASSOCIATES, INC.
HYDROGEOLOGY • ENGINEERING

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Tucson, AZ 85718
Phone: 520.881.7300
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September 7, 2012

VIA ELECTRONIC MAIL

Mr. Jose Marcos, Geologist
DEPARTMENT OF TOXIC SUBSTANCES CONTROL
5796 Corporate Avenue
Cypress, CA 90630

Re: FMIT Comments on Revised Protocol on Displaced Materials, August 28, 2012

Dear Mr. Marcos:

Hargis + Associates, Inc. (H+A) on behalf of our client, the Fort Mojave Indian Tribe ("the Tribe" or "FMIT"), is hereby providing comments on the above-referenced revision to the Displaced Materials Protocol ("the Protocol"), in response to your email of September 4, 2012.

The Tribe is concerned over the suggestion that this Protocol is nearing finalization, yet there does not appear to be full resolution of Tribal comments. The Tribe agrees that this document has been prepared in a collaborative manner with frequent opportunity to exchange ideas and for the parties to provide input. Nevertheless, our review of the "Response to Comments," (RTC) prepared by the Pacific Gas & Electric Company (PG&E), characterizes the status of various tribal comments as "resolved." However, some of the issues that have been consistently raised by the Tribe during the process in fact remain unresolved. As you know from the correspondence of July 23, 2012, referenced below, the Tribe has concerns with the comment resolution process for the project in general.

The Tribe commented previously on the RTC process for the draft *Soil RCRA Facility Investigation/Remedial Investigation Work Plan (Work Plan), PG&E Topock Compressor Station, Needles, California.* Specifically, the last column of the RTC table identifies the resolution status of individual "Absolute Comments," much like the last column in PG&E's RTC for the displaced soils protocol. The Tribe took issue with the fact that the Agencies, the California Department of Toxic Substances Control (DTSC) and U.S. Department of the Interior (DOI), characterized the resolution status as "resolved," when in fact the Tribe had certain residual issues.

While the Tribe understands that the ultimate decisions for project matters remain the Agencies' responsibility, it is important that dissenting views of Tribes and stakeholders be documented in the record whenever the "resolution" overrides the concerns expressed throughout the process. On August 31, 2012, the Tribe received a letter from DOI and DTSC in response to the Tribe's letter of July 23, 2012, expressing concerns over the RTC process. The Agencies' letter recognized that several of the Tribe's issues in fact remain unresolved and indicated that DOI would request that PG&E remove the "resolved" notation from all Tribal comments. DOI further indicated its willingness to consult with the Tribe on the matter and procedure for issue resolution.

The RTC for the displaced soils protocol is unacceptable to the Tribe for the same reasons: the document seems to state that PG&E, not the Agencies, had made determinations in regard to issue resolution. This function properly belongs to the Agencies and must not be directly or indirectly delegated to a third party. Also, the document does not accurately reflect unresolved issues raised by the Tribe or document why they cannot be accommodated, if that is the case, a key part of meaningful collaboration and consultation. Perhaps finalization of the Protocol can await the Agencies' consideration of this letter and the conclusion any further discussions on this subject with the Tribes.

Accordingly, below, the Tribe hereby is identifying three items where the Tribal issues remain unresolved, and requests that either these issues be resolved jointly with the Tribe(s) or the reasons why these issues cannot be accommodated at this time be identified and documented within the RTC summary. The comments are attached.

Please contact me if you have questions concerning this letter.

Sincerely,

HARGIS + ASSOCIATES, INC.

Leo S. Leonhart

Leo S. Leonhart, PhD, PG, CHG
Principal Hydrogeologist

Comments attached below

cc: K. Baker, DTSC
J. Bathke, Quechan
D. Bonamici, CRIT
M. Cavaliere, CH2M Hill
C. Coyle
M. Eggers, TRC
R. Escobar, Chemehuevi
W. Fisher-Holt, CRIT

D. Hubbs, Hualapai
P. Innis, DOI
L. Jackson-Kelly, Hualapai
J. McCormick, Cocopah
S. McDonald
N. McDowell-Antone, FMIT
Y. Meeks, PG&E
K. Morton, Cocopah
L. Otero, FMIT
R. Prucha, TRC
E. Rosenblum, TRC
C. Schlinger, TRC
M. Sullivan, CSUN
T. Williams, FMIT
W. Wright, TRC
A. Yue, DTSC

839.07 Displaced Materials

Fort Mojave Indian Tribe Comments on the Draft Soils Reuse Protocol that Remain Unresolved

Comments on the RTC

1. Comment 20 by FMIT.

   There are two separate issues that have been inappropriately combined. The first issue is the Tribe's position that this Protocol should apply to all aspects (*e.g.,* groundwater and soil) of the Topock Remediation Project. The second issue was the request by the Tribe that the Protocol be applied to all soil-related projects. This second issue was potentially addressed by moving it to discussions between PG&E and the Tribes directly. However, this resolution does not address the first issue. Therefore, the Tribe again requests that this Protocol be applied to all aspects of the Topock Remediation Project.

2. Comment 24 by FMIT and 29 by Hualapai/TRC.

   The comment and the comment's final sentence are two separate, but related issues regarding the application of the soil criteria to decide on the disposition of disturbed soils. One issue is that it should be the final location of disturbed soil replacement that determines the applicable criteria, not the source location of the disturbed soil. And second, when the final location of disturbed soil replacement is selected, if the location has deep (*i.e.,* below 2 feet bgs) backfill areas, and if future erosion is unlikely, then this deeper backfill soil may have less stringent acceptance criteria. While it is understood that the Protocol has criteria that are not depth-related, this issue of backfill depth can be used to decrease the amount of soil that must be removed from the site, thereby lessening the impact of the cleanup on the Site.

Comments on the August 30, 2012, Draft Protocol

1. Page 5, paragraph 6.

   FMIT has commented previously that when the Protocol describes a simple comparison between the material *(i.e.,* the disturbed soil) and the criteria, without further discussion, it gives the impression that concentration-by-concentration comparisons will be used. As discussed in the last teleconference, there may be other estimates of 'material concentration' that could be used (*e.g.,* average). While the RTC specifies that the procedure for this comparison will be addressed in specific work plans, the Tribe requests that this paragraph be edited to include the statement "material concentrations will be established for each soil pile in short-term storage. This concentration may include a statistical estimate for that soil pile." (Note: 'pile' may not be the correct word in this context and a substitute can be discussed.)

Department of Toxic Substances Control

Matthew Rodriquez
Secretary for
Environmental Protection

Deborah O. Raphael, Director
5796 Corporate Avenue
Cypress, California 90630

Edmund G. Brown Jr.
Governor

Sent Via Electronic Mail

September 18, 2012

Leo S. Leonhart, PhD, PG, CHG
Principal Hydrogeologist
Hargis + Associates, Inc.
1820 East River Road, Suite 220
Tucson, AZ 85718

RESPONSE TO SEPTEMBER 7, 2012 LETTER ON FMIT COMMENTS REGARDING REVISED PROTOCOL ON DISPLACED MATERIALS, PACIFIC GAS AND ELECTRIC COMPANY (PG&E), TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA

Dear Dr. Leonhart:

The Department of Toxic Substances Control (DTSC) is in receipt of your letter dated September 7, 2012, which was sent on behalf of the Fort Mojave Indian Tribe (FMIT) pertaining to the FMIT concerns over the *"Management Protocol for Handling and Disposition of Displaced Site Material, Topock Remediation Project"* (Protocol). DTSC appreciates the FMIT's input as provided in your letter, and believes that they will help greatly in quickly resolving any potentially unresolved issues related to the Protocol.

As you know, it has been nearly one year since your initial draft of what has evolved into the current version of the Protocol. Its development has been a collaborative effort between the various agencies, Tribes, stakeholders and PG&E as part of the displaced soil committee. The parties involved have met multiple times to discuss the details of the document and its implementation strategy. DTSC believes that these meetings throughout the past year demonstrate the commitment of all parties to completing this task and to provide meaningful input into its development.

After reviewing the August 28, 2012 version of the Protocol, DTSC believes that the document has captured the issues and the resolutions suggested during the yearlong dialogues of the committee. However, in your letter, you expressed, on behalf of the FMIT, concern over DTSC's suggestion that the Protocol is nearing completion, and your letter indicates that the response to comments (RTC) summary table does not accurately reflect unresolved issues raised by the Tribes. You specified three comments that the FMIT believes remain unresolved and you requested that these issues be resolved jointly with the Tribes or document the reasons why they cannot be accommodated at this time in the RTC summary table.

DTSC notes, however, that the ‘resolved’ status for comments listed on the RTC table were determined by the committee members during the various meetings after each comment was discussed. Never the less, DTSC will request PG&E to revise the RTC summary table for those three comments to reflect the FMIT’s position. DTSC is providing the following discussion to clarify our understanding of the issues raised by the three specific comments. DTSC hopes that the responses adequately address the FMIT’s comments so that the Protocol can continue to move forward.

1. Absolute Comment No. 20 by FMIT – According to the FMIT comment, the Protocol does not address soil disturbances associated with the soils investigation, and it appears that only soils displaced as a result of the groundwater remedy activities are explicitly covered. The FMIT requests that the protocol to be applied to all aspects (e.g., groundwater and soil) of the Topock Remediation Project.

As indicated in the first paragraph of the Protocol, *“This document presents the general approach and management protocol required for the handling and disposition of soil and/or rock (referred to as “material” throughout the document) that is displaced as a result of past (as practical), present, and future activities associated with the Pacific Gas and Electric Company (PG&E) Topock Remediation Project, Needles, California. Specifically, this includes material removed from the Earth (i.e., displaced) as a result of drilling, excavation, sampling, testing, construction, grading, and other remedial activities”.* As cited, DTSC does not interpret the Protocol to be limited only to soil displaced as a result of groundwater remedy implementation. On the contrary, the scope appears to be sufficiently broad to cover all aspects of the environmental project conducted under the oversight of DTSC and the US Department of the Interior. DTSC is aware, however, that this protocol, once developed, could be submitted by PG&E to comply with a portion of Mitigation Measure CUL-1a-8 of the certified Final Environmental Impact Report where PG&E is to develop a protocol for handling soil cuttings to be included in the Cultural Impact Mitigation Program as part of the final design of the approved groundwater remedy.

Currently, DTSC is in the process of conducting a California Environmental Quality Act (CEQA) evaluation for the soil investigation work plan. Based on the results of the soil CEQA evaluation, the same mitigation measure may be found to be appropriate for the soil investigation activities. Note that displaced soils from soil investigation activities will not be generated until after the soil CEQA evaluation is completed and the soil investigation work plan is approved. DTSC will instruct PG&E to add a statement in the RTC summary table reflecting DTSC’s position.

2. Absolute Comments No. 24 by FMIT and 29 by Hualapai/TRC – The Tribes request that the depth of the soil placement/reuse should be considered in the decision for reuse.

DTSC supports PG&E's response in the RTC summary table that separation of displaced soil to this level of detail (shallow vs. deep) greatly increases the level of complexity related to soil testing and management scenarios and could result in a larger storage footprint. The current return, reuse, and/or restoration scenarios are not depth-specific, and deeper reuse scenarios may be limited. Variables like future erosion or change in regulations also complicate two-tier reuse scenarios.

More importantly, the decision to reuse soil that is above screening criteria regardless of depth ultimately rests on the respective land owners who own the land where the displaced soil will be reused. If potentially contaminated soils will be reused, the land owner must agree to a land use covenant restricting the use of their land after backfilling. DTSC believes that this issue cannot be managed at a global level since the decision is dependent on location, depth, concentration of material and landowner acceptance, DTSC believes that this issue can be deferred and handled on a case-by-case basis, potentially during the individual work plan, to first determine if there are potential locations that will require deep backfill, and more importantly, the individual land-owners preference on this issue. DTSC will instruct PG&E to revise the RTC summary table to remove the 'resolved' status for this comment, incorporate DTSC's position, and indicate that additional detail can be included in the individual work plans.

3. FMIT Comment on page 5, paragraph 6 of the August 2012 draft protocol – The FMIT requests the inclusion of the statement, *"material concentrations will be established for each soil pile in short-term storage. This concentration may include a statistical estimate of the soil pile"*. In addition to potential concentration-by-concentration comparison between the disturbed soil and screening criteria, DTSC does not object to considering other alternative methods as long as the methods will yield data that are representative of the material in question, are in accordance with waste classification regulations, and standard practice for classifying materials such as investigation derived soil cuttings for the purposes of determining proper disposal. DTSC concurs with the approach that additional details regarding this issue can be addressed in the individual work plans. DTSC will instruct PG&E to update the Protocol and RTC summary table to incorporate the FMIT's proposed concept as a potential alternative.

Finally, your letter indicated that the FMIT has concerns with the comment resolution process for the project in general. The FMIT expressed similar concerns in a letter dated July 23, 2012. DTSC and the U.S. Department of the Interior provided a response to the FMIT letter on August 31, 2012. If you feel that this letter and the August 31, 2012 letter do not adequately address your general concerns regarding the comment resolution process for the project, we would like to meet with you to discuss any remaining concerns you may have.

DTSC hopes that this letter provided additional clarification and adequately addressed the FMIT's issues related to the Protocol. As always, DTSC appreciates the Tribes and stakeholders continuing involvement on the PG&E Topock project and we look forward to working with you in moving the overall project forward. If you have any questions, please feel free to contact me at (714) 484-5492.

Sincerely,

Jmarcos

Jose Marcos, PG
Engineering Geologist
Department of Toxic Substances Control

cc: Ms. Karen Baker, DTSC
Mr. John Bathke, Quechan
Mr. Douglas Bonamici, CRIT
Mr. Mike Cavaliere, CH2MHill for PG&E
Ms. Courtney Ann Coyle, for FMIT
Ms. Margaret Eggers, TRC
Mr. Ron Escobar, Chemehuevi
Ms. Wilene Fisher-Holt, CRIT
Mr. Christopher Guerre, DTSC
Ms. Dawn Hubbs, Hualapai
Ms. Pamela Innis, DOI
Ms. Loretta Jackson-Kelly, Hualapai
Ms. Jill McCormick, Cocopah
Mr. Steven McDonald, for FMIT
Ms. Nora McDowell-Antone, FMIT
Ms. Yvonne Meeks, PG&E
Ms. Kendra Morton, Cocopah
Ms. Linda Otero, FMIT
Mr. Robert Prucha, TRC
Mr. Eric Rosenblum, TRC
Mr. Charlie Schlinger, TRC
Mr. Michael Sullivan, for FMIT
Mr. Timothy Williams, FMIT
Mr. Win Wright, TRC
Mr. Aaron Yue, DTSC

Tables

TABLE J-1
Historical Activities Summary, Constituents Exceeding Interim Screening Levels for Soil RFI/RI Units Outside the Fence Line, Perimeter Area, and Storm Drains, and Associated Analytical Suites
Soil RCRA Facility Investigation/Remedial Investigation Work Plan
PG&E Topock Compressor Station, Needles, California

Units	Summary of Historical Activities	Constituents Exceeding Interim Screening Levels	Analytical Suites[a]
SWMU 1	SWMU 1 is located outside the facility fence line in the bed of Bat Cave Wash. During the 1950s, the facility discharged wastewater containing chromium (cooling-tower blowdown) wastewater into Bat Cave Wash without any impoundment. From about 1964 to approximately 1971, the facility discharged wastewater containing chromium to a percolation bed and allowed water to percolate into the ground and/or evaporate. The chromium-containing wastewater was combined with a small quantity (approximately 5 percent) of treated water from the oily waste treatment system discharged from the station.	As, Ba, Ca, Total Cr, Cr(VI), Co, Cu, Pb, Mn, Mo, Ni, K, Se, V, Zn, Ca, Mg, Mn, K	Title 22 metals, hexavalent chromium, VOCs. SVOCs, PAHs, TPH, pH, pesticides, PCBs[b]
AOC 1	AOC 1 is located in the area surrounding SWMU 1, outside the fence line within Bat Cave Wash. This area comprises property owned by PG&E, Havasu National Wildlife Refuge, and the Bureau of Reclamation. As discussed for SWMU 1, the facility discharged wastewater containing chromium into the Bat Cave Wash until approximately 1964.	As, Ba, Total Cr, Cr(VI), Cu, Pb, Mo, Ni, Zn, Mn, Benzo (a) anthracene; Benzo (a) pyrene; Benzo (b) fluoranthene; PAH high-molecular-weight; B(a)P equivalent; Aroclor-1254; Total PCBs	Title 22 metals, hexavalent chromium, VOCs. SVOCs, PAHs, TPH, pH, pesticides, PCBs[b]
AOC 4	AOC 4 is located south of the fence line, and is a narrow, steep ravine that drains into the Bat Cave Wash. This area comprises property owned by PG&E and the Havasu National Wildlife Refuge. Operation of the area is not well known, but trash burning has been identified on site. In 2009, a removal action and erosion control were conducted.	An, Ba, Cd, Total Cr, Cr(VI), Co, Cu, Pb, Hg, Ni, V, Zn, benzo(a)anthracene; benzo (a) pyrene; benzo(b)fluoranthene; benzo(k)fluoranthene; indeno(1,2,3-cd)pyrene; PAH high-molecular-weight; B(a)P equivalent; Aroclor-1254; Aroclor-1260, Total PCBs	Title 22 metals, hexavalent chromium, VOCs, SVOCs, PAHs, TPH, pH, pesticides, PCBs
AOC 9	AOC 9 is located outside the fence line on the east side, south of the visitor parking lot on a steep slope. In 2000, a broken stormwater drainage pipe and stained soil were found in the area. The staining most likely originated from leaks near the Auxiliary Building. The stained soil was excavated, a new stormwater drainage pipe was installed, and the area was backfilled with 1 to 2 feet of clean soil. The exact location of the former stormdrain line is uncertain, and the footprint of AOC 9 is sufficiently large to address both potential locations.	Total Cr, Cr(VI), Cu, Pb, Hg, Mo, Ni, Tl, Zn, benzo (a) pyrene; B(a)P equivalent; 4,4-DDE	Title 22 metals, hexavalent chromium, VOCs, SVOCs, PAHs, TPH, pH, asbestos, pesticides, PCBs
AOC 10	AOC 10 is the east ravine located on the southeast side, outside of the fence line. This AOC comprises property owned by PG&E and the Havasu National Wildlife Refuge. The ravine is bisected by three constructed berms built between 1916 and the 1950s. AOC 10 receives runoff from the eastern portion of the upper yard of the compressor station, and the station access road.	As, Ba, Total Cr, Cr(VI), Co, Cu, Pb, Mo, Ni, Se, V, Zn, benzo(a)anthracene; benzo(a)pyrene; benzo(b)fluoranthene; benzo(k)fluoranthene; indeno(1,2,3-cd)pyrene; PAH high-molecular-weight; B(a)P equivalent	Title 22 metals, hexavalent chromium, VOCs, SVOCs, PAHs, TPH, general chemistry parameters, pesticides, PCBs, dioxins and furans (if burn material present)

TABLE J-1
Historical Activities Summary, Constituents Exceeding Interim Screening Levels for Soil RFI/RI Units Outside the Fence Line, Perimeter Area, and Storm Drains, and Associated Analytical Suites
Soil RCRA Facility Investigation/Remedial Investigation Work Plan
PG&E Topock Compressor Station, Needles, California

Units	Summary of Historical Activities	Constituents Exceeding Interim Screening Levels	Analytical Suites[a]
AOC 11	AOC 11 consists of the topographic low areas on the northeast side of the Topock Compressor Station. AOC 11 is located on PG&E and Havasu National Wildlife Refuge property. Multiple storm drains may be discharging to this area, or have discharged to this area in the past. AOC 11 also includes the topographic low area north of the plant access road near the Old Route 66 sign. This area receives runoff from the station access road.	As, Ba, Total Cr, Cr(VI), Cu, Pb, Mo, Se, Zn, Al, Mn, K, benzo(a)anthracene; benzo(a)pyrene; benzo(b)fluoranthene; benzo(k)fluoranthene; PAH high-molecular-weight; B(a)P equivalent; Aroclor-1260; Total PCBs; 4,4-DDE; dieldrin	Title 22 metals, hexavalent chromium, VOCs, SVOCs, PAHs, TPH, pH, PCBs, pesticides
AOC 12	AOC 12, known as the Fill Area, included three areas located near the Transwestern gas pipeline meter station, east of the compressor station. Portions of AOC 12 are located on PG&E and Havasu National Wildlife Refuge property. These areas were identified as locations that may contain buried construction-related debris, but no debris was found in the identified areas during the soil Part A Phase investigation.	Co, Cu, Se, Zn, di-n-butyl phthalate; benzo(a)pyrene; B(a)P equivalent	Title 22 metals, hexavalent chromium, VOCs, SVOCs, PAHs, TPH, pH, asbestos, pesticides, PCBs
AOC 14	AOC 14, the Railroad Debris Site, is located immediately north of I-40. It is bounded by Santa Fe railroad tracks to the north. The area sits approximately 100 feet above the bottom of the Bat Cave Wash. Aerial photos dated from 1947 to 1955 depicted materials and debris scattered in this area, and water softening (lime) sludge is also believed to have been disposed of in this area. An asbestos removal action was completed in 1999, and sampling detected no remaining asbestos. Field observations identified scattered debris and a potential burn layer (visible in the I-40 road cut) in this area.	Total Cr, Cr(VI), Cu, Pb, Hg, Mo, Se, Zn, benzo(a)pyrene; PAH high-molecular-weight; B(a)P equivalent; 4,4-DDE; 4,4-DDT	Title 22 metals, hexavalent chromium, VOCs, SVOCs, PAHs, TPH, pH, asbestos, pesticides, PCBs, dioxins/furans (if burn material present)
AOC 27	AOC 27, known as the MW-24 Bench, is located north of the upper yard of the compressor station and south of I-40. During employee interviews conducted by PG&E, a former PG&E Topock Compressor Station employee indicated this area was also used as a potential waste disposal area. In January 2008, during trenching activities in the MW-24 bench area associated with installation of a control panel related to the upland in situ pilot test, debris consisting mostly of treated wood, concrete, and scrap steel/tin (including a possible fragment of a storage tank) were encountered.	No data have been collected in this area.	Title 22 metals, hexavalent chromium, pesticides, PAHs, VOCs, SVOCs, PCBs, TPH, pH, dioxins and furans (if burn material present)
AOC 28	AOC 28, the Pipeline Drip Legs, consists of three drip legs associated with the 300A and 300B pipelines are located to the east of the compressor station and a drip leg for the 300B pipeline downstream of the compressor station in Bat Cave Wash. A drip leg collects pipeline liquids by gravity. It is connected to a valve used to drain the pipeline liquids to a fixed or portable tank.	No data have been collected in this area.	TPH, PAHs, and PCBs

TABLE J-1
Historical Activities Summary, Constituents Exceeding Interim Screening Levels for Soil RFI/RI Units Outside the Fence Line, Perimeter Area, and Storm Drains, and Associated Analytical Suites
Soil RCRA Facility Investigation/Remedial Investigation Work Plan
PG&E Topock Compressor Station, Needles, California

Units	Summary of Historical Activities	Constituents Exceeding Interim Screening Levels	Analytical Suites[a]
AOC 29	AOC 29, the Interim Measure-3 Treatment Plant, is located north of Interstate-40. Interim Measure No. 3 provides hydraulic control of the plume boundaries near the Colorado River to maintain a landward gradient. This facility was established and is operated under modern waste management laws, and will be closed pursuant to a decommissioning plan. Investigation of this AOC has been postponed until the plant is closed.	No data have been collected in this area.	Title 22 metals, hexavalent chromium, sodium, chloride
AOC 30	AOC 30, the MW-20 Bench, is located between the National Trails Highway and the Colorado River. This area is part of the floodplain reductive zone in situ pilot test. This facility was established and is operated under modern waste management laws and will be closed in accordance with agency requirements; therefore, investigation of this AOC is postponed until this unit is closed.	No data have been collected in this area.	Title 22 metals, hexavalent chromium, sodium, chloride
AOC 31	AOC 31, the Teapot Dome oil pit, is located on the northeast side of the facility, just outside the compressor station fence line. It is located within and overlaps with the Perimeter Area investigation. Former employees indicated that they had been told that the Teapot Dome restaurant provided oil changes, and that oil from vehicles was dumped into a pit. Potential wastes in this area pre-date the construction of the compressor station.	No data have been collected in this area.	Title 22 metals, hexavalent chromium, TPH, SVOCs, PAHs, and PCBs
UA 1	UA 1 is located north of the gas pipeline road near the former evaporation ponds. During site investigations, a former employee identified this area as a possible burial for asbestos-covered metal pipes. In 2008, a geophysical survey did not reveal any presence of the buried pipes, only small metallic anomalies found underground. This area will be investigated further, but no historical data have been documented. UA-1 is located within an especially culturally sensitive area, and the Tribes have expressed their desire to avoid or greatly limit any further activity in this area.	No data have been collected in this area.	Asbestos
UA 2	UA 2, the former 300B Pipeline Drip Tank, is located southeast of the plant on a shelf in the hill next to old Route 66. In 1994, investigation found oil-stained soil in a small area underneath and adjacent to this tank. In 1996 the tank was removed, and a cleanup was implemented. Soil was excavated to a depth of 5.5 feet. No further characterization is recommended in this area.	As, Ba, Pb, Zn	Title 22 metals, hexavalent chromium, VOCs, SVOCs, PAHs, TPH, pH, pesticides, PCBs
Perimeter Area[c]	The Perimeter Area is the area extending from the facility fence line to the toe of the slope. The majority of the Perimeter Area is lower than the station, and these topographically lower areas could have received runoff and incidental spills from the station. The Perimeter Area excludes those portions of the slope that are already part of a designated unit (that is, portions of SWMU 1, AOC 9, AOC 10, and AOC 11). There has been no previous investigations or sampling in this area.	No data have been collected in this area.	Title 22 metals, hexavalent chromium, TPH, SVOCs, PAHs, and PCBs

TABLE J-1
Historical Activities Summary, Constituents Exceeding Interim Screening Levels for Soil RFI/RI Units Outside the Fence Line, Perimeter Area, and Storm Drains, and Associated Analytical Suites
Soil RCRA Facility Investigation/Remedial Investigation Work Plan
PG&E Topock Compressor Station, Needles, California

Units	Summary of Historical Activities	Constituents Exceeding Interim Screening Levels	Analytical Suites[a]
Storm Drains[c]	Fifteen storm drain outfalls have been visually identified outside the fence line, but little information is known regarding the exact locations of historic lines and drainage to these lines. Contaminants discharged to catch basins within the compressor station would most likely have entered the storm drains and been transported to the outfalls.	No data have been collected in this area.	Title 22 metals, hexavalent chromium, TPH, PAHs, and PCBs

Notes:

[a] Analytical suites as presented in the revised Soil RFI/RI Work Plan.

[b] PCB analysis only on soil collected between 0 and 2 feet below ground surface.

[c] The Perimeter Area and Storm Drains are being investigated separately from the areas outside (Part A) and within (Part B) the fence line; once the data from the Perimeter Area and Storm Drains investigations have been collected, they will be combined with the appropriate existing Part A or B unit(s) or identified as a hotspot if there is no apparent connection to an existing unit.

Metals: Antimony (An); Arsenic (As); Barium (Ba); Beryllium (Be), Cadmium (Cd); Hexavalent Chromium (Cr^{+6}); Total Chromium (Total Cr); Cobalt (Co); Copper (Cu); Lead (Pb); Mercury (Hg); Molybdenum (Mo); Nickel (Ni); Selenium (Se); Silver (Hg); Thallium (Tl); Vanadium (V); Zinc (Zn)

Inorganics: Aluminum (Al); Calcium (Ca); Iron (Fe); Magnesium (Mg); Manganese (Mn); Potassium (K); Sodium (Na); Cyanide (CN)

Semivolatile Organic Compounds (SVOCs): 4-Methylphenol; Bis (2-ethylhexyl) phthalate; Di-N-butyl phthalate

Volatile Organic Compounds (VOCs): Methyl acetate

Polycyclic Aromatic Hydrocarbons (PAHs): 1-methyl naphthalene; 2-methyl naphthalene; acenaphthene, anthracene; benzo(a)anthracene; benzo(a)pyrene; benzo(b)fluoranthene; benzo(ghi)perylene; benzo(k)fluoranthene; chrysene; dibenzo(a,h)anthracene; fluoranthene; fluorene; indeno(1,2,3-cd)pyrene, naphthalene; phenanthrene; pyrene, PAH low-molecular-weight; PAH high-molecular-weight; B(a)P equivalent

Polychlorinated biphenyls (PCBs): Aroclor-1016; Aroclor-1254; Aroclor-1260; Total PCBs

Pesticides: 1,1-dichloro-2.2-bis[p-chlorophenyl] ethylene (4,4-DDE); 1,1,1-trichloro-2,2-bis(4-chlorophenyl)ethane (4,4-DDT)

Total Petroleum Hydrocarbons (TPH): TPH as diesel; TPH as motor oil

AOC = Area of Concern
B(a)P = benzo(a)pyrene
DDE = dichlorodiphenyldichloroethylene
DDT = dichlorodiphenyl trichloroethane
PAH = polycyclic aromatic hydrocarbon
PCB = polychlorinated biphenyl
SVOC = semivolatile organic compound
SWMU = solid waste management unit
TPH = total petroleum hydrocarbons
UA = Undesignated Area
VOC = volatile organic compound

TABLE J-2
Historical Area Summary and Constituents Exceeding Background Threshold Value for Soil RFI/RI Units Inside the Fence Line and Associated Analytical Suites
Soil RCRA Facility Investigation/Remedial Investigation Work Plan
PG&E Topock Compressor Station, Needles, California

Units	Summary of Historical Activities	Constituents Exceeding Background Threshold Value	Analytical Suites[a]
SWMU 5	SWMU 5 is located inside the fence line and comprises the two former sludge drying beds. Both of these beds were approximately 20 feet wide by 50 feet long. Bed 1, constructed in the early 1950s, was used to dehydrate lime sludge generated by the water softening process. From 1964 through 1969, it was used to treat chromium-bearing wastewater in the single-step chromate reduction process. A second bed was constructed in the late 1960s, and from 1969 through 1985, the two drying beds were used to dehydrate chromic hydroxide sludge. Use of these beds ceased in 1985. Closure of the drying beds was accomplished during Phase I of the Hazardous Waste Treatment System Closure, between 1988 and 1989.	Total Cr, Pb, Zn	Title 22 metals, hexavalent chromium, VOCs, TPH, SVOCs, and PAHs
SWMU 6	SWMU 6 was the chromate reduction tank located in the southern end of the lower yard. The tank was part of the two-step waste water treatment system installed in 1969 and was in operation through 1985. The tank was approximately 10 feet high and 5 feet in diameter, with a capacity of 1,500 gallons. Closure of this system was completed during Phase I hazardous waste treatment system closure.	Total Cr, Cr(VI), Zn	Title 22 metals, hexavalent chromium, VOCs, TPH, SVOCs, and PAHs
SWMU 8	SWMU 8 was located on the southern end of the lower yard in an area that is now covered by the new Fire Pump Building. SWMU 8 was the process pump tank that was part of the two-step waste water treatment system. The tank was approximately 8 feet high and 5.5 feet in diameter. The pump tank was used as a temporary holding tank for treated wastewater discharged from the precipitation tank, before it was pumped to the former percolation bed. In 1985, this unit was removed from service and closure was accomplished during Phase 1.	Co, Cu, Ni	Title 22 metals, hexavalent chromium, VOCs, TPH, SVOCs, and PAHs
SWMU 9	SWMU 9, located in the southwestern portion of the lower yard, was the transfer sump that was part of a two-step wastewater treatment system. The sump was a pre-fabricated concrete septic tank that had the capacity of 1,500 gallons. The sump was 3 feet in diameter and 20 feet deep. From 1969 through 1985 effluent from the chromate reduction tank was routed through SWMU 9. In 1989, the transfer sump was removed during Phase 2 of the Hazardous Waste Treatment System Closure.	Be	Title 22 metals, hexavalent chromium, VOCs, TPH, SVOCs, and PAHs
SWMU 11	SWMU 11 consists of two 400-gallon sulfuric acid tanks, located in Cooling Tower A (AOC 5) and Cooling Tower B (AOC 6). These tanks were used to control pH to minimize scale, corrosion, and biological growth. The 1950s through 1984, sulfuric acid was delivered to the facility in drums and pumped directly into the basins. To date, no data have been collected to evaluate any potential concerns related to sulfuric acid tanks.	No data have been collected in this area.	Title 22 metals, hexavalent chromium, and pH
AOC 5	AOC 5 is the area surrounding original Cooling Tower A, and encompasses the cooling tower, former chemical shed, and SWMU 11. Most of the area is covered with gravel, but pavement bounds the surrounding area. From 1951 to 1985 chromium-based corrosion inhibitors were used to treat the cooling water, and stored within the chemical shed. Stained soils were observed within the shed during demolition of the shed in 2000. The stained soils were excavated.	Cr^{+6}, total Cr, Cu, Zn	Title 22 metals, hexavalent chromium, and pH

TABLE J-2
Historical Area Summary and Constituents Exceeding Background Threshold Value for Soil RFI/RI Units Inside the Fence Line and Associated Analytical Suites
Soil RCRA Facility Investigation/Remedial Investigation Work Plan
PG&E Topock Compressor Station, Needles, California

Units	Summary of Historical Activities	Constituents Exceeding Background Threshold Value	Analytical Suites[a]
AOC 6	AOC 6 is the entire area surrounding Cooling Tower B, and encompasses the cooling tower, former chemical shed, and SWMU 11. Most of the area is covered with gravel, but pavement bounds the surrounding area. From 1951 to 1985 chromium-based corrosion inhibitors were used to treat the cooling water, and stored within the chemical shed. Stained soils were observed within the shed during demolition of the shed in 2000. The stained soils were excavated.	Cr+6, total Cr, Cu, Ni, Zn	Title 22 metals, hexavalent chromium, and pH
AOC 7	AOC 7 consists of the hazardous materials storage area and loading dock, and the adjacent Carpenter Shop (former Chemical Storage Building). The current hazardous material storage area has been used since the mid 1980s to store chemical products used at the station. The former Chemical Storage Building was constructed in 1951 as part of the original station configuration.	No data have been collected in this area.	Title 22 metals, hexavalent chromium, VOCs, SVOCs, PAHs, PCBs, TPH, and pH
AOC 8	AOC 8 consists of a small storage locker used for paint storage. The locker is 5 feet wide by 5 feet long and is set back into southern retaining wall at the Compressor Station. The paint locker is constructed of steel with tight fitting doors, and located on pavement. No evidence of release is present.	No data have been collected in this area.	Title 22 metals, VOCs and TPH
AOC 13	AOC 13 consists of the current and former unpaved areas within the fence line. Many of the former unpaved areas are now paved and covered by buildings. Spills that have occurred at the facility and may have affected unpaved areas.	Be, Cd, Cr+6, Total Cr, Co, Cu, Pb, Mo, Ni, Se, Zn	Title 22 metals, hexavalent chromium, VOCs, TPH, SVOCs, PAHs, PCBs, and asbestos
AOC 15	AOC 15 consists of the auxiliary jacket cooling water pumps located north of the Auxiliary Building. AOC 15 is part of the closed-loop cooling system for the generator engines. From 1951 through 1985, chromium-based cooling water additives were used in the closed loop cooling systems. Leaks from valve seals and pumps may have affected the soil at AOC 15.	Cr(VI), total Cr, Cu, Pb, Mo, Ni, Zn	Title 22 metals, hexavalent chromium, and pH
AOC 16	AOC 16 is the sand blast shelter located in the lower yard. The sandblast shelter was installed in the early 1990s, and used primarily for smaller items (fixed infrastructure and large items are typically sandblasted in place).	No data have been collected in this area.	Title 22 metals
AOC 17	AOC 17 is the onsite septic system that serves the Auxiliary Building and nearby buildings. It consists of the septic located northeast of the air dryer building, and the associated leachfield. Wastewater from the facility laboratory of the Auxiliary Building is routed to the septic system. According to informal station drawings, the leachfield consists of 3 100-foot-long lines spaced 6 feet apart. The onsite septic system is believed to have been installed as part of the original compressor station facilities.	No data have been collected in this area.	Title 22 metals, hexavalent chromium, VOCs, TPH, SVOCs, and PAHs

TABLE J-2
Historical Area Summary and Constituents Exceeding Background Threshold Value for Soil RFI/RI Units Inside the Fence Line and Associated Analytical Suites
Soil RCRA Facility Investigation/Remedial Investigation Work Plan
PG&E Topock Compressor Station, Needles, California

Units	Summary of Historical Activities	Constituents Exceeding Background Threshold Value	Analytical Suites[a]
AOC 18	AOC 18 consists of the hazardous waste transference pipelines associated with the hazardous waste treatment system, as well as the pipelines conveying the cooling tower blowdown to the lower yard. In the 1980s, the pipelines were uncovered, pressure tested, and removed in accordance with the hazardous waste treatment system closure plan. Visually contaminated soil was removed, confirmation sampling was conducted, and supplemental soil excavation was conducted where needed. Not all sections of the piping could be removed, and active sections were not pressure tested.	Be, Cr(VI), Total Cr, Pb, Mo, Ni, Zn	Title 22 metals, hexavalent chromium, pH, VOCs, TPH, SVOCs, and PAHs
AOC 19	AOC 19 is the Former Cooling Liquid Mixing and Jacket Cooling Water Hot Well Area located east of the Compressor Building. Employee interviews indicated that the hot well periodically overflowed. The hotwell was replaced with surge tanks circa 1967. Remnants of the hotwell were discovered and removed during a construction project in the 1990s. The former cooling liquid mixing area consists of a small concrete pad. Green droplets were noticed on the concrete pad during a routine test of a nearby eyewash fountain/safety shower in 2006. Elevated levels of chromium were found in the green water.	Cd, Cr(VI), total Cr, Cu, Pb, Mo, Se, Zn	Title 22 metals, hexavalent chromium, and pH
AOC 20	AOC 20 consists of the industrial floor drains within the compressor station building and other buildings within the upper yard, as well as the associated pipelines, and the pipelines conveying the drainage to the oily water holding tank in the lower yard. Historically, the pipes associated with AOC 20 were made from vitrified clay.	No data have been collected in this area.	Title 22 metals, hexavalent chromium, VOCs, TPH, PCBs, and PAHs
AOC 21	AOC 21 is a former round structure found adjacent to Sludge Drying Bed No. 1. This round structure was filled with white material that was most likely water softener (lime) sludge. The material appears to be similar to the material found in Sludge Drying Bed No. 1. No information is available on the construction of this area, although it appears to be of earthen materials.	No data have been collected in this area.	Title 22 metals, hexavalent chromium, calcium, sodium, and pH
AOC 22	AOC 22 consists of a three-sided structure located in the upper yard, along the present compressor station fence line. A 1955 aerial photo appears to depict a drum that was near the structure. No further information about this structure is available.	No data have been collected in this area.	Title 22 metals, hexavalent chromium, pH, VOCs, TPH, SVOCs, PCBs, and PAHs
AOC 23	AOC 23 is the former water conditioning (water softening) building located in the southern part of the upper yard. Currently AOC 23 is used for storage of dry non-hazardous materials. Chemical feed tanks for the water softening process were located inside the building, and the precipitator for the water softening system was located outside the building.	No data have been collected in this area.	Title 22 metals, hexavalent chromium, VOCs, TPH, SVOCs, PAHs, PCBs, and pH
AOC 24	AOC 24 consists of the stained area near the American Petroleum Institute oil/water separator formerly located northeast of the northern scrubbers, as well as the footprint of the separator. The staining is apparent in 1955 aerial photographs and some plant photographs. The separator was later moved and reused as part of the old oily water treatment system adjacent to Sludge Drying Bed No. 1.	No data have been collected in this area.	Title 22 metals, hexavalent chromium, VOCs, TPH, SVOCs, PAHs, PCBs, and pH

TABLE J-2
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Soil RCRA Facility Investigation/Remedial Investigation Work Plan
PG&E Topock Compressor Station, Needles, California

Units	Summary of Historical Activities	Constituents Exceeding Background Threshold Value	Analytical Suites[a]
AOC 25	AOC 25 consist of the compressor and generator engine basements. There are 10 compressor engines (nine of which are still active) and four generators engines. Each of the engines is mounted on a concrete pedestal on a concrete foundation. The pedestal is surrounded by a concrete trench. The trench around the pedestal is known as the basement. Drips and leaks from the engines would discharge into the drains in the basements, and enter AOC 20. Surface and shallow subsurface site investigation and soil removal have been conducted in areas immediately adjacent to the auxiliary and compressor buildings.	No data have been collected in this area.	Title 22 metals, hexavalent chromium, VOCs, TPH, SVOCs, PAHs, PCBs, and asbestos
AOC 26	AOC 26 is the location of the former scrubber oil sump located in the lower yard south of the South Scrubbers. The sump received pipeline liquids of the natural gas scrubbers, as well as oil from the oil-bath filters until the filters were taken out of service in the 1960s. The scrubber sump was removed in 1996 as part of an upgrade to the waste-oil system. The area was investigated and contaminated soil was removed to the degree feasible (excavation was limited by the presence of infrastructure). Residual contamination is present below the maximum excavation depth (approximately 10 feet).	No data have been collected in this area.	Title 22 metals, hexavalent chromium, VOCs, TPH, SVOCs, PAHs, PCBs, and pH
AOC 32	AOC 32 is the oil storage area in the upper yard immediately west of the visitor parking lot. AOC 32 contains five 7,150-gallon-capacity oil storage tanks, the steel-lined waste-oil sump, and two 150-gallon-capacity lubricating-oil surge tanks. The tanks and oil sump are part of the original compressor station installation. The tanks and sump are located within a concrete containment structure. The sidewalls of the containment structure are apparent in a ca. 1956 station photograph; however, it is uncertain if the floor of the oil storage area has always been paved. Associated piping is also located within the containment. The containment structure appears to be in good repair; an inspection conducted in 1994 indicated that it was in good condition at the time. The dirty oil sump receives waste oil from the oil/water separator, and pipeline liquids collected from the scrubbers. It formerly received used oil from the scrubber sump.	No data have been collected in this area.	Title 22 metals, hexavalent chromium, VOCs, TPH, SVOCs, PAHs, and PCBs
AOC 33	AOC 33 is the potential burn area located near AOC 17. This area was identified when PG&E conducted additional interviews with current and former employees to collect new anecdotal information pertaining to historical compressor station practices. Several employees reported that PG&E may have conducted a yearly fire training exercise during which materials were set on fire and employees practiced extinguishing the fire. The employees indicated that these fire extinguishing drills took place in the early 1980s (and may have taken place prior to then) and continued into the 1990s.	No data have been collected in this area.	Title 22 metals, hexavalent chromium, VOCs, TPH, SVOCs, PAHs, PCBs, asbestos, and dioxin and furans
Unit 4.3	Unit 4.3 is the oil/water holding tank that was installed in 1970. It was a cylindrical steel tank 15 feet long by 5 feet in diameter, that was used to collect oily water from the compressor floor drainage, engine and steam-cleaning operations, and other activities discharging to AOC 20.	None, sampled only for TPH.	Title 22 metals, hexavalent chromium, pH, VOCs, TPH, SVOCs, and PAHs

TABLE J-2
Historical Area Summary and Constituents Exceeding Background Threshold Value for Soil RFI/RI Units Inside the Fence Line and Associated Analytical Suites
Soil RCRA Facility Investigation/Remedial Investigation Work Plan
PG&E Topock Compressor Station, Needles, California

Units	Summary of Historical Activities	Constituents Exceeding Background Threshold Value	Analytical Suites[a]
Unit 4.4	Unit 4.4 was the oil/water separator located adjacent to Unit 4.3 (the American Petroleum Institute oil/water separator relocated from the area northeast of the north scrubbers. Unit 4.4 was equipped with an underflow weir to control discharge, and the floating oil was transferred by hose to a portable waste-oil storage tank.	None, sampled only for TPH.	Title 22 metals, hexavalent chromium, pH, VOCs, TPH, SVOCs, and PAHs
Unit 4.5	Unit 4.5 was the portable waste-oil storage tank adjacent to the Unit 4.3 and 4.4. Skimmed oil from Unit 4.4 was discharged into Unit 4.5. The portable tank was stationed on a concrete pad; when it was full it was transported to the east side of the facility, and pumped into the waste-oil tank. Starting in 1975, the oil was either sold for reuse or transported to a recycling center.	None, sampled only for TPH.	Title 22 metals, hexavalent chromium, pH, VOCs, TPH, SVOCs, and PAHs

Notes:

[a] Analytical suites as presented in the revised Soil RFI/RI Work Plan.

Metals: Antimony (An); Arsenic (As); Barium (Ba); Beryllium (Be), Cadmium (Cd); Hexavalent Chromium (Cr^{+6}); Total Chromium (Total Cr); Cobalt (Co); Copper (Cu); Lead (Pb); Mercury (Hg); Molybdenum (Mo); Nickel (Ni); Selenium (Se); Silver (Hg); Thallium (Tl); Vanadium (V); Zinc (Zn)

Inorganics: Aluminum (Al); Calcium (Ca); Iron (Fe); Magnesium (Mg); Manganese (Mn); Potassium (K); Sodium (Na); Cyanide (CN)

Semivolatile Organic Compounds (SVOCs): 4-Methylphenol; Bis (2-ethylhexyl) phthalate; Di-N-butyl phthalate

Volatile Organic Compounds (VOCs): Methyl acetate

Polycyclic Aromatic Hydrocarbons (PAHs): 1-methyl naphthalene; 2-methyl naphthalene; acenaphthene, anthracene; benzo(a)anthracene; benzo(a)pyrene; benzo(b)fluoranthene; benzo(ghi)perylene; benzo (k) fluoranthene; chrysene; dibenzo(a,h)anthracene; fluoranthene; fluorene; indeno(1,2,3-cd)pyrene, naphthalene; phenanthrene; pyrene, PAH low-molecular-weight; PAH high-molecular-weight; B(a)P equivalent

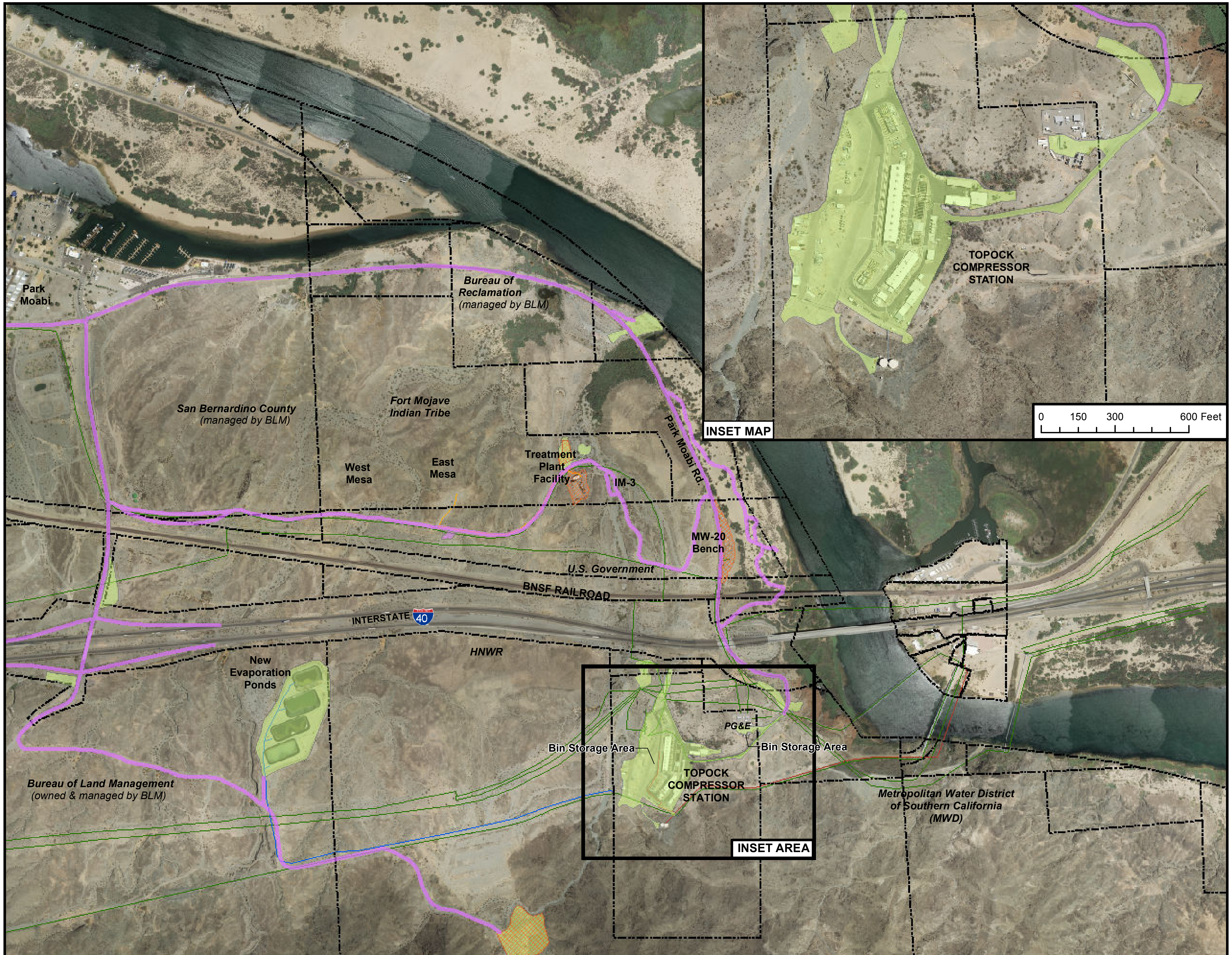
Polychlorinated biphenyls (PCBs): Aroclor-1016; Aroclor-1254; Aroclor-1260; Total PCBs

Pesticides: 1,1-dichloro-2.2-bis[p-chlorophenyl] ethylene (4,4-DDE); 1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane (4,4-DDT)

Total Petroleum Hydrocarbons (TPH): TPH as diesel; TPH as motor oil

AOC = Area of Concern
B(a)P = benzo(a)pyrene
DDE = dichlorodiphenyldichloroethylene
DDT = dichlorodiphenyl trichloroethane
PAH = polycyclic aromatic hydrocarbon
PCB = polychlorinated biphenyl
SVOC = semivolatile organic compound
SWMU = solid waste management unit
TPH = total petroleum hydrocarbons
UA = Undesignated Area
VOC = volatile organic compound

Figure



LEGEND

- Proposed Waste Management Area
- Proposed Staging Area
- Access/Haul Route

Piping

- Effluent
- Natural Gas
- Potable Water
- Underground Waste Water

0 400 800 1,600 Feet

FIGURE J-1
STAGING AREAS

DISPLACED SOIL AND HAZARDOUS WASTE MANAGEMENT PROCEDURES
PACIFIC GAS AND ELECTRIC,
TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

CH2MHILL

Appendix K
PG&E Engineering Drawings Referenced in this Work Plan

(Drawing Scans on CD Only)

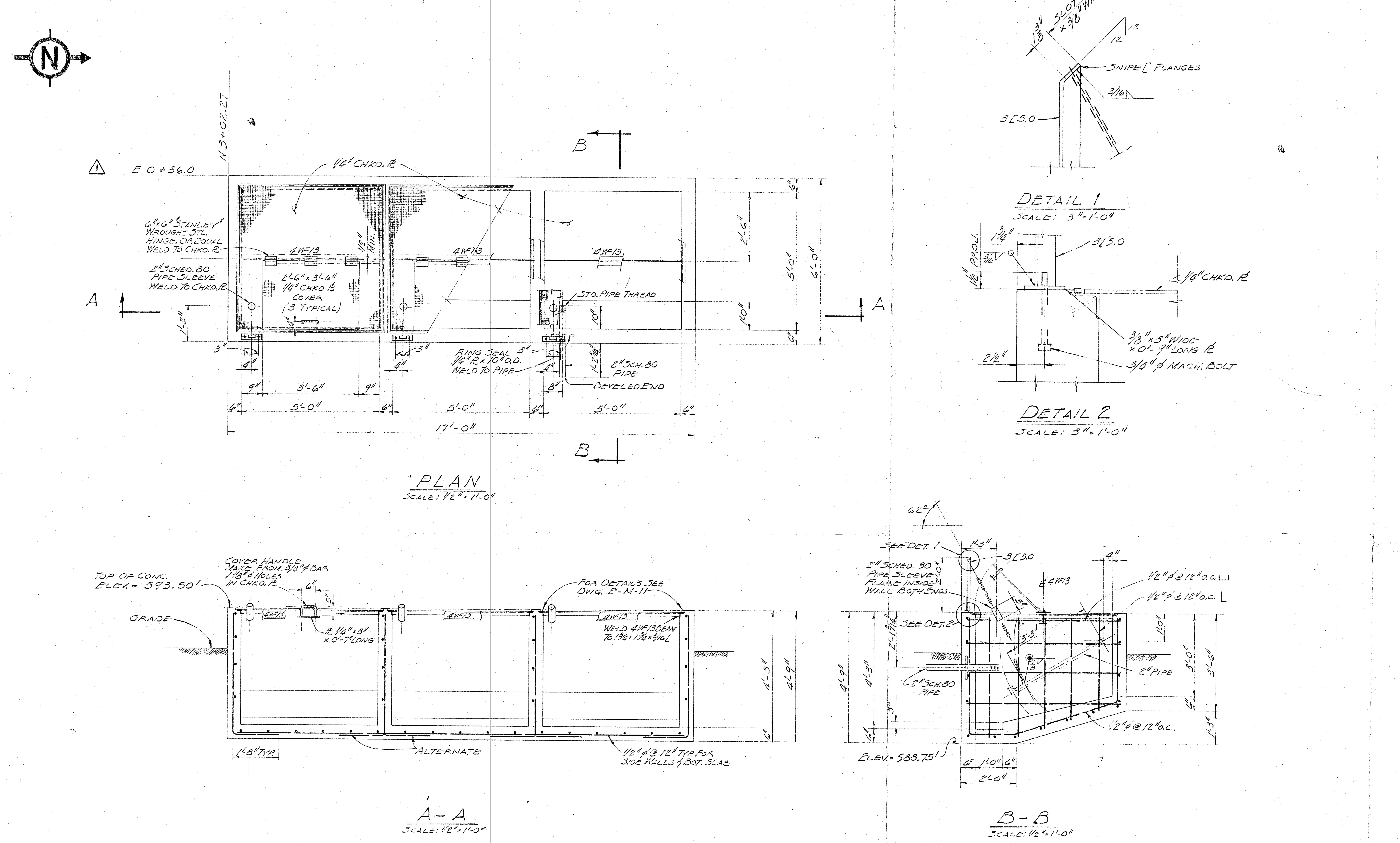
Part 1 of 2

APPENDIX K
PG&E Engineering Drawings Referenced in the Soil RCRA Facility Investigation/Remedial Investigation Work Plan
Soil RCRA Facility Investigation/Remedial Investigation Work Plan,
Pacific Gas and Electric Company, Topock Compressor Station, Needles, California

No.	Section - Text	Engineer Drawing No.	Title	Date	Source
1	Appendix B - SubAppendix B2	485352	Location Plan of Tanks, Equipment & Piping, Waste Water Well Disposal System- Areas 13 & 14, Topock Compressor Station Gas Operations.	2001	PG&E
2	Appendix B - SubAppendix B3	485349	Piping Plan for Waste Water Well Disposal System Area No. 5, Topock Compressor Station, Gas Operations.	Febuary 25, 1970	PG&E
3	Appendix B - SubAppendix B3	485352	Location Plan of Tanks, Equipment & Piping, Waste Water Well Disposal System – Areas 13 & 14 Topock Compressor Station, Gas Operations.	No date	PG&E
4	Appendix B - SubAppendix B7	482629, Rev. 5	Sewers, Domestic, Utility & Fire Water System, Topock Compressor Station.	No date (original drawing dated, January 9, 1957)	PG&E
5	Appendix B - SubAppendix B8	482629, Rev. 5	Sewers, Domestic, Utility & Fire Water System, Topock Compressor Station.	No date (original drawing dated, January 9, 1957)	PG&E
6	Appendix B - SubAppendix B9	383318, Rev. 1	Floor Plan, Section and Details, Chemical Storage Building, Topock Compressor Station.	April 8, 1953	PG&E
7	Appendix B - SubAppendix B14	481785, Rev. 22	Sewers & Drains, Topock Compressor Station.	December 11, 1967	PG&E
8	Appendix B - SubAppendix B16	481878, Rev. 7	Foundation for Jacket Cooler, Auxiliary Cooler & Hot Well, Topock Compressor Station.	February 2, 1954	PG&E
9	Appendix B - SubAppendix B16	484387, Rev. 2	Foundation Plan and Piping Supports, 1967 Construction, Topock Compressor Station.	May 2, 1967	PG&E
10	Appendix B - SubAppendix B17	481785, Rev. 22	Sewers & Drains, Topock Compressor Station.	December 11, 1967	PG&E
11	Appendix B - SubAppendix B17	387706, Rev. 2	Elementary-Mechanical Drain and Sewer Systems, Topock Compressor Station, Gas Operations.	June 16, 1988	PG&E
12	Appendix B - SubAppendix B18	580855, Rev. 4	Topography Colorado River Crossing to Topock Compressor Station	January 17, 1957	PG&E
13	Appendix B - SubAppendix B20	482717	Plan and Details, Fdn. for Bulk Chemical Storage, Topock Compressor Station. (no revision number)	February 28, 1957	PG&E
14	Appendix B - SubAppendix B20	481775, Rev. 7	Piping Plan, Water Softening Area No.5, Topock Compressor Station.	March 1, 1960	PG&E
15	Appendix B - SubAppendix B20	481794, Rev. 5	Electrical Layout & Details, Water Softener Building, Topock Compressor Station.	Corrected July 28, 1970	PG&E

APPENDIX K
PG&E Engineering Drawings Referenced in the Soil RCRA Facility Investigation/Remedial Investigation Work Plan
Soil RCRA Facility Investigation/Remedial Investigation Work Plan,
Pacific Gas and Electric Company, Topock Compressor Station, Needles, California

No.	Section - Text	Engineer Drawing No.	Title	Date	Source
16	Appendix B - SubAppendix B20	485349	Piping Plan for Waste Water Well Disposal System Area No. 5, Topock Compressor Station, Gas Operations.	February 25, 1970 (no revision number)	PG&E
17	Appendix B - SubAppendix B20	482629, Rev. 5	Sewers, Domestic, Utility & Fire Water System, Topock Compressor Station.	No revision date (original drawing dated January 9, 1957)	PG&E
18	Appendix B - SubAppendix B21	481785, Rev. 22	Sewers and Drains, Topock Compressor Station.	December 11, 1967	PG&E
19	Appendix B - SubAppendix B21	382956, Rev. 1	Plan and Details of Oil-Water Separator, Topock Compressor Station.	April 21, 1970	PG&E
20	Appendix B - SubAppendix B21	482429, Rev. 12	Piping Plan - Area No. 11, Scrubber Area, Topock Compressor Station.	June 5, 1993	PG&E
21	Appendix B - SubAppendix B22	482377, Rev. 1	Compressor Foundation Plan and Details, Compressor Building Expansion, Topock Compressor Station.	January 28, 1953	PG&E
22	Appendix B - SubAppendix B23	382914, Rev. 1	Scrubber Oil Sump, Topock Compressor Station.	March 13, 1951	PG&E
23	Appendix B - SubAppendix B23	481766, Rev. 21	Piping Plan at Scurbber (Typical) and Oil Sump – Area No. 2, Topock Compressor Station.	August 26, 1994	PG&E
24	Appendix B - SubAppendix B25	485353, Rev. 0 (As Built)	Elevations and Details of Tanks, Equipment and Piping for Waste Water Well Disposal System – Areas 13 & 14, Topock Compressor Station.	August 1, 1970	PG&E
25	Appendix B - SubAppendix B25	382956, Rev. 1	Plan & Details of Oil-Water Separator, Topock Compressor Station.	April 21, 1970	PG&E
26	Appendix B - SubAppendix B25	386121, Rev. 1	Flow Diagram, Waste Water Treatment and Disposal System, Topock Compressor Station.	October 1982 (original drawing dated April 9, 1970)	PG&E
27	Appendix B - SubAppendix B25	481785, Rev. 27	Sewers and Drains, Topock Compressor Station.	March 29, 1991	PG&E



LIST OF MATERIAL

ITEM	QUAN.	DESCRIPTION	ORDER NO.
1	5	CU. YDS. CONCRETE — CEMENT	150-045
		AGGREGATE	150-046
2	1 LOT	REINFORCING STEEL	150-040
3	16	LIN. FT. 1/4" x 5'-2 1/2" WIDE CHKD. PL	150-049
4	63	LIN. FT. FABRICATED L 1 3/4 x 1 3/4 x 3/16 COMPLETE WITH ANCHORS & 5/16" x 1/2" BAR PER DWG. E-M-11.	150-049
5	9	6" x 6" "STANLEY" WROUGHT STEEL HINGE, OR EQUAL	150-048
6	24	LIN. FT. 3/16" COIL CHAIN	150-048
7	6	3/4" Ø x 0'-8" (L) LONG MACH. BOLT WITH 1-CPSF HEX. NUT	150-048
8	4	LIN. FT. 2" SCHED. 80 PIPE	FIELD
9	15	LIN. FT. 4WF13	150-049
10	3	LIN. FT. 3/8" x 3" WIDE STL. PL.	150-049
11	7	LIN. FT. 3[5.0	150-049
12	3	1/4" STL. SEALRING 2 1/2" I.D. x 10" O.D.	150-049

GENERAL NOTES

1. FOR DESIGN & CONSTRUCTION NOTES SEE DWG. # 031850.

REFERENCE DRAWINGS

PIPING PLAN AT SCRUBBER (TYPICAL) & OIL SUMP AREA NO. 2	481765
TYPICAL FLOOR PLATE DETAILS	E-M-11
PLOT PLAN	481751
DESIGN & CONSTRUCTION NOTES FOR CONC. DWGS.	031850

TABLE OF CHANGES

NO	DATE	DESCRIPTION			APPRD
1	3/13/51	CHANGED COORDINATE FROM E-0+32.00 TO E-0+36.00			
0	1/10/51	ISSUED FOR CONSTRUCTION			

APPROVED BY — GM 113785 DRAWING LIST

BY: DR. EMS; CH.; O.K. RPS; DATE 1-4-51

SCALES: AS SHOWN

SCRUBBER OIL SUMP
TOPOCK COMPRESSOR STATION

PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO CALIFORNIA

BILL OF MATERIAL

SUPERSEDES

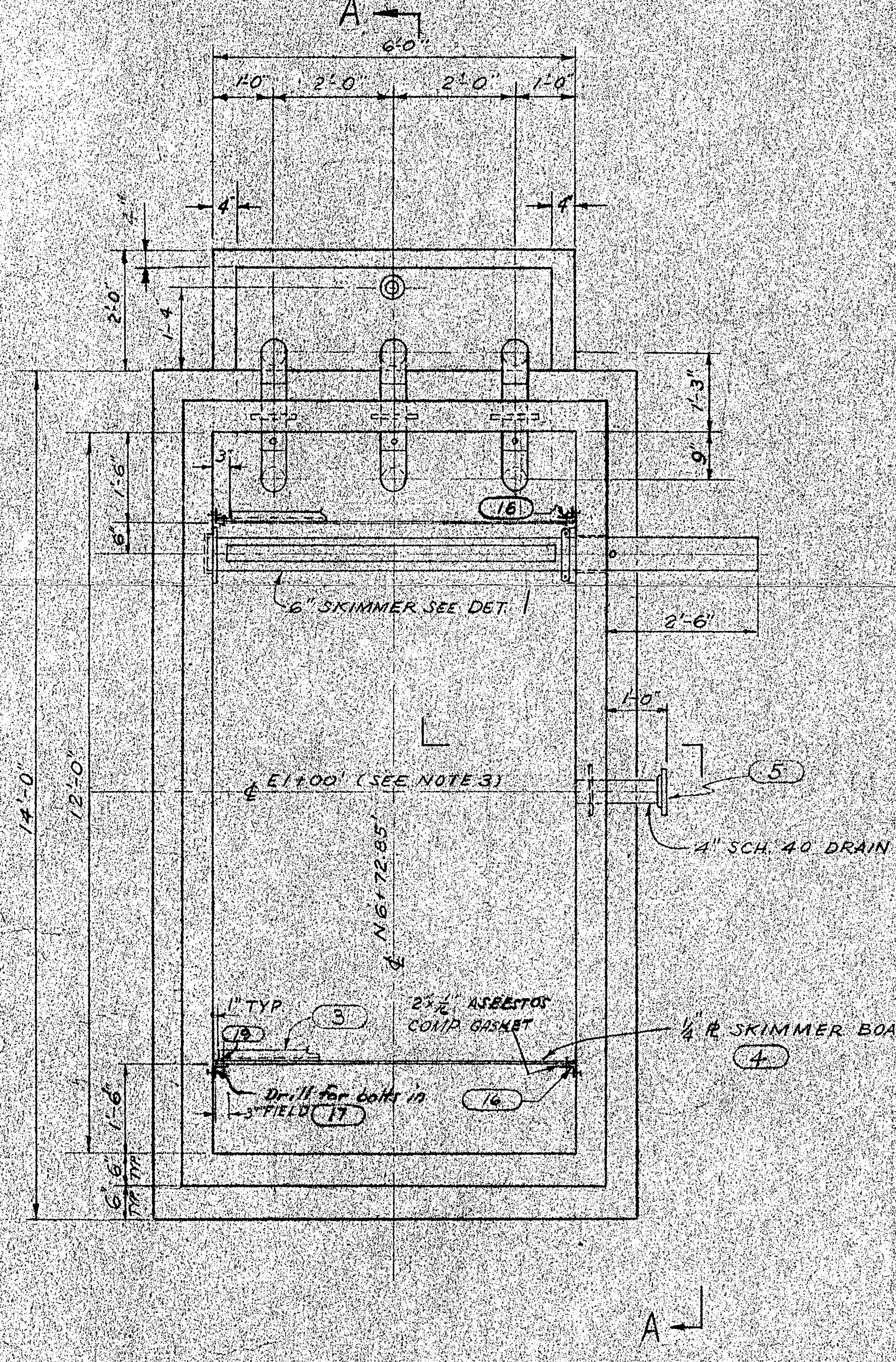
SUPERSEDED BY

SHEET NO. SHEETS

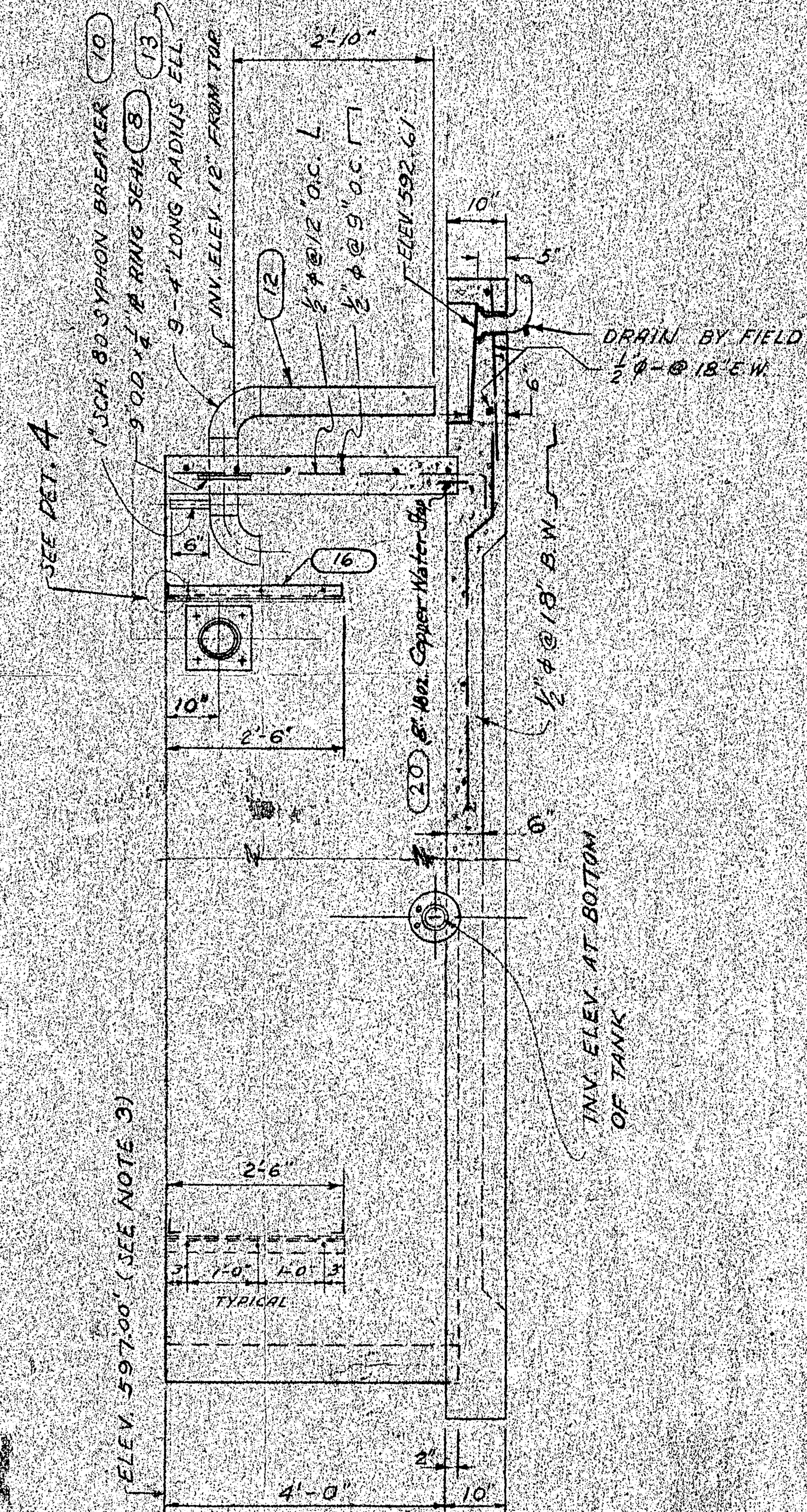
DRAWING NUMBER: 382914 — CHANGE: 1

Q

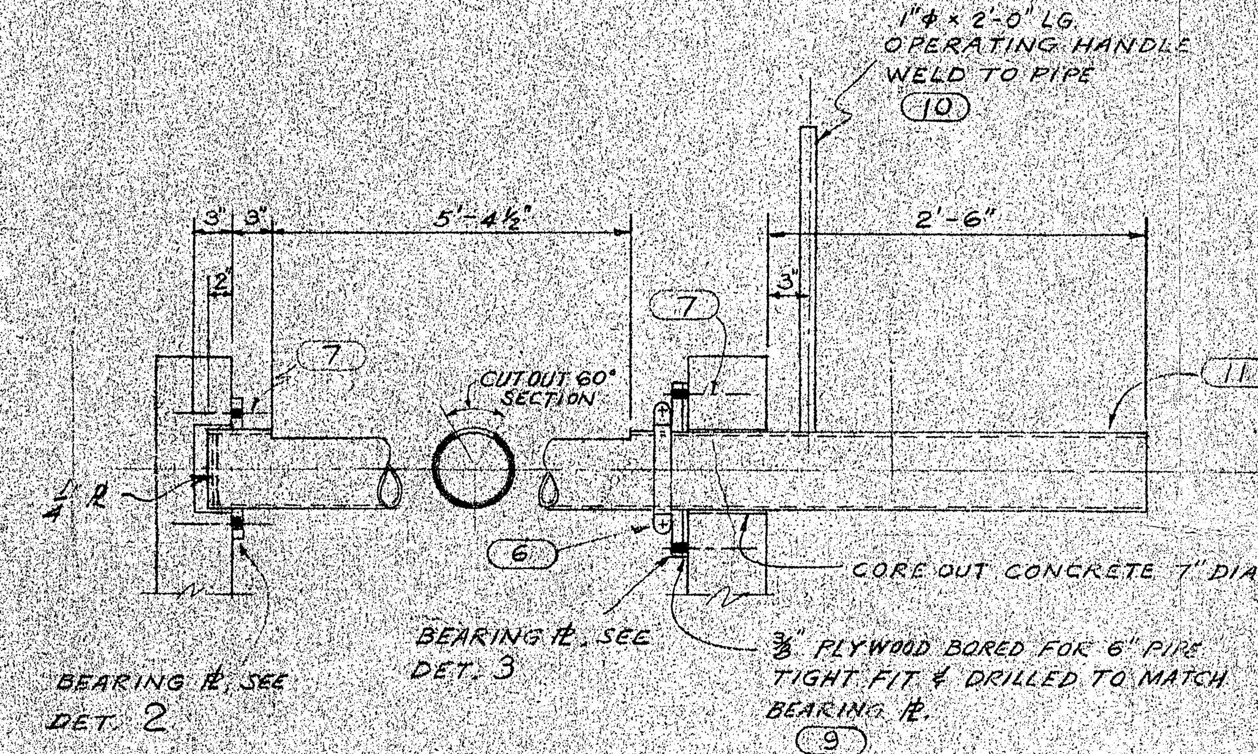
382914-1



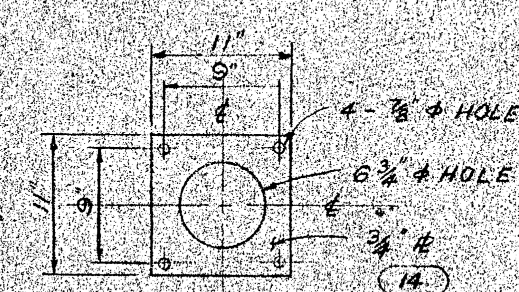
PLAN



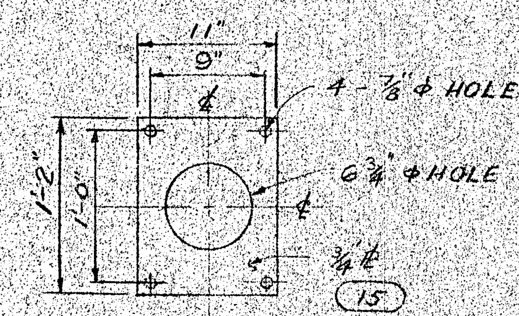
A-A



DETAIL 1
SKIM PIPE
SCALE 1" = 1'-0"



DETAIL 2
SCALE 1" = 1'-0"



DETAIL 3
SCALE 1" = 1'-0"

DETAIL 4
NO SCALE

LIST OF MATERIAL

ITEM	QUAN	DESCRIPTION	ORDER NO
1	6	CU. YD. CONCRETE	Field
2	1 LOT	REINF. STL AS SHOWN	150,040
3	24	LIN. FT. L 2 x 2 x ¼	150,119
4	13	LIN. FT. ℞ 30 x ½	150,119
5	1	4" 150# F.S. SO. FLANGE, F.F.	150,119
6	1	PIPE CLAMP CRANE #212G OR EQ.	150,119
7	8	¾" ϕ x 6" LG. MACH. BOLT WITH 1 C.P.S.F. HEX NUT	150,047
8	4	9" ϕ x ¼" ℞	150,119
9	1	PC. ⅜ PLYWOOD 11" x 1'-2"	Field
10	4	LIN. FT. 1" SCH. 80 STL PIPE	150,119
11	10	LIN. FT. 6" SCH. 40 STL PIPE	150,119
12	11	LIN. FT. 4" SCH. 40 STL PIPE	150,119
13	6	4" STD. WT. F.S. WELD ELL. L.R.	150,119
14	1	PC. PLATE 11 x ¾ x 0'-11" LG.	150,119
15	1	PC. PLATE 11 x ¾ x 1'-2" LG.	150,119
16	10	LIN. FT. L 3 x 2 x ¼	150,119
17	12	½" ϕ x 6" LG. MACH. BOLT WITH 1 CPSF HEX NUT	150,047
18	4	2" x 1/16" ASBESTOS COMP. GASKET 2'-C" lg.	150,119
19	12	½" ϕ x 1¼" lg. Mach. Bolts with 1 C.P.S.F. Hex Nut	150,047
20	40	lin ft 8" wide 18 ounce copper sheet	150,119

DESIGN & CONSTRUCTION NOTES

1. FOR DESIGN & CONSTRUCTION NOTES SEE DWG. NO. 081850
2. REINF. STL ON ℄ OF WALLS & SLAB
3. EAST COORDINATE AND ELEVATION OF STRUCTURE SUBJECT TO CHANGE IN FIELD DEPENDING UPON GRADE ELEVATION. BOTTOM OF STRUCTURE MUST REST ON FIRM GROUND.

REFERENCE DRAWINGS

PLOT PLAN	481751
DESIGN & CONSTRUCTION NOTES FOR CONCRETE DWGS.	081850
SEWERS & DRAINS	481795
LOCATION PLAN	485352

382956

⚠ NOTE:
This dwg. was not revised to meet construction changes required for Waste Water Disposal System installation on GM 172520.

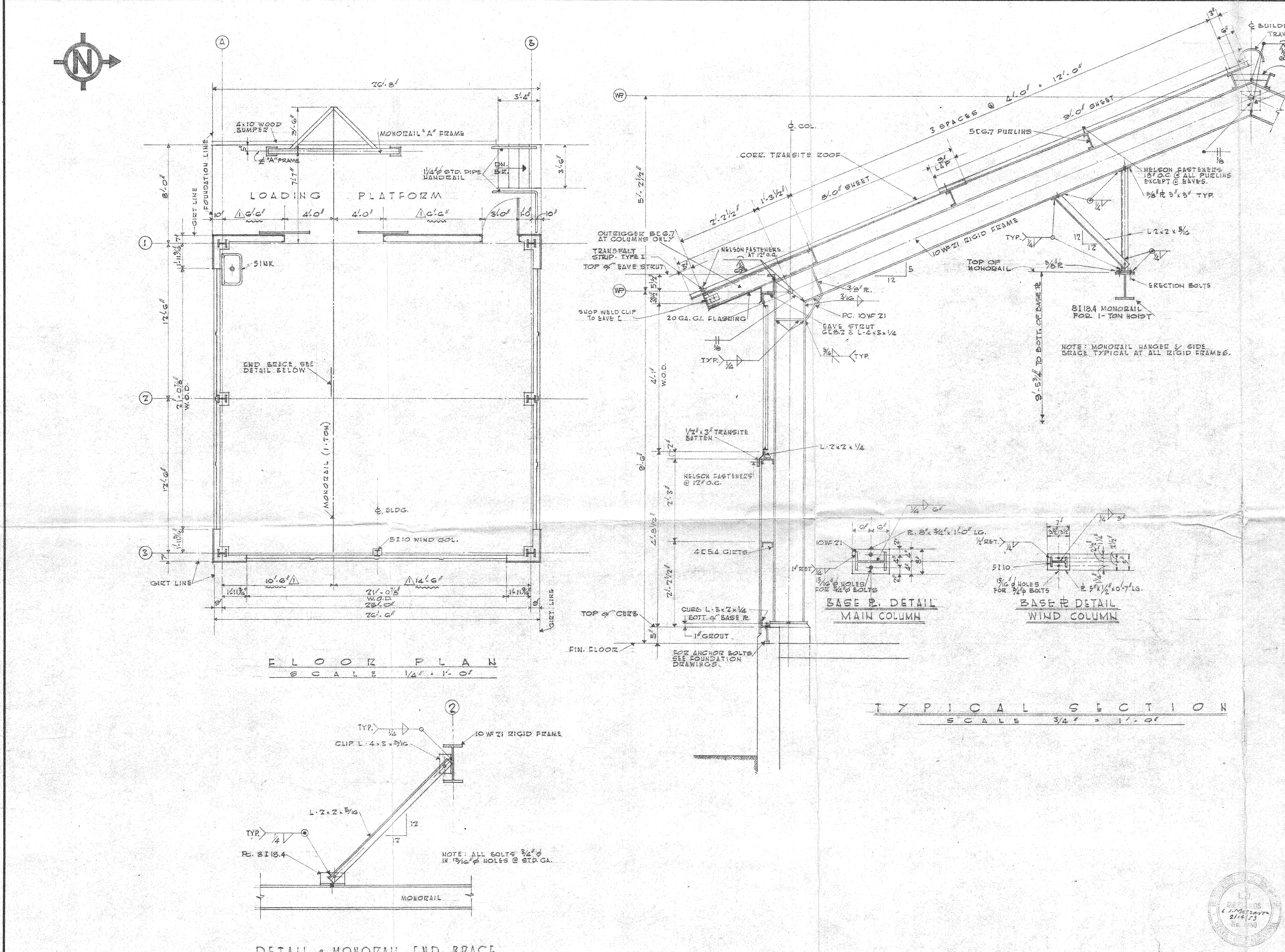
TABLE OF CHANGES

NO	DATE	DESCRIPTION	APPRD
1	4-21-70	Note & Reference added	
0	4/4/61	ISSUED FOR CONSTRUCTION	

APPROVED BY
GM 113785
DRAWING LIST
BY
DR. K. Lao-Fu
CH.
Q.K. RPS
DATE 3-25-51
SCALES ½" = 1'-0" & AS NOTED

PLAN & DETAILS OF
OIL – WATER SEPARATOR
TOPOCK COMPRESSOR STATION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

BILL OF MATERIAL
SUPERSEDES
SUPERSEDED BY
SHEET NO. SHEETS
DRAWING NUMBER 382956 CHANGE 1



LIST of MATERIAL

ITEM	QUANT.	DESCRIPTION	ORDER №
1	1 LOT	FABRICATE & DELIVER TO JOB SITE, 1-RIGID FRAME BUILDING, COMPLETE WITH ALL BOLTS, FASTENINGS & ACCESSORIES AS SHOWN ON DRAWINGS 383318, 383319, 383321 & 383323, AND AS FOLLOWS, (a) STEEL FRAME INCL. MONORAIL & A-FRAME (b) CEMENT-ASBESTOS ROOFING & SIDING INCL. ACCESSORIES & FASTENINGS, (c) DOORS & WINDOWS COMPLETE WITH HARDWARE (d) ALL SHEET METAL WORK INCL. LOUVERS (e) FLOOR GUIDE FOR SLIDING DOOR (TO BE INSTALLED BY OTHERS.) WORK NOT INCLUDED: (a). CONC. FOUNDATION & FLOOR SLAB INCLUDING ALL ANCHOR BOLTS IMBEDDED IN CONCRETE. (b). WOOD BUMPER AT PLATFORM. (c). PIPE HANDRAILS (d) ONE TON HOIST (e) GLASS & GLAZING	TX-84
2	1-LOT	GLAZING FOR SASH & DOORS	TX-SUB-2

SPECIFICATIONS & GENERAL NOTES

NOTE: MANUFACTURERS LISTED BELOW INDICATE QUALITY. SUBSTITUTIONS SHALL BE SUBMITTED FOR APPROVAL

1. EXTERIOR WALL COVERING & BATTENS SHALL BE 1/2" THICK FLAT TRANSITE ASBESTOS SHEETS, JOHNS-MANVILLE OR EQUAL. INSTALLATION & FASTENER SPACING TO CONFORM TO JOHNS-MANVILLE RECOMMENDATIONS.
2. ROOF COVERING SHALL BE 4.2" CORRUGATED TRANSITE, JOHNS-MANVILLE, OR EQUAL. INSTALLATION & FASTENER SPACING TO CONFORM TO JOHNS-MANVILLE RECOMMENDATIONS.
3. SIDE WALL FASTENINGS SHALL BE NELSON WELDING STUDS, WHERE INDICATED ON DRAWINGS.
   a. SINGLE THICKNESS TRANSITE TO TAKE STUDS 1/4-20 (1" LG.) CADMIUM PLATED, SLUG LOADED, TYPE KO, GROOVED & THREADED, 5/8" THREADS, WITH NELSON NUT SP20F & 7/8" O.D. FLAT LEAD WASHER.
   b. DOUBLE THICKNESS TRANSITE TO TAKE STUDS 1/4-20 (1" LG.) CADMIUM PLATED, SLUG LOADED, WITH NELSON F.H. ROOF NUTS SP21F & 7/8" O.D. FLAT LEAD WASHERS.
4. ROOF FASTENINGS. CORRUGATED TRANSITE ROOF SHEETS SHALL BE SECURED TO PURLINS WITH 1/4-20 (1 3/4" LG.) CADMIUM PLATED NELSON WELDING STUDS, SLUG LOADED, WITH NELSON ZINC ROOF NUTS, LEAD COATED, HEX. HEAD, AS FOLLOWS.
   a. SINGLE LAP SP-20
   b. DOUBLE LAP SP-21
   c. TRIPLE LAP SP-22

   SIDE LAP FASTENINGS BETWEEN PURLINS, SHALL BE 1/4-20 (1 1/2" LG.) CADMIUM PLATED BOLTS & NELSON ZINC ROOF NUTS, LEAD COATED HEX. HEAD, SP-20 W/ SMOOTH ROLLED ROOFING WASHERS, 44-55# @ UNDERSIDE OF TRANSITE.
5. SLIDING DOOR SHALL BE SHOP FABRICATED, ALL STEEL, WELDED DOOR AS DETAILED. (DWG. 383321) TRANSITE COVERED OUTSIDE ONLY. DOOR TO BE COMPLETE WITH FOLLOWING HARDWARE, RICHARDS-WILCOX, OR EQUAL.
   a. BALL BEARING HANGERS № 29 1/2 B, WITH RIGID FRAME TRUCKS, NO APRON REQUIRED.
   b. TROLLEY TRACK № 232 COMPLETE WITH OVERHEAD BRACKETS
   c. FLOOR DOOR GUIDE № 736
   d. WEATHERSTRIPPED WITH PARKER (OR EQUAL) № 125 DOUBLE HEMMED SPRING BRONZE AS PER DETAILS.
   e. FABRICATOR SHALL PROVIDE INSIDE BOLTING DEVICE.
6. SWING DOOR SHALL BE TRUSCON (OR EQUAL) INDUSTRIAL STEEL DOOR SERIES 31, № 3070 WITH UPPER PANEL FITTED FOR GLAZING AND COMPLETE WITH FOLLOWING HARDWARE.
   a. 1 1/2 PR. HINGES, P-2996
   b. LEVER LATCH, P-3578
7. WINDOWS SHALL BE COMMERCIAL PROJECTED STEEL WINDOWS, TRUSCON OR EQUAL, № A33161, COMPLETE WITH CLIPS, ACCESSORIES, ETC. INSTALLED IN ACCORDANCE WITH MANUFACTURERS STANDARD PRACTICE.

DESIGN & CONSTRUCTION NOTES

1. DESIGN OF STEEL STRUCTURE IS IN ACCORDANCE WITH THE UNIFORM BUILDING CODE, 1952 EDITION.
2. FABRICATION & ERECTION SHALL BE IN ACCORDANCE WITH U.B.C., 1952 ED.
3. ALL FIELD CONNECTIONS SHALL BE BOLTED WITH 3/4"⌀ UNFINISHED BOLTS EXCEPT AS SHOWN OR NOTED.
4. SHOP CONNECTIONS MAY BE RIVETED OR WELDED, EXC. AS SHOWN OR NOTED.
5. ALL GUSSETS SHALL BE 3/8" THICK, EXCEPT AS SHOWN OR NOTED.
6. ALL SURFACES SHALL BE SHOP PAINTED WITH 1 COAT OF APPROVED PRIMER EXCEPT SURFACES TO BE FIELD WELDED WHICH SHALL BE FIELD PAINTED ONE COAT OF APPROVED PRIMER AFTER WELDING.
7. USE A.I.S.C. STD. B. SERIES CONNECTIONS, EXCEPT AS SHOWN OR NOTED.
8. WIND DESIGN LOAD = 30 P.S.F.

APPROVED FOR CONSTRUCTION

L.J. MEZZETTA 2/14/53 No. 1560

BECHTEL

DETAILS OF PLUMBING FOR SINK	181378
REFERENCE DRAWINGS	

PAVING & GRADING	481784
PLOT PLAN	481751
DESIGN & CONST. NOTES FOR CONCRETE	081850
ANCHOR BOLTS	D-Q.504
ARCHITECTURAL ELEVATIONS	383319
MISCELLANEOUS DETAILS	383321
FOUNDATION PLAN & DETAILS	383323
REFERENCE DRAWINGS	

NO.	DATE	DESCRIPTION	APPRD.	APPROVED BY
1	4/8/53	REVISED DIMENSIONS	TJK	RFE

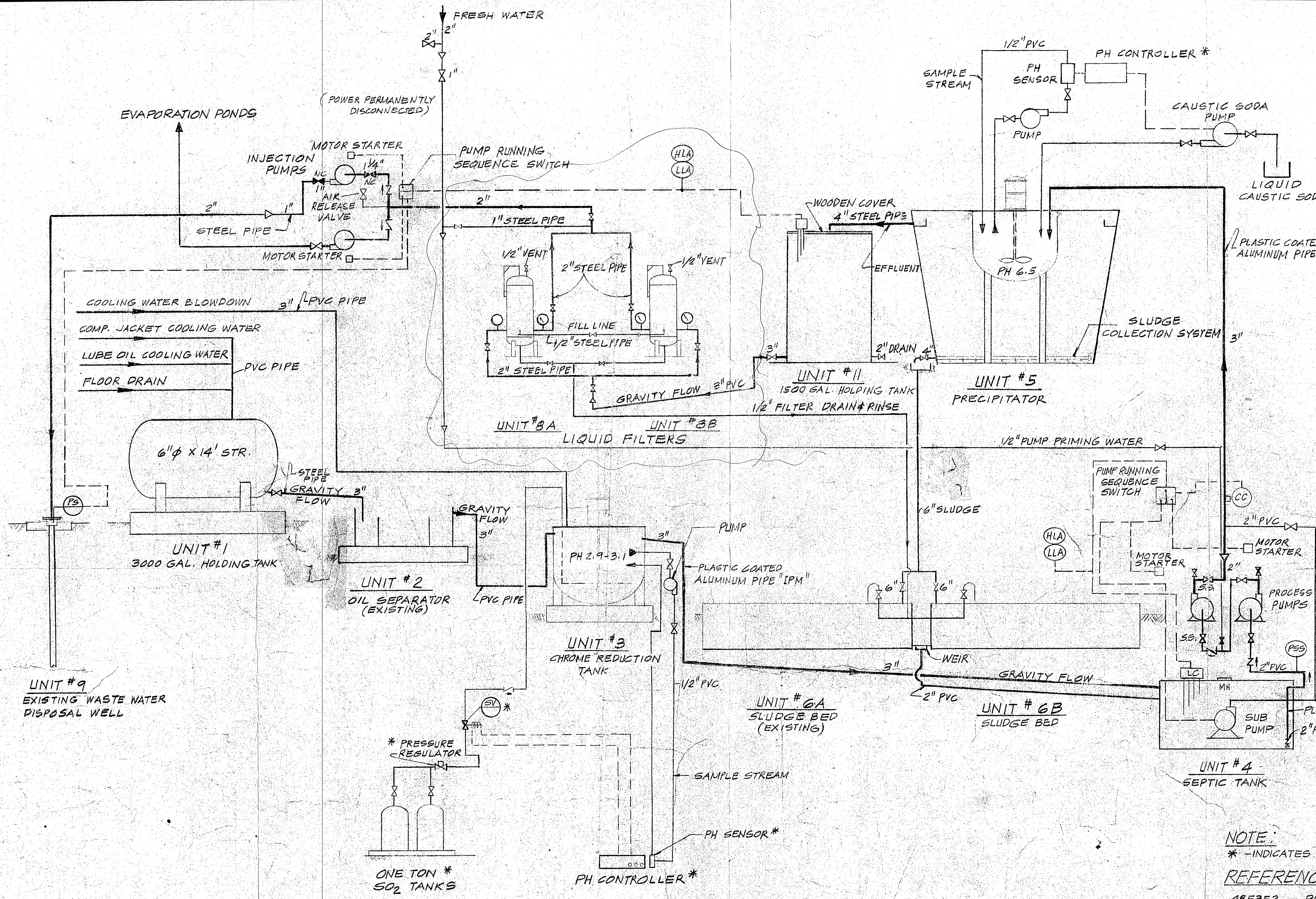
TABLE OF CHANGES

GM 1.G053 DRAWING LIST
BY DR. L.J.H.S. CH. S.L.S. O.K. [illegible] DATE 2-8-53
SCALES 1/8" & 3/4" = 1'-0"

FLOOR PLAN, SECTION & DETAILS
CHEMICAL STORAGE BLDG.
TOPOCK COMPRESSOR STATION

PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

BILL OF MATERIAL
SUPERSEDES
SUPERSEDED BY
SHEET NO. | SHEETS
DRAWING NUMBER 383318 | CHANGE 1



LEGEND

SYMBOLS
GATE VALVE
GLOBE VALVE
CHECK VALVE
CONTROL VALVE DIRECT OPERATED
CONTROL VALVE
INSTRUMENT BOARD MOUNTED
INSTRUMENT LOCALLY MOUNTED
SOLENOID VALVE, CLOSES ON AIR FAILURE
INSTRUMENT AIR CONTROL LINE
ELECTRIC CONTROL LINE
PRESSURE REGULATOR SELF CONTAINED
NEEDLE VALVE
PRESSURE INDICATOR

INSTRUMENTS	
LC	LEVEL CONTROLLER
LLA	LOW LEVEL ALARM
PI	PRESSURE INDICATOR
SV	SOLENOID VALVE
LCV	LEVEL CONTROL VALVE
PS	PRESSURE SWITCH
CC	CONTACT CELL CLOSES PUMP CIRCUIT WHEN WET
HLA	HIGH LEVEL ALARM
PSS	PUMP SUCTION SWITCH

NOTE:
* - INDICATES EQUIPMENT SUPPLIED by LAKEWOOD INSTRUMENTS.

REFERENCE DWGS:
485352 - PIPING - PLAN, AREA 13 & 14
485349 - PIPING - PLAN, AREA 5
485350 - PIPING - SECTIONS & DETAILS, AREA 5
386122 - PIPING - ARRGT, PUMPS & FILTERS

NO	DATE	DESCRIPTION	GM	BY	CH.	APPD
1	10-82	FIELD CORRECTED		RDD		

TABLE OF CHANGES

NO	DATE	DESCRIPTION	GM	BY	CH	APPD

TABLE OF CHANGES

APPROVED BY JK
GM 172520
SUPV. BY
DSGN.
DR. M. Leberlin
CH.
O.K.
DATE 4-9-70
SCALES

FLOW DIAGRAM
WASTE WATER TREATMENT & DISPOSAL SYSTEM
TOPOCK COMPRESSOR STATION
GAS OPERATIONS
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

BILL OF MATERIAL
DRAWING LIST 082272
SUPERSEDES
SUPERSEDED BY
SHEET NO. SHEETS
DRAWING NUMBER 386121 CHANGE 1

386121-1

THIS DRAWING MUST BE UPDATED ON AN AUTOCAD T.M. CAD (COMPUTER AIDED DRAFTING) SYSTEM OR SIMILAR MINI-BASED CAD SYSTEM. FAILURE TO DO SO WILL RESULT IN THE PERMANENT LOSS OF EQUIPMENT INFORMATION. SEE DRAWING NOS. 088784 and 088785 FOR INSTRUCTIONS.

TA ENGINEERING CO., INC.
920 COUNTRY CLUB DRIVE
MORAGA, CALIFORNIA

PIPE LINE OPERATIONS

REFERENCE DRAWINGS

DWG. NO.	TITLE
481750	PIPING SPECIFICATIONS
† 387708	ELEMENTARY MECHANICAL; UTILITY WATER SYSTEM
* 387707	ELEMENTARY MECHANICAL; COOLING WATER SYSTEM
387701	ELEMENTARY MECHANICAL; USE OF SYMBOLS & NOMENCLATURE
387700	ELEMENTARY MECHANICAL; DRAWING LIST
183296	GENERAL EQUIPMENT LIST

REVISIONS

NO.	DATE	DESCRIPTION	GM/SPEC	DWN.	CHKD.	SUPV.	APVD. BY
2	6-16-88	REVISED WASTEWATER MANAGEMENT SYSTEM	1947217	I.P.			
1	1-5-87	ISSUED FOR USE/AS-BUILT	4530762	KC	mcH		

APPROVED BY	GM 4530762
	SUPV.
	DSGN. TA ENGR
	DWN. KOL/KC
	CHKD. mcH
	O.K.
	DATE 9/12/86
	SCALES NONE

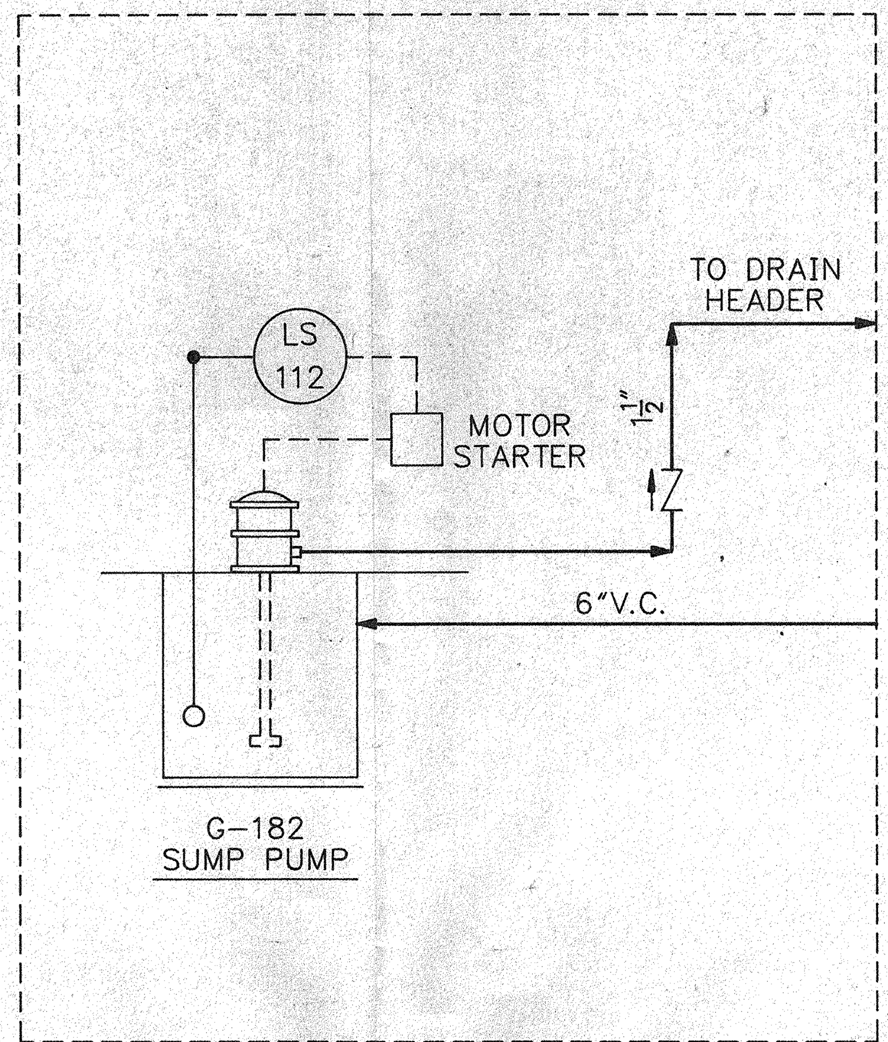
ELEMENTARY-MECHANICAL
DRAIN & SEWER SYSTEMS
TOPOCK COMPRESSOR STATION
GAS OPERATIONS
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

MICROFILM	
BILL OF MATL	
DWG LIST	387700
SUPSDS	
SUPSD BY	
SHEET NO. 1 OF 3 SHEETS	
387706	REV. 2

387706-1.

387706 SH.2

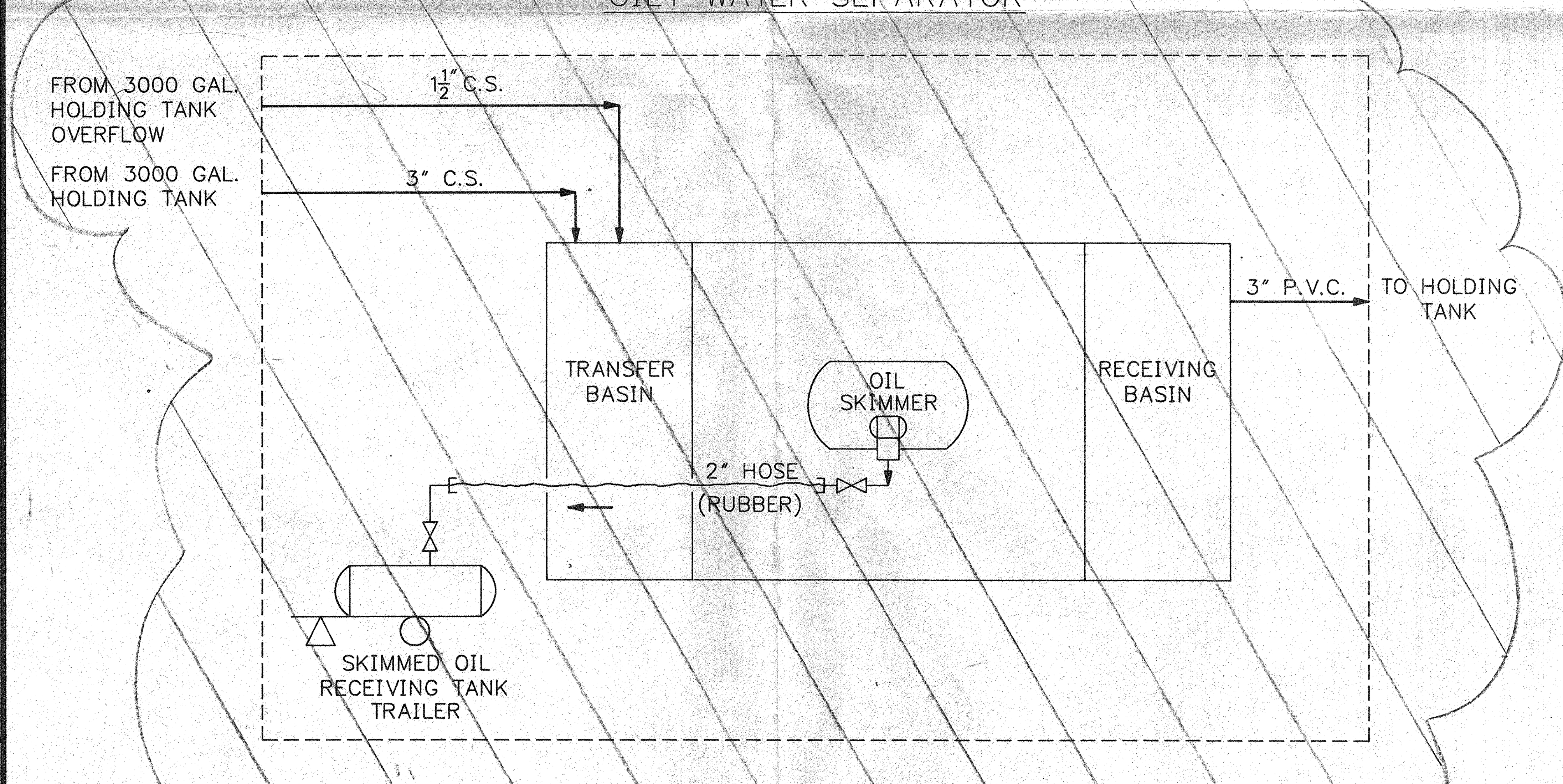
WASHING AREA SUMP PIT



DETAIL A

REFERENCE 387706
SHEET 1, ZONE (A-4)

OILY WATER SEPARATOR

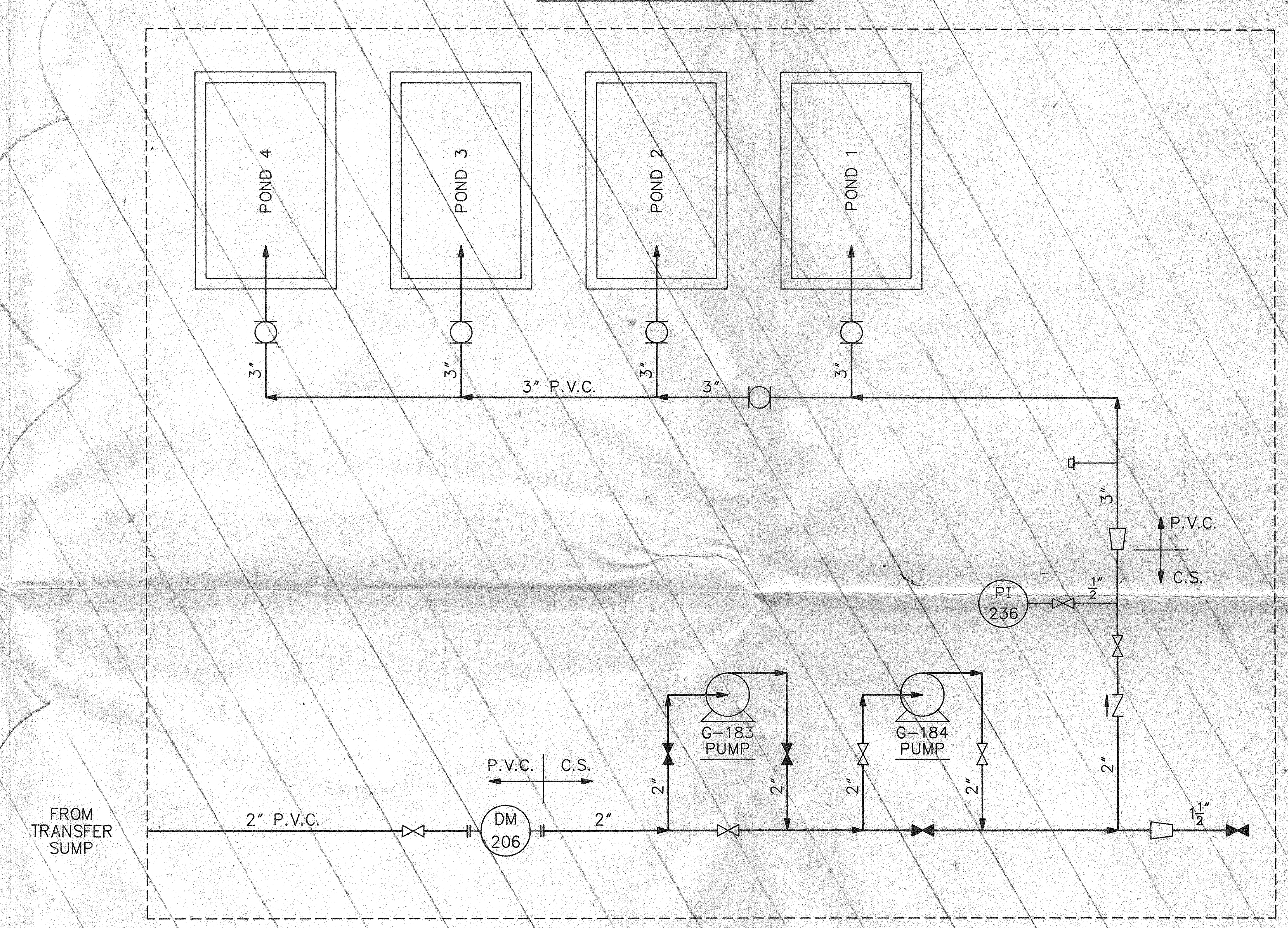


DETAIL B

REFERENCE 387706
SHEET 1, ZONE (E-4)

2

EVAPORATION PONDS



DETAIL C

REFERENCE 387706
SHEET 1, ZONE (E-5)

2

THIS DRAWING MUST BE UPDATED ON AN AUTOCAD T.M. CAD (COMPUTER AIDED DRAFTING) SYSTEM OR SIMILAR MINI-BASED CAD SYSTEM. FAILURE TO DO SO WILL RESULT IN THE PERMANENT LOSS OF EQUIPMENT INFORMATION. SEE DRAWING NOS. 088784 and 088785 FOR INSTRUCTIONS.

TA ENGINEERING CO., INC.
920 COUNTRY CLUB DRIVE
MORAGA, CALIFORNIA

PIPE LINE OPERATIONS

DWG. NO.	TITLE
387700	ELEMENTARY MECHANICAL; DRAWING LIST

REFERENCE DRAWINGS

NO.	DATE	DESCRIPTION	GM/SPEC	DWN.	CHKD.	SUPV.	APVD. BY
2	6-16-88	REVISED WASTEWATER MANAGEMENT SYSTEM	1947217	I.P.			SJC RSR
1	1-5-87	ISSUED FOR USE/AS-BUILT	4530762	KC			

REVISIONS

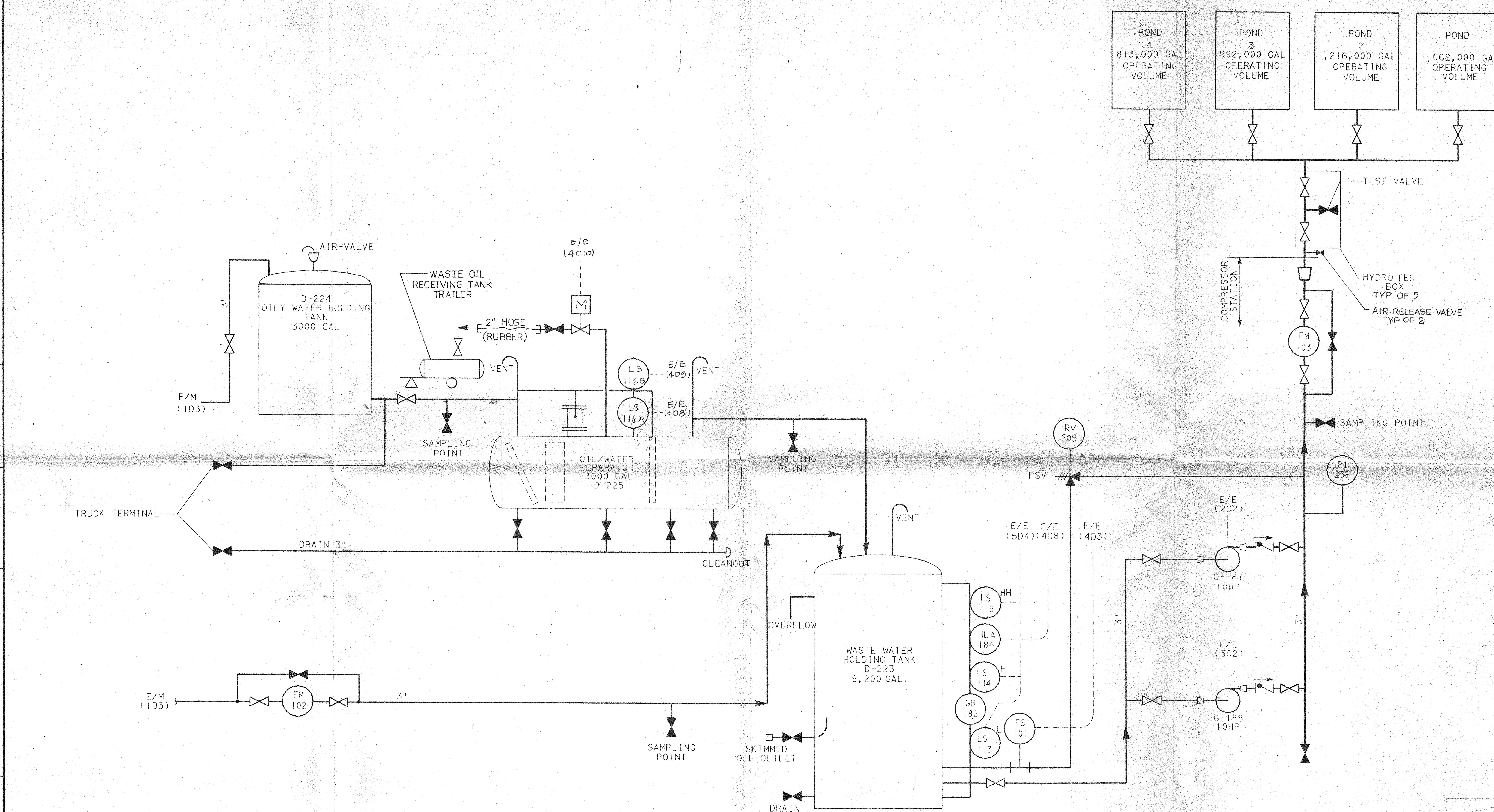
APPROVED BY

GM 4530762
SUPV.
DSGN. TA ENGR
DWN. KOL/KC
CHKD.
O.K.
DATE 9/12/86
SCALES NONE

ELEMENTARY-MECHANICAL
DRAIN & SEWER SYSTEMS, DETAILS
TOPOCK COMPRESSOR STATION
GAS OPERATIONS
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

MICROFILM
BILL OF MATL
DWG LIST 387700
SUPSDS
SUPSD BY
SHEET NO. 2 OF 3 SHEETS
387706 REV. 2

387706-2



PIPE LINE OPERATIONS

NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD BY
2	6-16-89	ISSUED FOR USE	1947217	GLN			SJC RSR

REVISIONS

APPROVED BY: SJC, RSR, RAT

GM 1947217
SUPV C. FORMOSO
DSGN G. SLUTSKY
DWN G. NORRIS
CHKD
OK
DATE 5-10-88
SCALES NONE

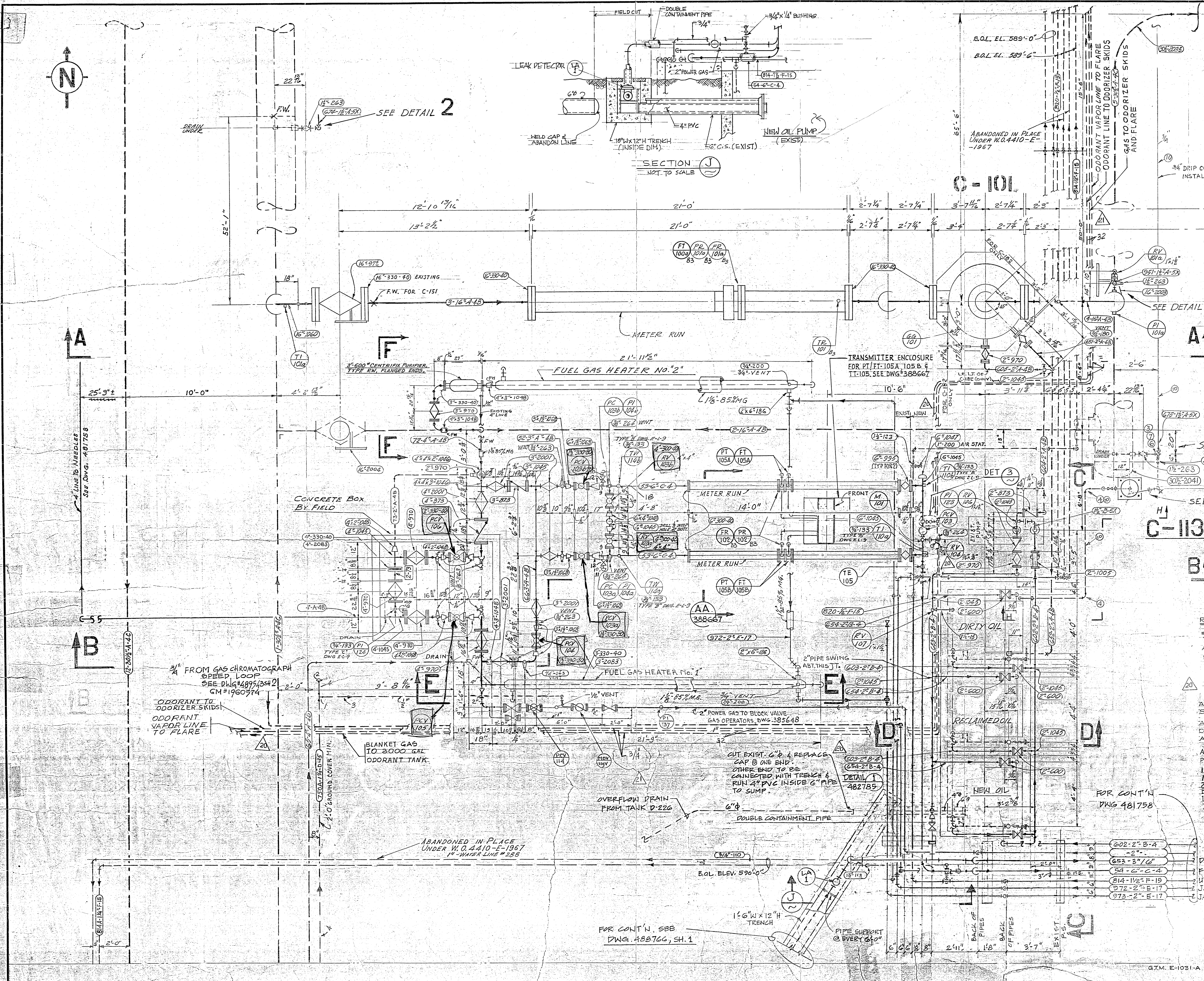
ELEMENTARY-MECHANICAL
WASTEWATER MANAGEMENT SYSTEM
TOPOCK COMPRESSOR STATION

GAS OPERATIONS
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

MICROFILM
BILL OF MATL
DWG LIST
SUPSDS
SUPSD BY
SHEET NO. 3 OF 3 SHEETS

387706 REV 2

[100,160]387706SH3 .G11 05-5-88 GLN



ITEM	QUAN.	DESCRIPTION	REMARKS
1	3	VALVE, CHAPMAN #960, SCRWED. GATE — 3/4"	
2	1	THREADOLET, OUTLET, BONNEY FORGE — 3/4"×12"	
3	4	UNION, STL. SCRWD. FEM. — 3/4"	
4	9	ELBOW, 90°, E.H. SCRWED. — 3/4"	
5	1	CAP, WELD, E.H. — 12"	
6	2	TEE, SCRWED. E.H. — 1½"	
7	3	BUSHING, STL. HEX. — 1½"×3/4"	
8	4	BOLT, "J" ANCHOR — 3/8"×12"	
9	1	PLATE, STL. — 2'×3'×¼"	
10	240 FT.	PIPE, STL. GAS LINE X-H., BLACK — 3/4"	
11	4 FT.	" — 4"	
12	4 FT.	" — 12"	
13	1 FT.	" [CASING] — 12"	
14	TO SUIT	CONCRETE	

BILL OF MATERIAL DET. #1

KEY PIPING PLAN

GENERAL NOTES

1. ALL FLANGES (EXCEPT WHERE NOTED) ARE WELD. NECK WITH BORE SAME AS I.D. OF CONNECTING PIPE AND FACING SAME AS THAT OF ADJOINING FLANGE.
2. ALL WELD.ELLS (EXCEPT WHERE NOTED) ARE 90° STD. WT. LONG RADIUS.
3. SCREWED FITTINGS (EXCEPT WHERE NOTED) ARE:
   3000# F.S. IN SPECIFICATIONS A, B, C, D.
   150# M.I. " " E.
   3000# F.S. " " F - FOR UTILITY AIR.
   150# M.I. " " F - FOR INSTRUMENT AIR.
4. SCREWED UNIONS (EXCEPT WHERE NOTED) ARE:
   3000# F.S. FEMALE, STL. TO STL. SEAT, IN SPECS. A, B, C, D.
   300# M.I. FEMALE, BRASS TO IRON SEAT, IN SPECS. E.
   3000# F.S. FEMALE, STL. TO STL. SEAT, IN SPECS. F - FOR UTILITY AIR.
   300# M.I. FEMALE, BRASS TO IRON SEAT, IN SPECS. F - FOR INST. AIR.
5. BALLOON LEGEND
   LINE № — 691-3"-A-4B — PIPE ITEM №; SIZE; SPEC.
6. PROVIDE PLUGS FOR ALL VENT & DRAIN VALVES ITEM № (180) UNLESS NOTED OTHERWISE.
7. —×— INDICATES FIELD WELD.
8. 30½" PIPE & FITTINGS ARE 30½" O.D.
9. ALL BURIED LINES SHALL BE WRAPPED IN ACCORDANCE WITH SPECS. 121920-S-2 WHERE LINES PENETRATE GRADE WRAPPING SHALL BE EXTENTED 6" ABOVE GRADE.
10. BACK WELD ALL SCREWED JOINTS IN SPEC. A AND SCREWED LUBE OIL LINES IN SPEC. B.
11. LINES SHOWN THUS — — — INDICATE BURIED PIPING.

SEPARATOR - DET. 1
SCALE: NONE
BILL OF MATERIAL ON THIS DWG.

REVISION NOTES:

"AS-BUILT" PER FIELD INFORMATION:
ADDED 3/4" LINE FROM GAS CHROMATOGRAPH SPEED LOOP - GM 1960574 & REVISED MISC. PIPINGS - GM 4065330.

(20) ADDED 3/4" LINES TO 3000 GAL ODORANT TANK, ODORIZER SKIDS AND DET. 3 REVISED MISC. PIPINGS. GM. 4163275.

ADDED LINE 288A-3/4" E-15 UTILITY WATER TO SLUDE DRYING BED.

ADD DIMENSIONAL REQUIREMENTS FOR SCRUBBER C-182. MATERIAL LIST NO. 082564
ADDED NOTE.

ADDED SEPARATOR & ASSOCIATED PIPING & MATERIAL AS PER W.O. 4187-C, 1955. -(PLAN, SEC. H-H & BILL OF MAT.)
INSTALLED 2" BLOWDOWN ON G.M. 409395.
1" WATERLINE & 3/4" GAS LINE ABANDONED IN PLACE ON W.O. 4410-E-1967.
2" BLOWDOWN PARTLY REMOVED, REST OF PIPING CHANGED TO POWER GAS TO BLOCK VALVE GAS OPERATORS ON G.M. 163079.
INSTALLED VALVES & REGULATORS FOR 2" POWER GAS TO BLOCK VALVE GAS OPERATORS AND INSTALLED 750A-1¼"-D-15 GAS LINE & ½" GAS LINE TO MOV 119V VALVE ON G.M. 163079 (SEE DWG. 385648)

NEW SCRUBBER OIL
POWER GAS TO BLOCK VALVE GAS OPERATOR, SEE DWG. 385648
DIRTY SCRUBBER OIL (DOUBLE CONTAINMENT PIPE)
FUEL GAS HEADER
UTILITY AIR
JACKET WATER SUPPLY
JACKET WATER RETURN

(12) Rev'd for GM 135863
(8) Rev'd for GM-121920
(7) Rev'd for GM 116053

REVISION NOTES:
1989 CONSTRUCTION, GM #92
ADDED PT/FT-105A & 105B, TT-105 WITH SCADA TRANSMITTER ENCLOSURE AND FT-100a TO PR/FR-101a

1991 CONSTRUCTION - GM 4965588
REPLACED PLUG VALVES WITH BALL VALVES, REPLACED MOV-119V, PCV-114 & ADDED TIMING CIRCUIT ON ESD.

NOTE:
FOR COMPLETE LIST OF REFERENCE DWGS. REFER TO DWG № 481758 & 482804

REFERENCE DRAWINGS	
PIPING PLAN - AREA №2, SCRUBBER AREA	481758
PIPING SECTIONS A-A, B-B, C-C, D-D & DETAILS	481767
PIPING LIST OF MATERIAL	382912
DETAIL OF WELDING COUPLING (BECHTEL)	E-L-509
PIPING LIST OF MATERIAL FOR FIELD [GM 116053]	383282
PIPING LIST OF MATERIAL (GM-121920)	383346
POWER GAS TO BLOCK VALVE GAS OPERATORS	385648
BILL OF MATERIAL FOR DWG. 385648, G.M. 163079	084477
SCADA TRANSMITTER ENCLOSURE	388667
ELEMENTARY - MECHANICAL, FUEL GAS SYSTEM	387705 SH 2
PIPING ARRANGEMENT, TRENCHES & PIPE SUPPORT	489551

NO	DATE	DESCRIPTION		APPRD
17	10-8-92	REVISED PIPING PER GM 4065330		
16	1-1-91	SEE REVISION NOTE 16		
21	3-26-94	AS BUILT PER FIELD INFO. GM 4163275	IP	MDT
20	3-15-94	SEE REVISION NOTE 20	IP MDT	
18	11-22-93	SEE REVISON NOTE 19		
19	11-3-92	SEE REVISION NOTE		

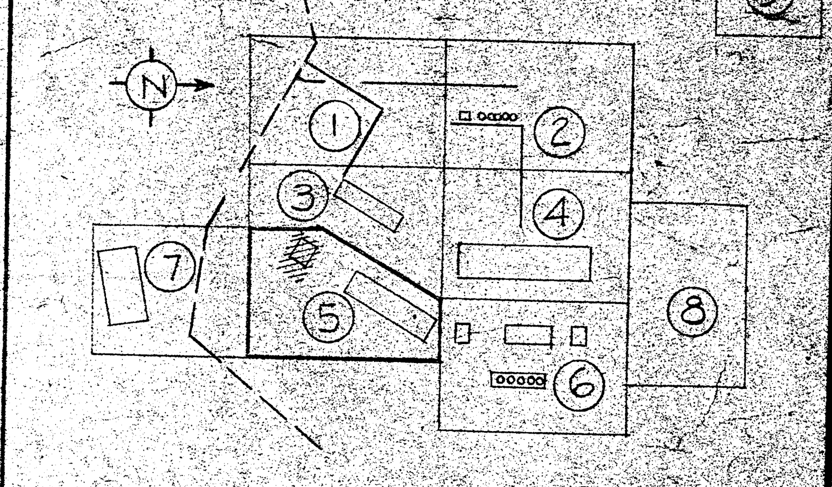
TABLE OF CHANGES

APPROVED BY | GM 113785 | DRAWING LIST 082272 | BY WEBBER | DR. SHAMLIAN | CH. H. GIUSTI | O.K. EPM | DATE 5-18-51 | SCALES 3/8" = 1'-0"

PIPING PLAN AT SCRUBBER (TYPICAL) AND OIL SUMP - AREA № 2
TOPOCK COMPRESSOR STATION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO CALIFORNIA

BILL OF MATERIAL 383346 & 383351/084605
SUPERSEDES
SUPERSEDED BY
SHEET NO. SHEETS
DRAWING NUMBER 481766 CHANGE 21

481766-1-#-##



GENERAL NOTES

1. ALL FLANGES (EXCEPT WHERE NOTED) ARE WELD NECK WITH BORE SAME AS I.D. OF CONNECTING PIPE AND FACING SAME AS THAT OF ADJOINING FLANGE.
2. ALL WELD ELLS (EXCEPT WHERE NOTED) ARE 90° STD. WT. LONG RADIUS.
3. SCREWED FITTINGS (EXCEPT WHERE NOTED) ARE:
   3000# F.S. IN SPECIFICATIONS A, B, C, D.
   150# M.I. " " E.
   3000# F.S. " " F - FOR UTILITY AIR.
   150# M.I. " " F - FOR INSTRUMENT AIR.
4. SCREWED UNIONS (EXCEPT WHERE NOTED) ARE:
   3000# F.S. FEMALE, STL. TO STL. SEAT, IN SPECS. A, B, C, & D.
   300# M.I. FEMALE, BRASS TO IRON SEAT, IN SPEC. E.
   3000# F.S. FEMALE, STL. TO STL. SEAT, IN SPEC. F - FOR UTILITY AIR.
   300# M.I. FEMALE, BRASS TO IRON SEAT, IN SPEC. F - FOR INST. AIR.
5. BALLOON LEGEND
   LINE Nº — 691-3"-A-48 — PIPE ITEM Nº; SIZE; SPEC.
6. PROVIDE PLUGS FOR ALL VENT & DRAIN VALVES ITEM Nº 180
7. —*— INDICATES FIELD WELD.
8. ALL BURIED LINES SHALL BE WRAPPED IN ACCORDANCE WITH SPEC. 1551-5-4. WHERE LINES PENETRATE GRADE WRAPPING SHALL BE EXTENDED 6" ABOVE GRADE.
9. LINES SHOWN THUS — — — INDICATES BURIED LINES.
10. * FURNISHED BY OTHERS.
11. LOCATION & ROUTING OF BRANCH LINES FROM INSTRUMENT AIR HEADERS TO BE DONE BY FIELD.

REVISION NOTES

△2 ADDED INSULATION ON LINES 106, 284, 108, 281, 180, 109, 110, 111, 112, 113, 129 & 911-E SAMPLE LINES AT D-112

REVISION NOTE △1
ADDED RV 183, 185 & LINE 140 AT G-108 & G-108A
CHANGED 1½" CONTROL VALVES BY PERMUTIT AT D-112 FROM SCREWED TO FLGD. DM 184 & 184 TO BE CLOSE UNIONS & NIPPLES

NOTE:
FOR COMPLETE LIST OF REFERENCE DRAWINGS SEE DWG Nº 481761.

REFERENCE DRAWINGS	
PIPING PLAN - AREA Nº 5 AUXILIARY AREA	481761
PIPING SECTIONS & DETAILS	481776
PIPING LIST OF MATERIAL	382912
DETAIL OF WELDING COUPLING (BECHTEL)	E-1-8
PIPING INDEX DRAWING	481756

7 Rev'd For GM 403467
6 Rev'd for GM 134695

NO.	DATE	DESCRIPTION	APP'D
8	3-1-60	Added 4" Valve & 6" Insulating	WT
6	4-22-57	ADDED CHEM. VAT & PIPING	[illegible]
5	2-26-52	ADDED PLATFORM PER FIELD REV.	C.E.M.
4	1-11-52	DISCONNECTED LINE 818 FROM LINE 80	[illegible]
3	11/8/51	ADDED VENT VALVES ON [illegible]	[illegible]
2	8/15/51	SEE REVISION NOTE △2	[illegible]
1	7/26/51	See Revision Note △1	[illegible]
0	6/15/51	ISSUED FOR CONSTRUCTION	[illegible]

TABLE OF CHANGES

APPROVED BY
GM 13735
DRAWING LIST 481756
BY DR. SHAMLIAN
CH. H. GIUSTI
DATE 6-8-51
SCALES 3/8" = 1'-0"

PIPING PLAN
WATER SOFTENER AREA Nº 5
TOPOCK COMPRESSOR STATION

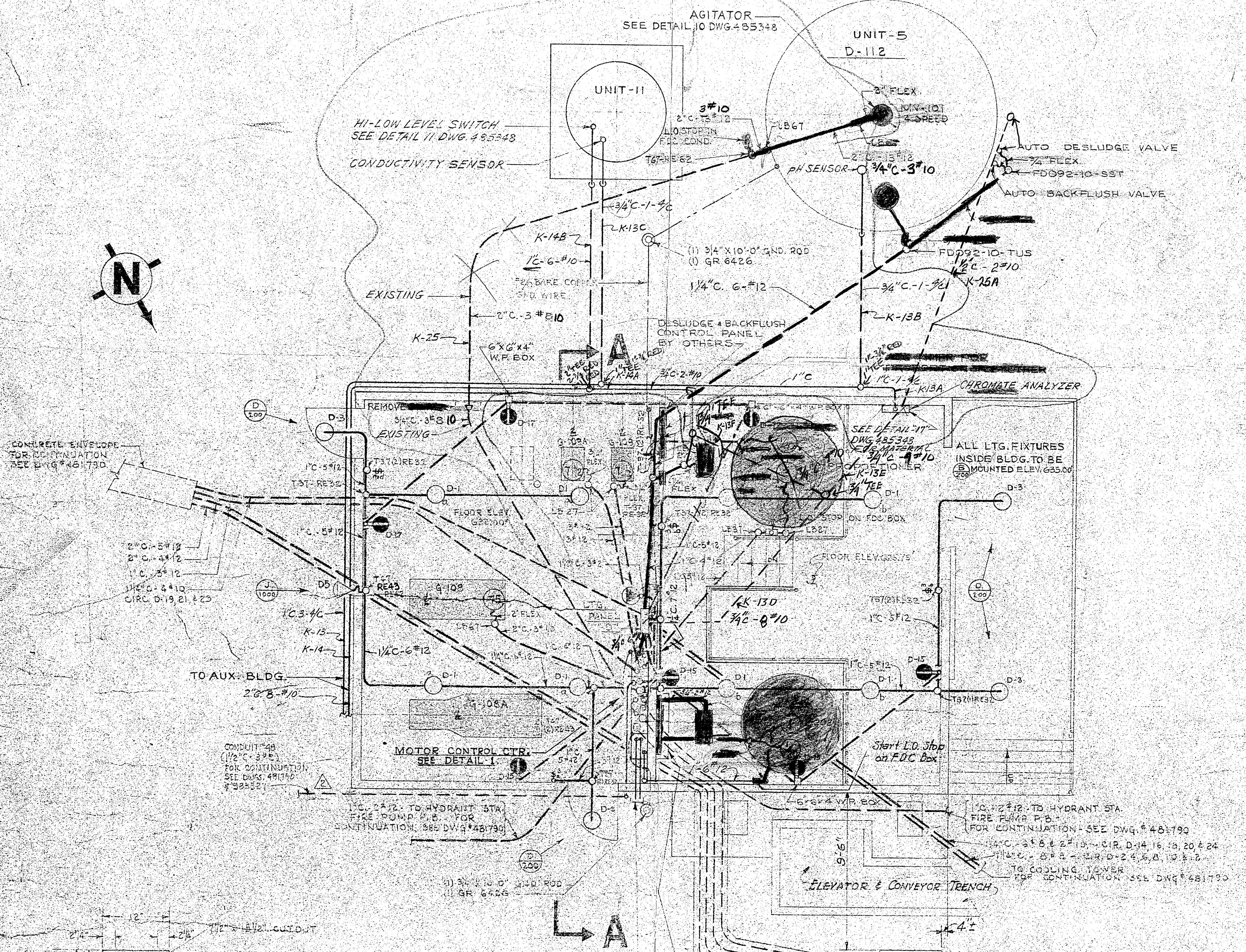
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

BILL OF MATERIAL 382912

481756

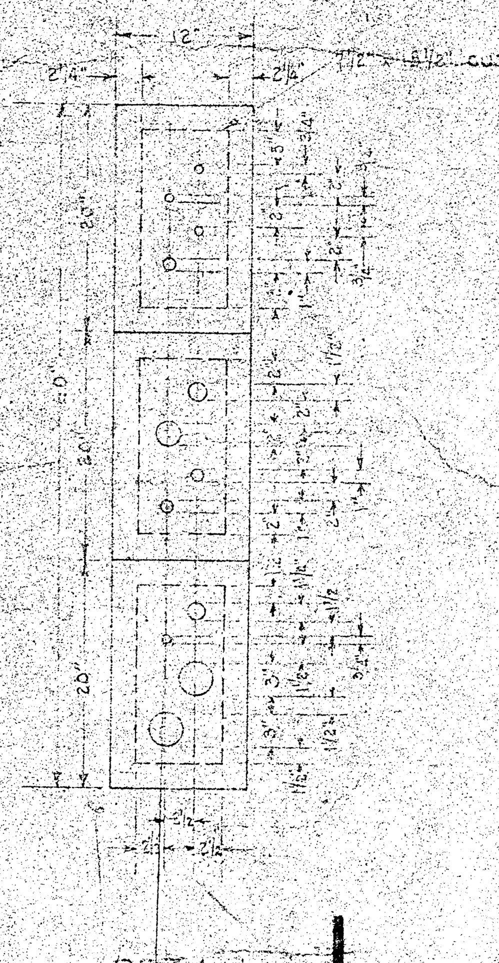

SECTION A-A
DETAIL 1
NO SCALE
DETAIL 2
NO SCALE
DETAIL 3
TYPICAL CLEANOUT
NO SCALE
DETAIL 4 AS SHOWN & NOTED
DETAIL 13 SIMILAR.
DETAIL 5
DETAIL 6
DETAIL 7
DETAIL 8
DETAIL 9
DETAIL 10
DETAIL 11
DETAIL 12
NO SCALE
DETAIL 14
B-B
NOTE: PROVIDE CONCRETE LINED DRAIN WITH CATCH BASIN & 8" DRAIN TO OPEN GROUND. (LOCATE IN FIELD.)
NOTE: INSERT STRAIGHT PIECE OF C.I. PIPE BETWEEN C.I. BEND & V.C. "Y" AS REQUIRED FOR DET. 13 ONLY.
NOTE: LENGTH OF TRENCH AS SHOWN "N" PERPENDICULAR WALLS SAME AS SIDE WALLS.
MAIN COMPRESSOR BUILDING
AUXILIARY BLDG.
COOLING TOWER
NORTH COOLING TOWER
BULK ACID STORAGE TANK
JACKET WATER AIR COOLER EXCHANGER
OFFICE & WAREHOUSE
GARAGE
New Office Bldg.
20' ROAD
25' ROAD
15' ROAD
PLAN
ELEVATION
DETAIL OF CATCHBASIN
SECTION
WOOD TROUGH TO COUNTY OUTFALL OVER FACE OF ...
REFERENCE DRAWINGS
NORTH COOLING TOWER BASIN
PIPING PLAN AT N. COOLING TOWER 580844
PIPING PLAN AREA No 1 481457
PIPE SUPPORTS & DRAIN PIT 282301
DETAIL OF FLOOR DRAIN, COMPRESSOR BLDG. 181317
PIPING PLAN AT OIL STORAGE TANKS
WATER SOFTENER BLDG. DRAINS
PRECIPITATOR FOUNDATION
AUXIL. BLDG. PLUMBING
PLOT PLAN 481751
PAVING & GRADING
FOUNDATION SLAB - COMPRESSOR BLDG.
COOLING TOWER BASIN
PIPING PLAN AT COOLING TOWER
LUBE OIL COOLER FOUNDATION
INSTAL. OF NEW ENGINE JACKET WATER PUMPS (PIPING)
SEWERS, DOMESTIC, UTILITY & FIRE WATER SYS.
PLUMBING LOCATOR COMP. BLDG.
REVISION NOTES
TABLE OF CHANGES
DESCRIPTION
APPROVED
DRAWING LIST
SEWERS & DRAINS
COMPRESSOR STATION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA
BILL OF MATERIAL
SUPERSEDES
SUPERSEDED BY
SHEET NO.
SHEET
DRAWING NUMBER
481785

NOTE: PROVIDE CONCRETE LINED BASIN WITH CATCH BASIN & 8" DRAIN TO OPEN GROUND. (LOCATE IN FIELD.)
DETAIL 14
4" V.C. 1/4 BEND
6"x4" V.C. "Y"
3" DISCHARGE LINE FOR CONTINUATION & TIE-IN DETAIL SEE DWG 488544
WASTEWATER TRANSFER PUMPS
SECTION A-A
OIL-WATER SEPARATOR
OILY WATER HOLDING TANK
WASTE OIL TANK
WASTE OIL PUMP
BLOW OFF LINE FROM COOLING TOWERS
FIELD TO VERIFY LOCATION OF DRAIN LINE & BLOW OFF PIPE
NEW 3" DISCHARGE LINE TO TIE-IN TO EXISTING WASTE OIL LINE
EXISTING 2" WASTE OIL LINE TO DIRTY OIL SUMP
SCRUBBER OIL SUMP (EXISTING)
DETAIL 5
B-B
DETAIL 3
TYPICAL CLEANOUT
NOTE: INSERT STRAIGHT PIECE OF C.I. PIPE BETWEEN C.I. BEND & V.C. "Y" AS REQUIRED FOR DET. 13 ONLY
DETAIL 4 AS SHOWN
DETAIL 13 SIMILAR
DETAIL 2
PROPOSED NEW 3" PVC SCH 80 PIPE (DRAIN LINE) - TO OILY WATER HOLDING TANK.
FLANGED ELBOW 45°, 3" DIA, PVC, SCH 80, (FOR DRAIN LINE ONLY)
PROPOSED NEW 3" PVC SCH 80 PIPE (BLOW OFF LINE) - TO WASTEWATER HOLDING TANK
FLANGE GASKET SET CONSISTING BOLTS, NUTS & NEOPRENE GASKET. "HARRINGTON PLASTIC CO" PART # 154A-030 TOTAL NUMBER: 10 SETS
PRECAST CONCRETE UTILITY BOX 30"x60". "CHRISTY CO" B52 WITH COVER B52-62D (TYP OF 2)
EXISTING 3" PVC PIPE (DRAIN LINE OR BLOW OFF LINE FROM COOLING TOWERS) TO BE ABANDONED.
MALE END FLANGE, PVC SCH 80. "HARRINGTON PLASTIC CO" PART # 854-030 TOTAL NUMBER REQ'D: 4
GATE VALVE, PVC, FLANGED, "HARRINGTON PLASTIC CO" PART # 203FG-030, 3" DIA TOTAL NUMBER REQ'D: 4
FLANGED TEE 3" DIA, PVC, SCH 80
PVC COMPRESSION FITTING WORKING PRESSURE 200 PSI "HARRINGTON PLASTIC CO" PART # 110-30 TOTAL NUMBER REQ'D: 4
EXISTING 3" PVC PIPE (DRAIN LINE OR BLOW OFF LINE FROM COOLING TOWERS) TO REMAIN.
DETAIL 16 TIE-IN
N.T.S.
TWO LOCATIONS
COOLING TOWER
20' ROAD
15' ROAD
MAIN COMPRESSOR BUILDING
OILY WATER SEWER
AUXILIARY BLDG.
JACKET WATER AIR COOLER EXCHANGER
FUTURE
NORTH COOLING TOWER
BULK ACID STORAGE TANK
DETAIL 8
DETAIL 7
DETAIL 1
DETAIL 11
DETAIL 9
DETAIL 12
DETAIL 10
DETAIL 6
PLAN
ELEVATION
DETAIL OF CATCHBASIN
REVISION NOTES
REVISED & ADDED DIMENSIONS AT NORTH COOLING TOWER.
REVISED RUNS OF DRAIN PIPES; ADDED WASTEWATER EQUIPMENT DETAIL 16 & REFERENCE DWG. PER GM-1947217
REFERENCE DRAWINGS
NORTH COOLING TOWER BASIN
PIPING PLAN AT N. COOLING TOWER
PIPING PLAN AREA No. 1
PIPE SUPPORTS & DRAIN
DETAIL OF FLOOR DRAIN COMPRESSOR BLDG.
PIPING PLAN AT OIL STORAGE TANKS
PRECIPITATOR FOUNDATION
AUXIL. BLDG. PLUMBING
PLOT PLAN
PAVING & GRADING
FOUNDATION SLAB COMPRESSOR BLDG.
COOLING TOWER BASIN
PIPING PLAN AT COOLING TOWER
INSTAL. OF NEW ENGINE JACKET WATER PUMPS
WASTEWATER TREATMENT, PIPING ARRANGEMENT 488766
26 SEE REVISION NOTE
25 4-28-71 Added Construction
24 11-18-69 CORRECTIONS FOR GM
23 ADDED 3/4" DRAIN LINE
22 12-11-67 Changed as built
REMOVED OLD SYSTEM GM# 4876173
NO. DATE DESCRIPTION APPR.
TABLE OF CHANGES
APPROVED BY
DRAWING LIST
BY DR. CH. O.K. DATE SCALES
BILL OF MATERIAL
SUPERSEDES SUPERSEDED BY SHEET NO. DRAWING NUMBER
SEWERS & DRAINS
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

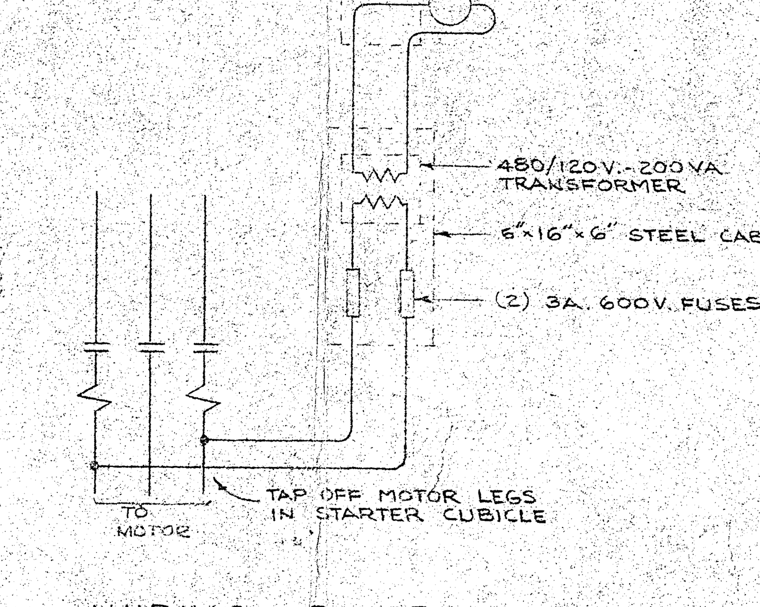


Two 3/4" conduits from new section of M.C.C. to top of bulk chem. elevator for 5 H.P. + 7 1/2 H.P. Motors. See Sec. "A-A"

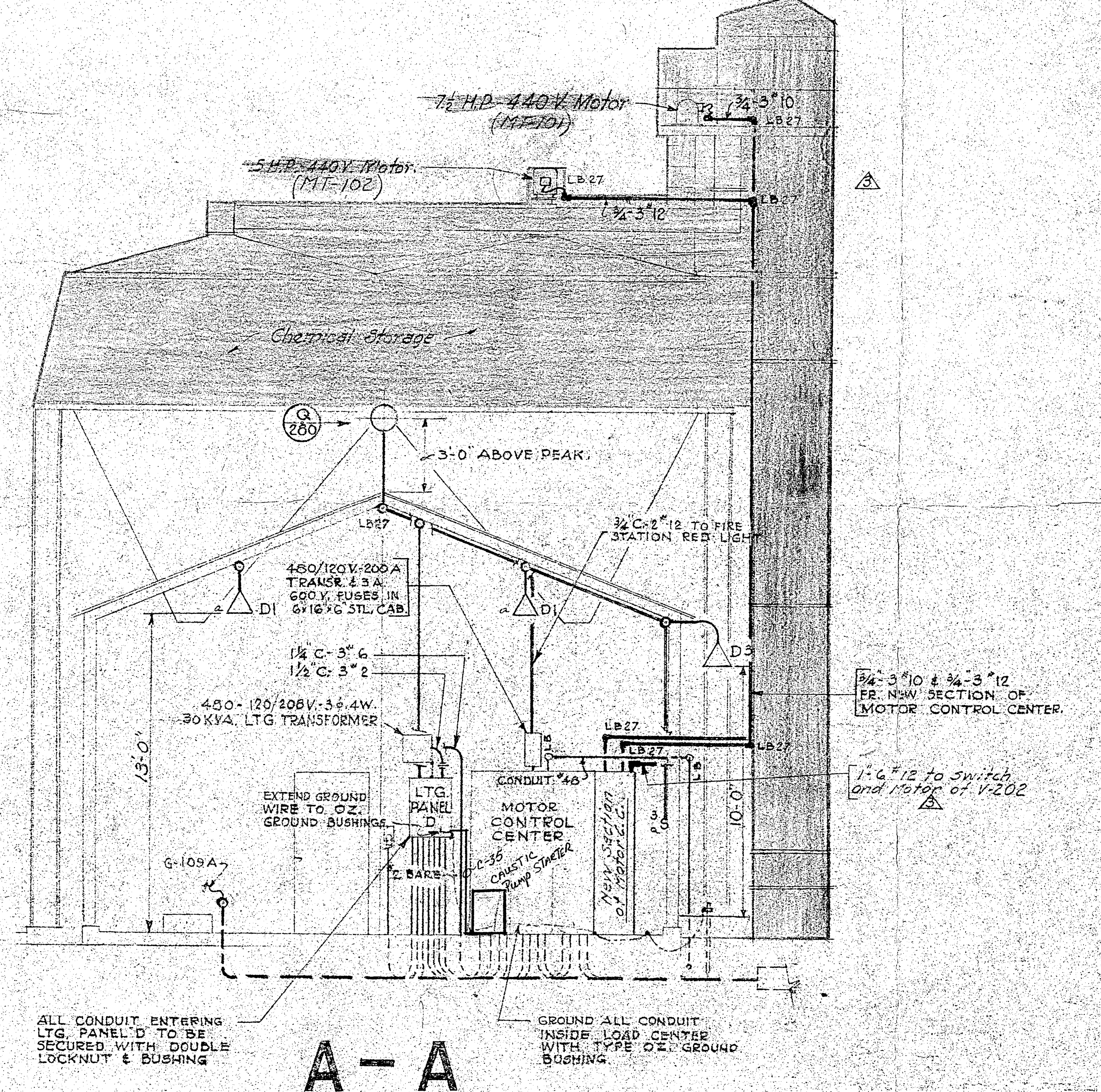
Install the Desludge + Backwash Control Panel, The A.T.C. Timer, The Proportioner Motor Switch and The Motor Switch for Pump G-217 (all equipment transfered fr. Hinkley) in a suitable location for the new installation at Topock.



DETAIL 1
BOTTOM VIEW OF SWITCH GEAR SHOWING CONDUIT PENETRATIONS
SCALE: 1" = 1'-0"



WIRING DIAGRAM
FIRE PUMP MOTOR RUNNING INDICATOR LIGHT CIRCUIT



A - A

LIGHTING PANEL SCHEDULE "D"

CIR. NO.	TRIP	OUTLETS NO.	OUTLETS WATTS	AREA SERVED	LOAD IN WATTS L_1A	L_2B	L_3C
1	20A	8	200	INSIDE WATER SOFTENER BLDG.	1600		
2		2 / 7	150 / 200	GROUND LEVEL-COOLING TWR. & ACID SHELTER	1700		
3		4	200	OUTSIDE WATER SOFTENER BLDG.		800	
4		2	500	ANGLE N. CORNER COOLING TWR.		1000	
5		1	1000	FLDLTG. WATER SOFTENER BLDG.			1000
6		2	500	ANGLE S. CORNER COOLING TWR.			1000
7		1	100	CROMATE ANALYZER		100	
8		1	1000	FLDLTG. N. CORNER COOLING TWR.	1000		
9		1	100	NEW DESLUDGE & BACKFLUSH PAN		100	
10		6	200	N.W. SIDE - TOP - COOLING TWR.		1200	
11		1	500	G-116 & PROPORTIONER			500
12		1	1000	FLDLTG. N. CORNER COOLING TWR.			1000
13		1	500	G-217 & NEW PROPORTIONER		500	
14		2	500	ANGLE - S. CORNER COOLING TWR.	1000		
15		4	200	RECPT. - WATER SOFTENER BLDG.		800	
16		6	200	S.E. SIDE - TOP - COOLING TOWER		1200	
17		3	200	RECPT. WATER SOFTENER BLDG.			600
18		2	500	ANGLE - E. CORNER - COOLING TWR.			1000
19		1	500	FLDLGT. - WATER TANK AREA	500		
20		1	1000	FLDLTG. S. CORNER COOLING TOWER	1000		
21		1	500	FLDLGT. - WATER TANK AREA		500	
22				SPARE			
23		2	200	[illegible]			400
24		5	200	RECEPTACLES - COOLING TOWER & ACID SHELTER			1000
				TOTAL	6800	6200	6500

NOTE:
Red - Items Added
Green - Items Removed

Field Corrections
By J. Popeney
Date: 7-28-70
GM 172520

481794

NOTE 3 Added; One new section to Western Switch Board M.C.C. containing 7 1/2 H.P. Comb. Starter for MT-101, 5 H.P. Comb. Starter for MT-102 and 1 H.P. Comb. Starter for MV-202; Added all elec. control equipment and circuits in connection with Chem. Vat D-214. Added Bulk Chemical Storage Facilities and Motors MT-101 and MT-102. Added light circuits Nos. 7 & 13.
The control equipment with Vat D-214 is to be tied to existing leads from control equipment at Precipitator so that both automatic control units operate in parallel.

REFERENCE DRAWINGS

ELECTRICAL DISTRIBUTION PLAN	481790	CONDUIT DETS. WASTE WATER TREATMENT	485348
ELECTRICAL DETAILS & GENERAL NOTES	481789	DIAGRAM OF CONN. WASTE WATER TREATMENT	485382
ELECTRICAL SINGLE LINE DIAGRAM	481785		
ELEC. LAYOUT & DETS. - CHEM. STORAGE BLDG.	383327		

3 Rev'd for GM 134695
2 Rev'd for GM 116053

NO.	DATE	DESCRIPTION		APPRD
4	5-15-70	ADDED UNIT 11 & CONDUITS		
3	4-18-47	See Revision Note 3		
2	1-23-53	ADDED CONDUIT #48		

TABLE OF CHANGES

APPROVED BY — GM 101688 DRAWING LIST
BY R.F.P. DR. R.F.P. CH. O.K. DATE
SCALES: 1/4" = 1'-0"

ELECTRICAL LAYOUT & DETAILS
WATER SOFTENER BUILDING
TOPOCK COMPRESSOR STATION
PACIFIC GAS AND ELECTRIC COMPANY

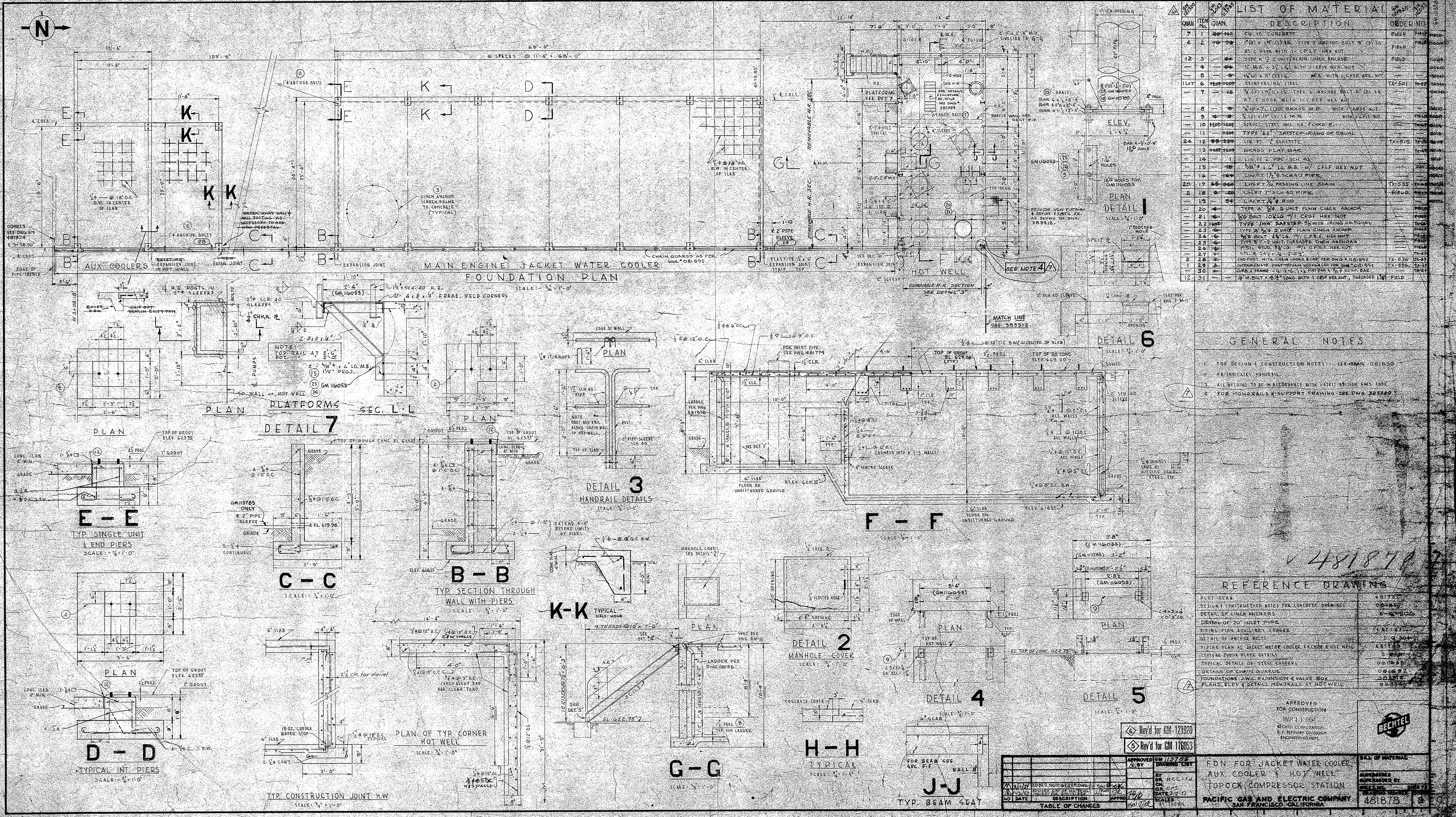
BILL OF MATERIAL
SUPERSEDES
SUPERSEDED BY
SHEET NO. SHEETS
DRAWING NUMBER CHANGE

BECHTEL

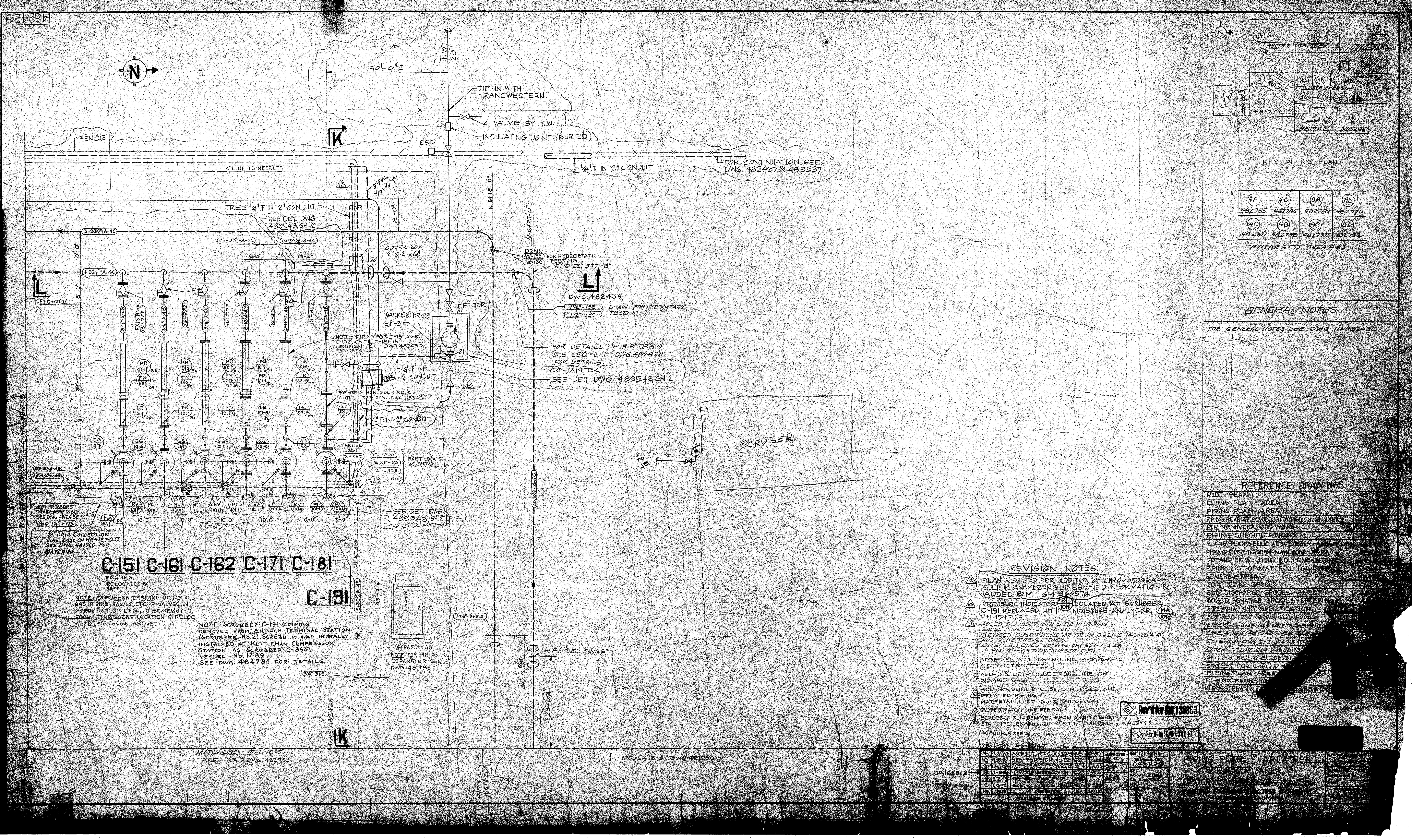
Appendix K
PG&E Engineering Drawings Referenced in this Work Plan

(Drawing Scans on CD Only)

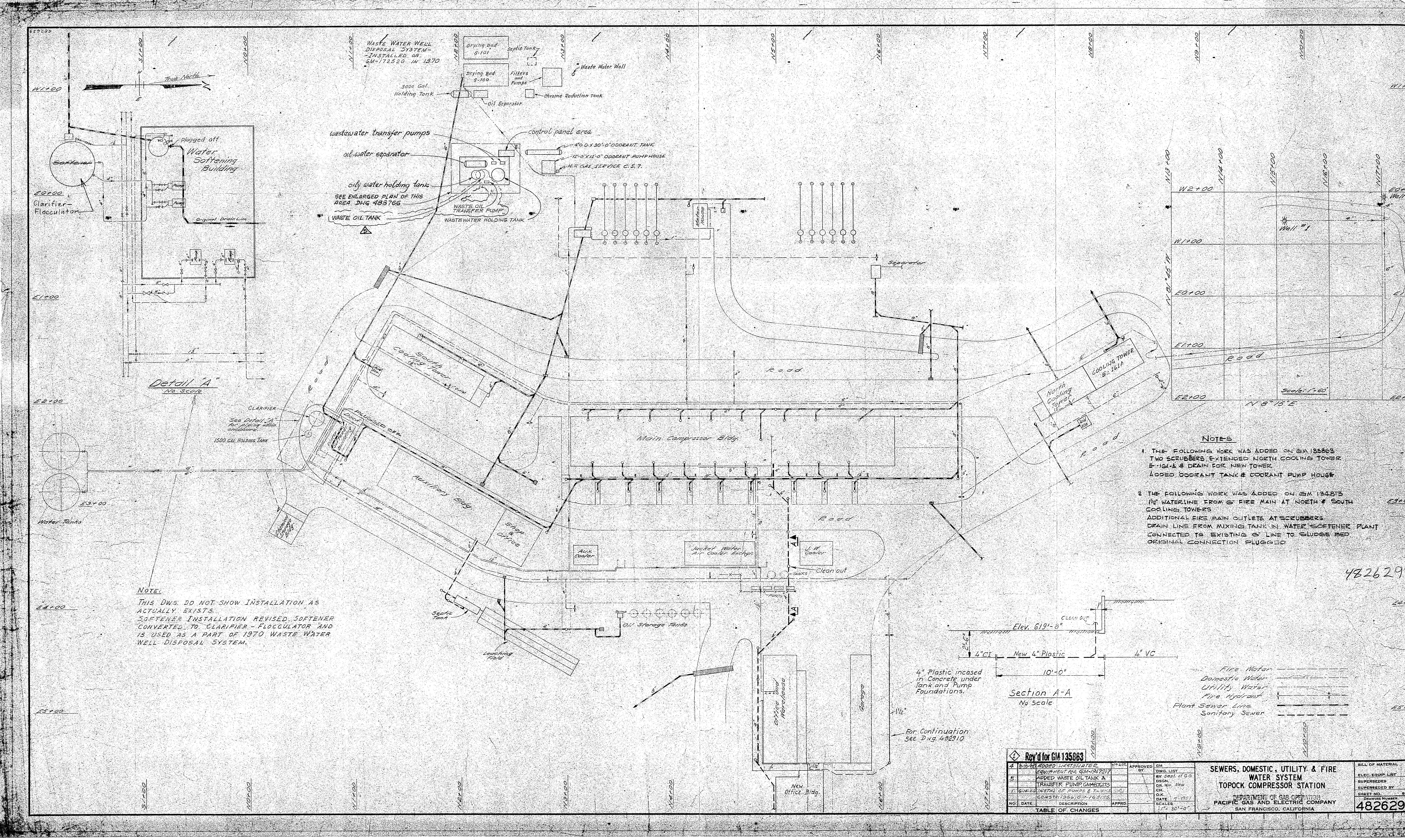
Part 2 of 2



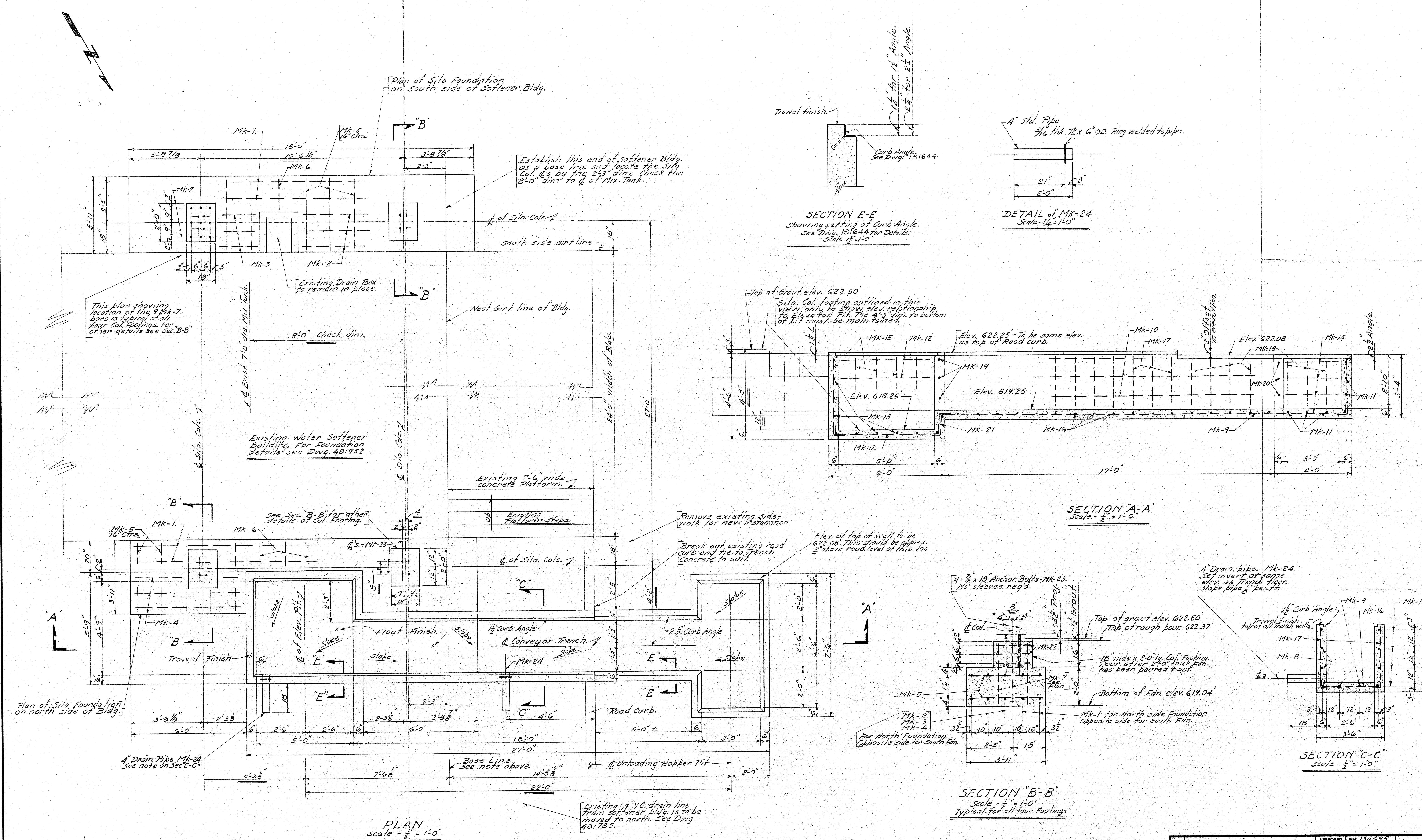
MAIN ENGINE JACKET WATER COOLER
FOUNDATION PLAN
AUX COOLERS
HOT WELL
LIST OF MATERIAL
GENERAL NOTES
1. FOR DESIGN & CONSTRUCTION NOTES: - SEE DWG 081850.
2. HR INDICATES HANDRAIL.
3. ALL WELDING TO BE IN ACCORDANCE WITH LATEST EDITION AWS CODE.
4. FOR MONORAILS & SUPPORT FRAMING SEE DWG 383340
REFERENCE DRAWING
PLAN PLATFORMS SEC. L-L
DETAIL 7
DETAIL 1
DETAIL 2
MANHOLE COVER
DETAIL 3
HANDRAIL DETAILS
DETAIL 4
DETAIL 5
DETAIL 6
E - E
TYP. SINGLE UNIT & END PIERS
D - D
TYPICAL INT. PIERS
C - C
B - B
TYP. SECTION THROUGH WALL WITH PIERS
K-K
F - F
G - G
H - H
TYPICAL
J-J
TYP. BEAM SEAT
PLAN OF TYP CORNER HOT WELL
TYP. CONSTRUCTION JOINT H.W.
Rev'd for GM-121920
Rev'd for GM 116053
APPROVED FOR CONSTRUCTION
MAR 11 1954
BECHTEL CORPORATION
S. F. REFINERY DIVISION
ENGINEERING DEPT.
TABLE OF CHANGES
FDN FOR JACKET WATER COOLER, AUX COOLER & HOT WELL
TOPOCK COMPRESSOR STATION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO CALIFORNIA
481878



482429
N
30'-0"±
T.W. 20"
TIE-IN WITH TRANSWESTERN
4" VALVE BY T.W.
INSULATING JOINT (BURIED)
FENCE
K
ESD
4" LINE TO NEEDLES
1/4" T IN 2" CONDUIT
FOR CONTINUATION SEE DWG 482437 & 489537
TREE 1/4" T IN 2" CONDUIT
SEE DET. DWG. 489543, SH. 2
COVER BOX 12" x 12" x 6"
DRAIN FOR HYDROSTATIC TESTING
N 6425'-0"
N 6418'-0"
L
DWG 482436
DRAIN FOR HYDROSTATIC TESTING
WALKER PROBE SP-2
FILTER
NOTE: PIPING FOR C-151, C-161, C-162, C-171, C-181, IS IDENTICAL. SEE DWG 482430 FOR DETAILS.
1/4" T IN 2" CONDUIT
FOR DETAILS OF H.P. DRAIN SEE SEC. "L-L" DWG. 482430 FOR DETAILS.
CONTAINTER
SEE DET. DWG 489543, SH. 2
FORMERLY SCRUBBER NO. 2 ANTIOCH TER. STA. DWG 483654
EXIST. LOCATE AS SHOWN
SEE DET. DWG 489543, SH. 2
HIGH PRESSURE DRAIN ASSEMBLY SEE DWG 482430
3/4" DRIP COLLECTION LINE EXIST ON WO 4167-C55 SEE DWG. 481766 FOR MATERIAL
C-151 C-161 C-162 C-171 C-181
C-191
EXISTING RELOCATED FR. AREA 2
NOTE: SCRUBBER C-151, INCLUDING ALL GAS PIPING, VALVES, ETC. & VALVES IN SCRUBBER OIL LINES, TO BE REMOVED FROM ITS PRESENT LOCATION & RELOCATED AS SHOWN ABOVE.
NOTE: SCRUBBER C-191 & PIPING REMOVED FROM ANTIOCH TERMINAL STATION (SCRUBBER NO. 2). SCRUBBER WAS INITIALLY INSTALLED AT KETTLEMAN COMPRESSOR STATION AS SCRUBBER C-365. VESSEL No. 1489. SEE DWG. 484781 FOR DETAILS.
SEPARATOR
NOTE: FOR PIPING TO SEPARATOR SEE DWG 481785
P.I. & EL. 541'-6"
SCRUBBER
TO JB
MATCH LINE E 1110'-0" AREA 8-A DWG 482763
AREA 8-B DWG 482750
KEY PIPING PLAN
ENLARGED AREA 4 & 8
GENERAL NOTES
FOR GENERAL NOTES SEE DWG No 482430
REFERENCE DRAWINGS
PLOT PLAN
PIPING PLAN - AREA 2
PIPING PLAN - AREA 8
PIPING PLAN AT SCRUBBER (TYP.) & OIL SUMP AREA 2
PIPING INDEX DRAWING
PIPING SPECIFICATIONS
PIPING PLAN & ELEV. AT SCRUBBER
PIPING & INST. DIAGRAM MAIN COMP. AREA
DETAIL OF WELDING COUPLING
PIPING LIST OF MATERIAL
SEWERS & DRAINS
30½ INTAKE SPOOLS
30½ DISCHARGE SPOOLS - SHEET No. 1
30½ DISCHARGE SPOOLS - SHEET No. 2
PIPE WRAPPING SPECIFICATION
30½ (1956) TIE IN PIPING SPOOLS
LINE 5-16-A-4B GAS TO SCRUBBER
LINE 4-16-A-4B GAS FROM SCRUBBER
EXTEN. OF LINE 652-2"-A-4B TO
EXTEN. OF LINE 604-2-A-4B TO
SPOOLS FOR C-181, C-191
SPOOLS FOR C-181, C-
PIPING PLAN - AREA
PIPING PLAN - A
PIPING PLAN & [illegible] SCRUBBER C-
REVISION NOTES:
12 PLAN REVISED PER ADDITION OF CHROMATOGRAPH SULFUR ANAYLZERS LINES, FIED INFORMATION & ADDED B/M GM 1960574
10 PRESSURE INDICATOR PI 101F LOCATED AT SCRUBBER C-151 REPLACED WITH MOISTURE ANALYZER MA 101F. GM 4545125.
3 ADDED SCRUBBER C-171 & TIE-IN PIPING. ADDED LINE 14-30½-A-4C. REVISED DIMENSIONS AT TIE IN OF LINE 14-30½-A-4C. ADDED REFERENCE DWGS. EXTENDED LINES 604-2"-A-4B, 652-2"-A-4B, & 814-½-F-15 TO SCRUBBER C-171
4 ADDED EL. AT ELLS IN LINE 14-30½-A-4C AS CONSTRUCTED.
5 ADDED ¾ DRIP COLLECTION LINE ON WO 4167-C55
6 ADD SCRUBBER C-181, CONTROLS, AND RELATED PIPING. MATERIAL LIST DWG. NO. 082564
7 ADDED MATCH LINE-REF DWGS
8 SCRUBBER RUN REMOVED FROM ANTIOCH TERM. STA. PIPE LENGTHS CUT TO SUIT. SALVAGE GM 437744
SCRUBBER SERIAL NO. 1489
6 Rev'd for GM 135863
3 Rev'd for GM 131617
12 6-5-93 AS-BUILT
11 AS BUILT, NO CHANGES
10 SEE REVISION NOTE
12 SEE REVISION NOTE
GM 165912
GM 121920
082273
PIPING PLAN - AREA No. 11 SCRUBBER AREA
TOPOCK COMPRESSOR STATION
PACIFIC GAS AND ELECTRIC COMPANY



SEWERS, DOMESTIC, UTILITY & FIRE WATER SYSTEM
TOPOCK COMPRESSOR STATION
DEPARTMENT OF GAS OPERATION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA
DRAWING NUMBER 482629
Rev'd for GM 135863
TABLE OF CHANGES
NO. DATE DESCRIPTION APPRD.
4 ADDED WASTEWATER EQUIPMENT PER GM-1947217
5 ADDED WASTE OIL TANK & TRANSFER PUMP, GM4876173
1 6-14-66 INSTAL OF PUMPS & TANKS CONST. 1966 / GM-165155
APPROVED BY
DWG. LIST
BY Dept. of G.O.
DR. Wm. New
SCALES 1" = 30'-0"
BILL OF MATERIAL
ELEC. EQUIP. LIST
SUPERSEDES
SUPERSEDED BY
SHEET NO.
Notes
1. THE FOLLOWING WORK WAS ADDED ON GM 135863
TWO SCRUBBERS, EXTENDED NORTH COOLING TOWER
E-161-A & DRAIN FOR NEW TOWER
ADDED ODORANT TANK & ODORANT PUMP HOUSE
2. THE FOLLOWING WORK WAS ADDED ON GM 134813
1½" WATERLINE FROM 6" FIRE MAIN AT NORTH & SOUTH COOLING TOWERS
ADDITIONAL FIRE MAIN OUTLETS AT SCRUBBERS
DRAIN LINE FROM MIXING TANK IN WATER SOFTENER PLANT CONNECTED TO EXISTING 6" LINE TO SLUDGE BED
ORIGINAL CONNECTION PLUGGED
NOTE:
THIS DWG. DO NOT SHOW INSTALLATION AS ACTUALLY EXISTS.
SOFTENER INSTALLATION REVISED. SOFTENER CONVERTED TO CLARIFIER - FLOCCULATOR AND IS USED AS A PART OF 1970 WASTE WATER WELL DISPOSAL SYSTEM.
Fire Water
Domestic Water
Utility Water
Fire Hydrant
Plant Sewer Line
Sanitary Sewer
Section A-A
No Scale
Elev. 619'-8"
New 4" Plastic
10'-0"
4" CI
4" VC
Clean out
4" Plastic incased in Concrete under Tank and Pump Foundations.
For Continuation See Dwg. 482910
Detail "A"
No Scale
Water Softening Building
Plugged off
Softener
Clarifier-Flocculator
Original Drain Line
True North
WASTE WATER WELL DISPOSAL SYSTEM - INSTALLED ON GM-172520 IN 1970
Drying Bed S-101
Drying Bed S-100
Septic Tank
Filters and Pumps
Waste Water Well
3000 Gal. Holding Tank
Oil Separator
Chrome Reduction Tank
wastewater transfer pumps
oil-water separator
oily water holding tank
control panel area
4'0 D.X 30'-0" ODORANT TANK
12'-0"X12'-0" ODORANT PUMPHOUSE
H.P. GAS SERVICE C.S.T.
SEE ENLARGED PLAN OF THIS AREA DWG 488766
WASTE OIL TANK
WASTE OIL TRANSFER PUMP
WASTEWATER HOLDING TANK
Separator
Road
South Cooling Tower
North Cooling Tower
COOLING TOWER E-161A
Main Compressor Bldg.
Auxiliary Bldg.
Shop & Office
Aux. Cooler
Jacket Water Air Cooler Exchgr.
J.W. Cooler
Clean out
Oil Storage Tanks
Septic Tank
Leaching Field
Office and Warehouse
Garage
New Office Bldg.
CLARIFIER
See Detail "A" for piping within enclosure
1500 GAL. HOLDING TANK
Water Tanks
Well #1
Scale: 1"=60'
N 8°15' E
N 81°45' W
482629



MATERIAL LIST

MARK.	QNT.	SIZE	DESCRIPTION	LGTH.
Mk-1	8	7/8"	17'-6"	17'-6"
Mk-2	6	7/8"	8'-8"	8'-8"
Mk-3	6	7/8"	6'-3"	6'-3"
Mk-4	12	7/8"	5'-6"	5'-6"
Mk-5	48	3/4"	3'-7"	3'-7"
Mk-6	12	3/4"	17"	17"
Mk-7	36	3/4"	3'-0"	3'-0"
Mk-8	4	1/2"	6" 23'-0" 6"	24'-0"
Mk-9	2	1/2"	6" 21'-0" 6"	22'-0"
Mk-10	4	1/2"	6" 17'-6" 6"	18'-6"
Mk-11	7	1/2"	6" 7'-0" 6"	8'-0"
Mk-12	11	1/2"	6" 5'-6" 6"	6'-6"
Mk-13	11	1/2"	6" 5'-3" 6"	6'-3"
Mk-14	12	1/2"	6" 3'-6" 6"	4'-6"
Mk-15	18	1/2"	6" 4'-2"	4'-8"
Mk-16	18	1/2"	6" 3'-0" 6"	4'-0"
Mk-17	26	1/2"	6" 3'-2"	3'-8"
Mk-18	30	1/2"	6" 3'-0"	3'-6"
Mk-19	3	1/2"	6" 2'-3" 6"	3'-3"
Mk-20	6	1/2"	6" 2'-0" 6"	3'-0"
Mk-21	4	1/2"	6" 12" 6"	2'-0"
Mk-22	12	3/8"	14 13 13 14 20 – 6" lap.	6'-2"
~~Mk-23~~	~~16~~	~~7/8"~~	7/8" x 18" Anchor Bolts	
Mk-24	2	4"	Drain pipe sleeve - see Detail.	

REFERENCE DRAWINGS

PLOT PLAN	481751
SEWERS AND DRAINS	481785
PAVING AND GRADING	481784
WATER SOFTENER BLD'G. FDN.	481952
CURB ANGLE DETAILS	181644

NOTES

1. All concrete to be 2500 lb strength.
2. Estimated yardage of concrete.

Silo Col. Foundations	=	10 Cu. Yds
Conv. Trench + Elev. Pit	=	7 " "
Total	=	17 " "

3. The Conveyor Trench and Elevator Pit are to be excavated for, formed and poured before excavation for adjacent Silo Fdn. is started. The Silo. Fdn is to be poured against Trench and Pit walls but no special preparation for bonding is to be made. Silo Fdn. on South side of Bldg. is to be poured around the concrete drain box so that this drainage system can be left in service. Excavate for this Fdn. below the 619.04' elev. shown if necessary to totally encase all underground pipework in concrete. Use extreme care not to undermine the Water Softener Bldg. Footing when excavating for the Silo. Fdn. on both sides of the Bldg.
4. All underlined dims. are to be closely adhered to.

10.
7.0

✓ 482717

NO.	DATE	DESCRIPTION	APPRD.

TABLE OF CHANGES

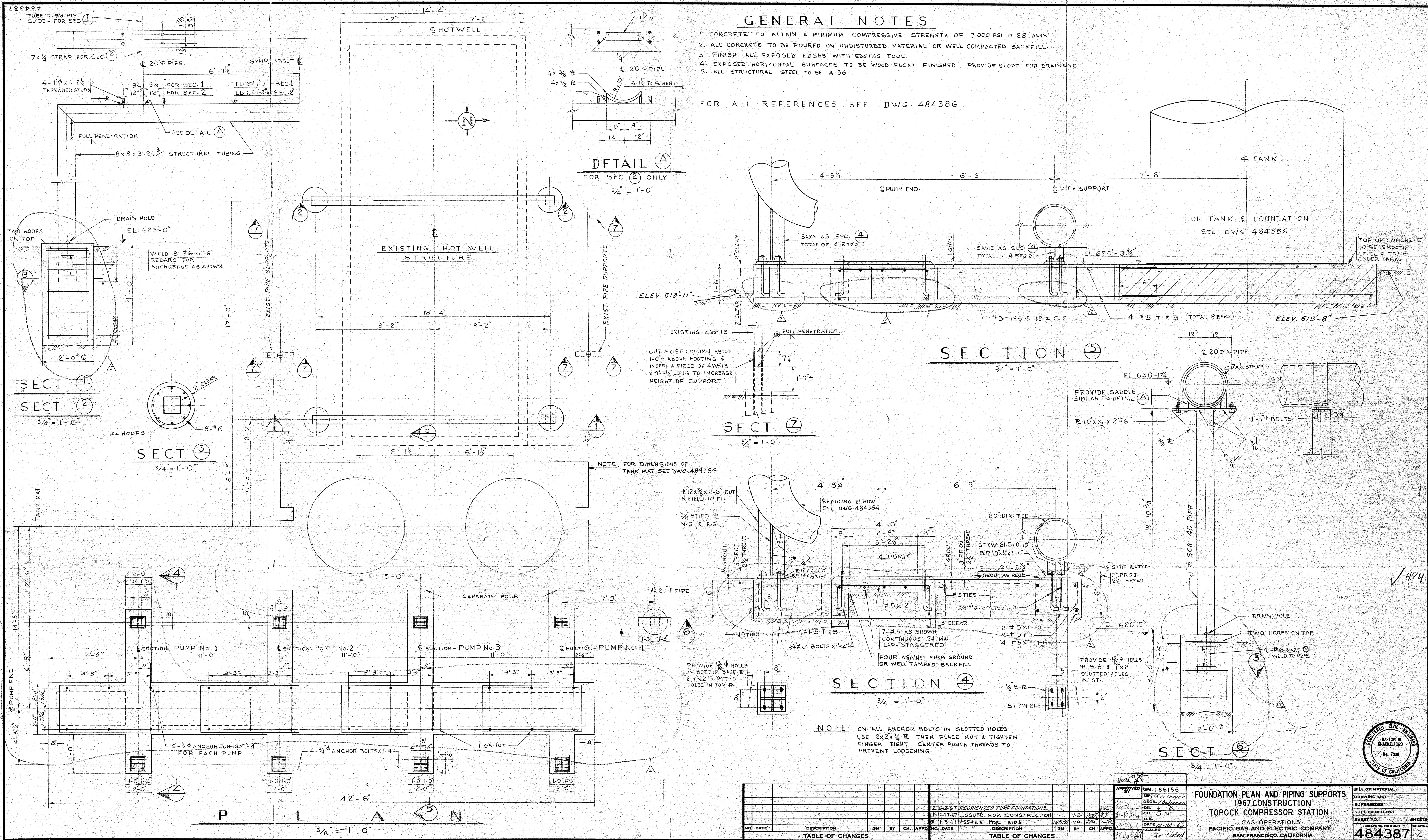
APPROVED BY [illegible]

GM 134695
DRAWING LIST
BY A.H.
DR.
CH. FSW.
O.K.
DATE 2-28-57
SCALES As Shown.

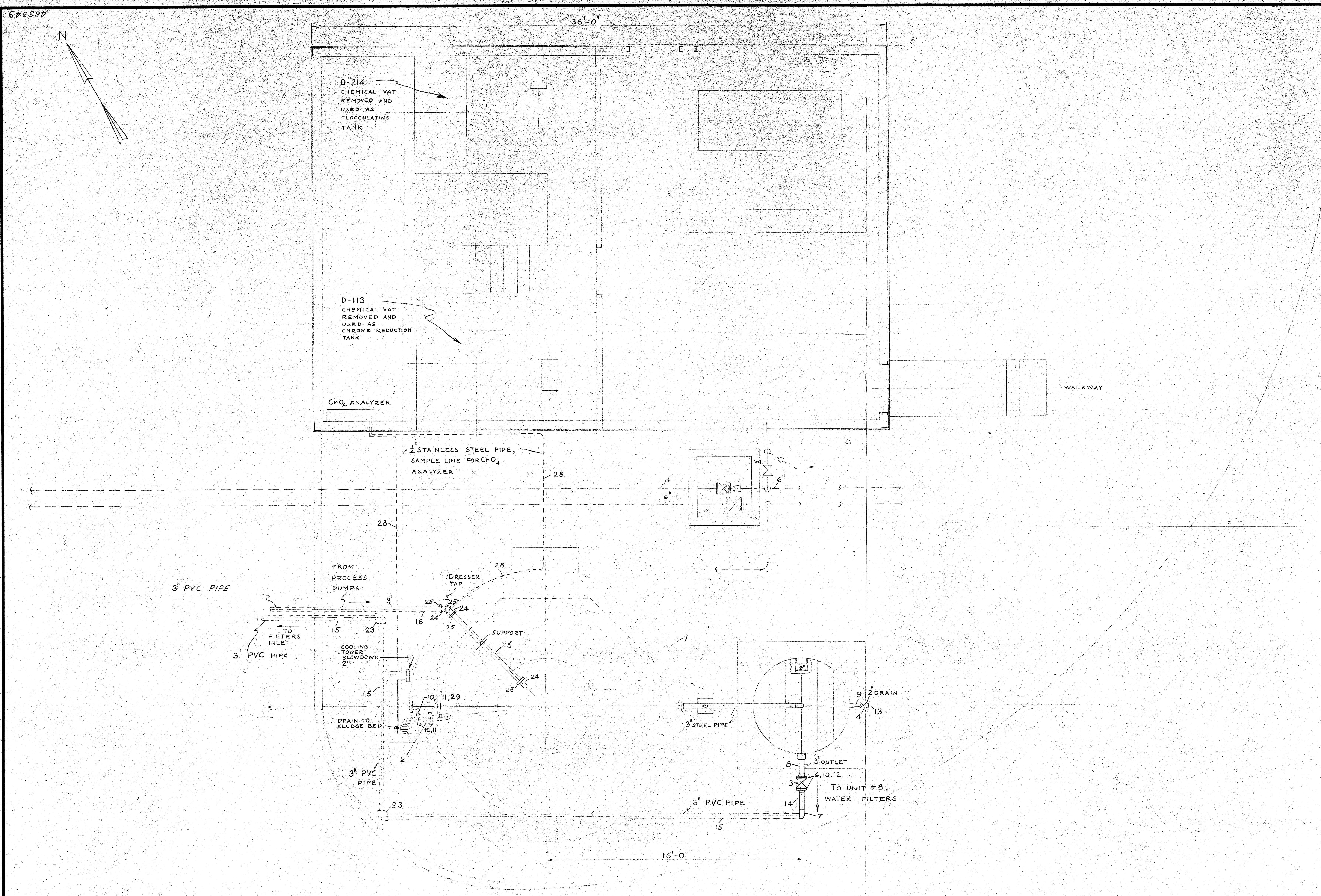
PLAN AND DETAILS
FDN. FOR BULK CHEMICAL STORAGE
TOPOCK COMPRESSOR STATION

PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

BILL OF MATERIAL
SUPERSEDES
SUPERSEDED BY
SHEET NO. SHEETS
DRAWING NUMBER 482717
CHANGE Q


GENERAL NOTES
1. CONCRETE TO ATTAIN A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI @ 28 DAYS.
2. ALL CONCRETE TO BE POURED ON UNDISTURBED MATERIAL OR WELL COMPACTED BACKFILL.
3. FINISH ALL EXPOSED EDGES WITH EDGING TOOL.
4. EXPOSED HORIZONTAL SURFACES TO BE WOOD FLOAT FINISHED, PROVIDE SLOPE FOR DRAINAGE.
5. ALL STRUCTURAL STEEL TO BE A-36
FOR ALL REFERENCES SEE DWG. 484386
DETAIL A
FOR SEC. 2 ONLY
3/4" = 1'-0"
SECT 1
SECT 2
3/4" = 1'-0"
SECT 3
3/4" = 1'-0"
EXISTING HOT WELL STRUCTURE
NOTE: FOR DIMENSIONS OF TANK MAT SEE DWG. 484386
SEPARATE POUR
SUCTION - PUMP No. 1
SUCTION - PUMP No. 2
SUCTION - PUMP No. 3
SUCTION - PUMP No. 4
6-3/4"φ ANCHOR BOLTS x 1'-4" FOR EACH PUMP
PLAN
3/8" = 1'-0"
FOR TANK & FOUNDATION SEE DWG 484386
TOP OF CONCRETE TO BE SMOOTH LEVEL & TRUE UNDER TANKS
SECTION 5
3/4" = 1'-0"
CUT EXIST. COLUMN ABOUT 1'-0" ± ABOVE FOOTING & INSERT A PIECE OF 4WF13 x 0'-7 1/4" LONG TO INCREASE HEIGHT OF SUPPORT
SECT 7
3/4" = 1'-0"
POUR AGAINST FIRM GROUND OR WELL TAMPED BACKFILL
SECTION 4
3/4" = 1'-0"
NOTE: ON ALL ANCHOR BOLTS IN SLOTTED HOLES USE 2x2x1/4 PL THEN PLACE NUT & TIGHTEN FINGER TIGHT. CENTER PUNCH THREADS TO PREVENT LOOSENING.
SECT 6
3/4" = 1'-0"
BARTON W. SHACKELFORD No. 7306
REGISTERED CIVIL ENGINEER STATE OF CALIFORNIA
2 5-2-67 REORIENTED PUMP FOUNDATIONS
1 2-17-67 ISSUED FOR CONSTRUCTION
0 1-3-67 ISSUED FOR BIDS
TABLE OF CHANGES
GM 165155
FOUNDATION PLAN AND PIPING SUPPORTS
1967 CONSTRUCTION
TOPOCK COMPRESSOR STATION
GAS OPERATIONS
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA
SCALES As Noted
484387 2

485349



PLAN.
Scale: $\frac{3}{8}$" = 1'-0"

REFERENCES:

Piping Sections & details, Waste Water Well Disposal System	DWG 485350.
Piping, Plan Area No. 5	481775.
" , Sections & details, Area No. 5	481776.
Details of Modification to Steel Tank D-1(?) √485349	485341.
Schematic Control Piping	485342.
Foundation for Clarifier	281915.
" " 1500 gals. Holding Tank	386065.
Location Plan, Tanks, Equipm. & Piping, Area 13 & 14	485352.

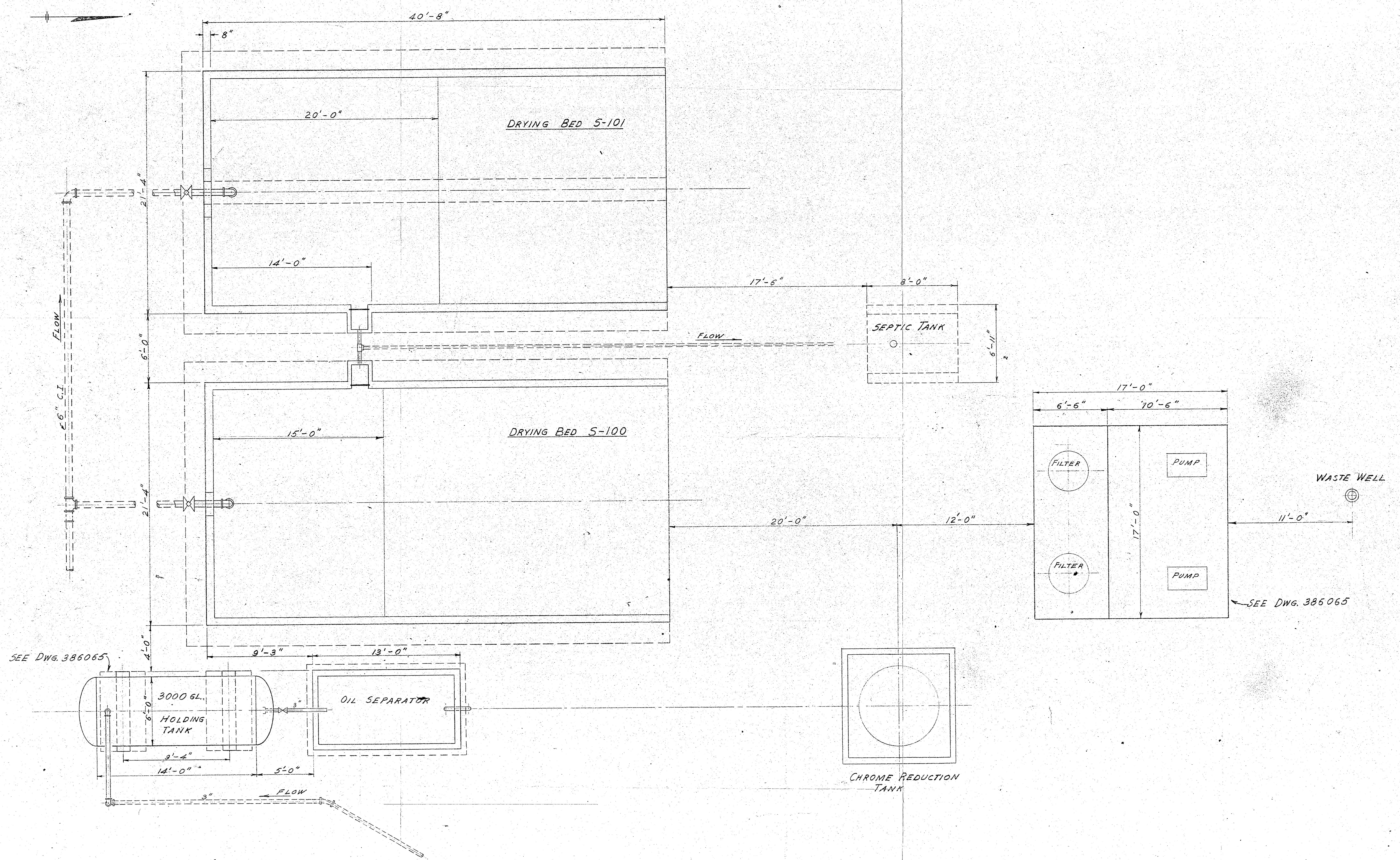
NO.	DATE	DESCRIPTION	GM	BY	CH.	APPD.
		TABLE OF CHANGES				

NO.	DATE	DESCRIPTION	GM	BY	CH	APPD.
		TABLE OF CHANGES				

APPROVED BY: J.R.
GM 172520
SUPV. BY
DSGN.
DR. D. Carmichael
CH.
O.K.
DATE Feb 25, 1970
SCALES As Noted

PIPING PLAN FOR WASTE WATER WELL
DISPOSAL SYSTEM AREA NO. 5
TOPOCK COMPRESSOR STATION
GAS OPERATIONS
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

BILL OF MATERIAL 085066
DRAWING LIST 082272
SUPERSEDES
SUPERSEDED BY
SHEET NO. SHEETS
DRAWING NUMBER 485349 CHANGE



√485352

REFERENCES:
1. FOUNDATIONS FOR TANKS AND EQUIPMENT WASTE WATER DISPOSAL SYSTEM. DWG. 385065

P.L.O.

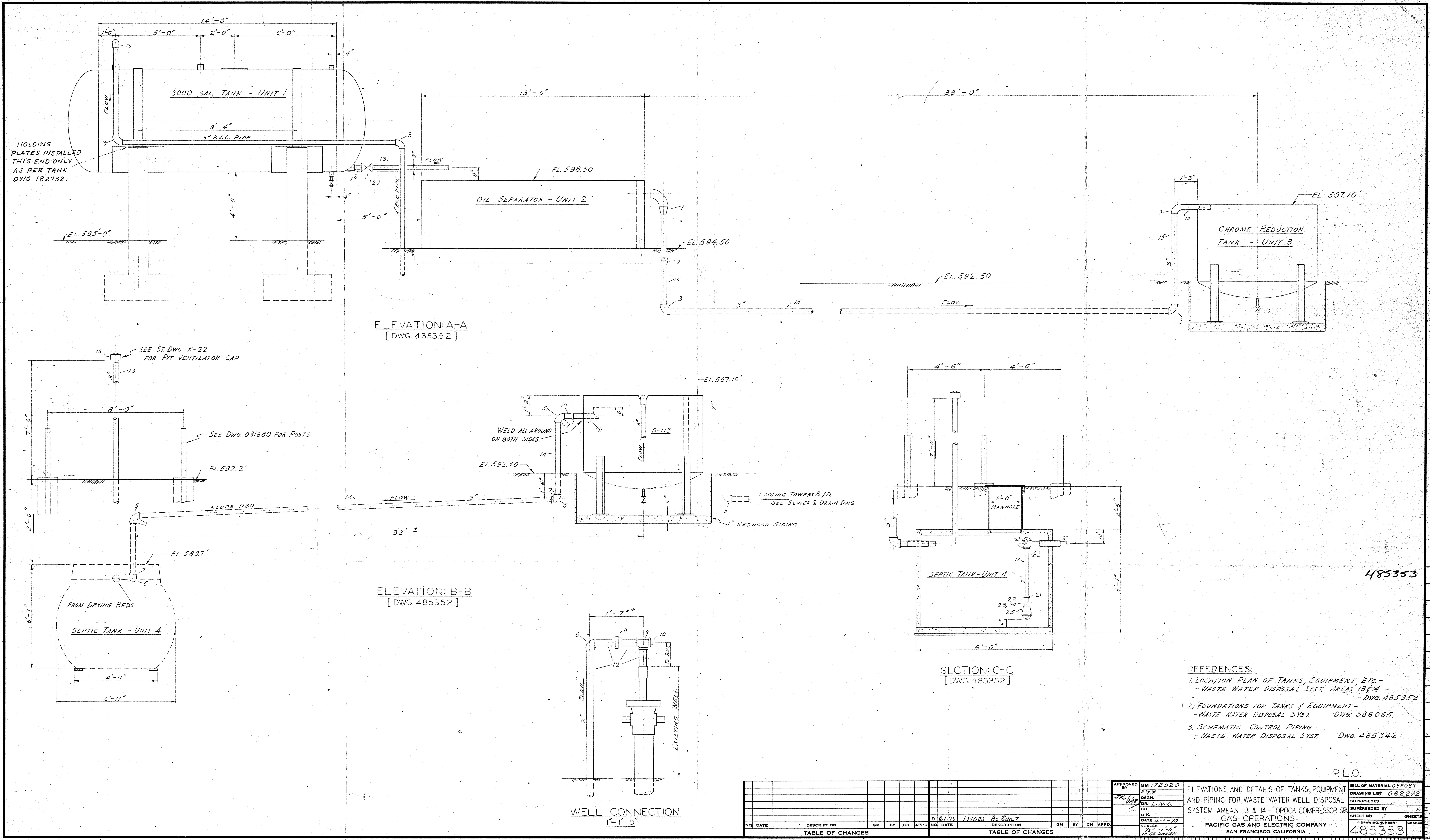
NO.	DATE	DESCRIPTION	GM	BY	CH.	APPD.	NO.	DATE	DESCRIPTION	GM	BY	CH	APPD.

TABLE OF CHANGES — TABLE OF CHANGES

APPROVED BY	GM 172520
SUPV. BY	
DSGN.	
DR.	L.N.O.
CH.	
O.K.	
DATE	
SCALES	1/4" = 1'-0"

LOCATION PLAN OF TANKS, EQUIPMENT & PIPING
WASTE WATER WELL DISPOSAL SYSTEM - AREAS 13 & 14
TOPOCK COMPRESSOR STATION
GAS OPERATIONS
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

BILL OF MATERIAL	
DRAWING LIST	082272
SUPERSEDES	
SUPERSEDED BY	
SHEET NO.	SHEETS
DRAWING NUMBER	485352

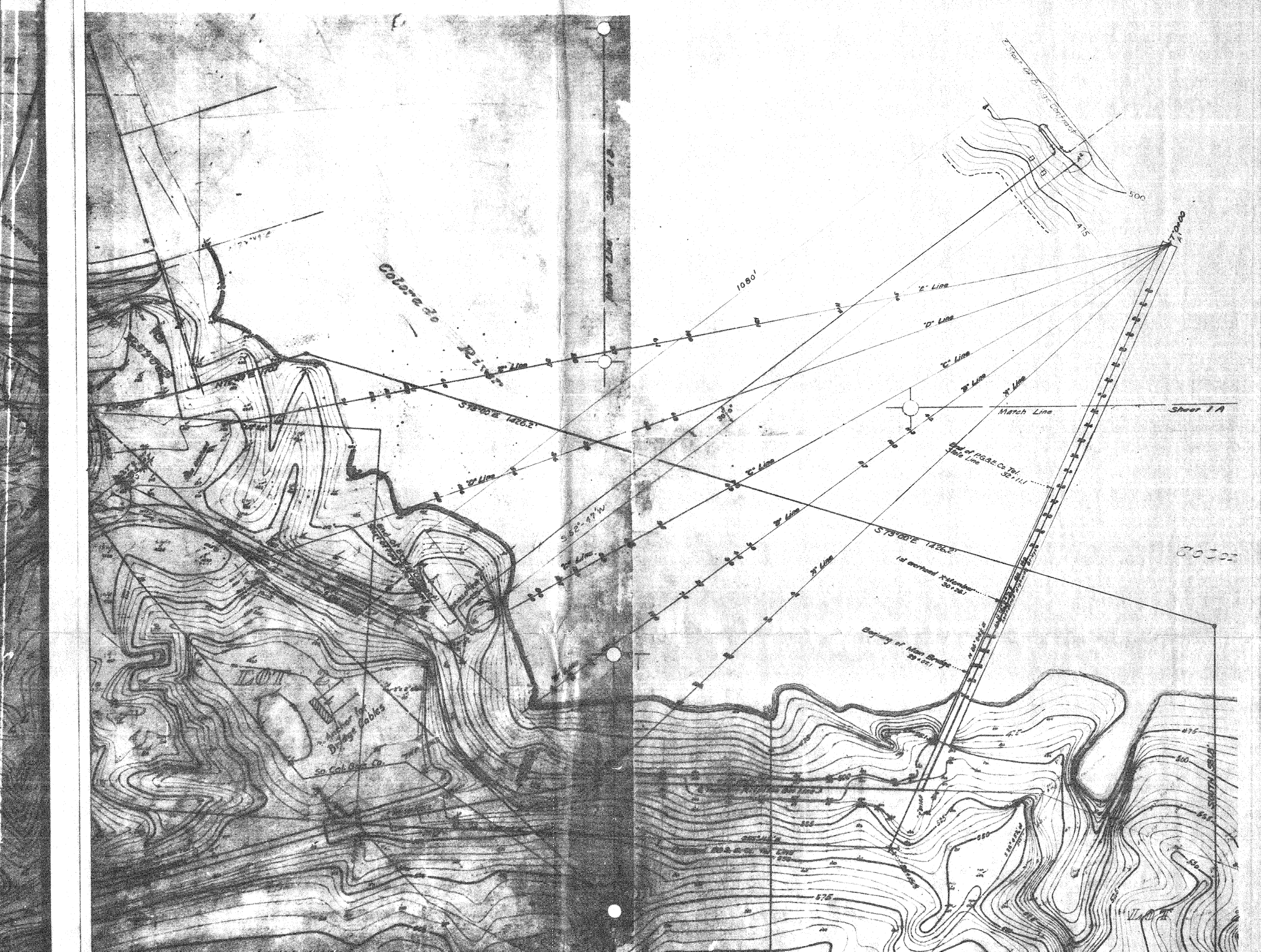


3000 GAL. TANK - UNIT 1
HOLDING PLATES INSTALLED THIS END ONLY AS PER TANK DWG. 182732.
3" P.V.C. PIPE
EL. 595'-0"
OIL SEPARATOR - UNIT 2
EL. 598.50
EL. 594.50
EL. 592.50
FLOW
CHROME REDUCTION TANK - UNIT 3
EL. 597.10'
ELEVATION: A-A
[DWG. 485352]
SEE ST. DWG. K-22 FOR PIT VENTILATOR CAP
SEE DWG. 081680 FOR POSTS
EL. 592.2'
SLOPE 1:30
EL. 589.7'
FROM DRYING BEDS
SEPTIC TANK - UNIT 4
WELD ALL AROUND ON BOTH SIDES
EL. 592.50
D-113
EL. 597.10'
COOLING TOWERS B/D. SEE SEWER & DRAIN DWG.
1" REDWOOD SIDING
ELEVATION: B-B
[DWG. 485352]
EXISTING WELL
WELL CONNECTION
1" = 1'-0"
MANHOLE
SEPTIC TANK - UNIT 4
SECTION: C-C
[DWG. 485352]
485353
REFERENCES:
1. LOCATION PLAN OF TANKS, EQUIPMENT, ETC. - WASTE WATER DISPOSAL SYST. AREAS 13 & 14 - DWG. 485352
2. FOUNDATIONS FOR TANKS & EQUIPMENT - WASTE WATER DISPOSAL SYST. DWG. 386065.
3. SCHEMATIC CONTROL PIPING - WASTE WATER DISPOSAL SYST. DWG. 485342
P.L.O.
0 8-1-76 ISSUED AS BUILT
TABLE OF CHANGES
APPROVED BY GM 172520
DR. L.W.O.
DATE 4-6-70
SCALES 3/8" = 1'-0" OR AS SHOWN
ELEVATIONS AND DETAILS OF TANKS, EQUIPMENT AND PIPING FOR WASTE WATER WELL DISPOSAL SYSTEM-AREAS 13 & 14-TOPOCK COMPRESSOR STA.
GAS OPERATIONS
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA
BILL OF MATERIAL 085087
DRAWING LIST 082272
DRAWING NUMBER 485353

120
15
18001

Notes: Changes due to … Cons…
Water Well Syste… Auth…
Relocate Co. Faci…

1. State Freeway Route relo… shown … new bridge construction … /W.-L…
2. Topock - Milpitas Gas Line … ain 3… conform to Dwg. B-409… hange…
3. All Company facilitis … ved … boundaries. The Teleph… and … the R/W. at a specified … The …
4. New Construction: W… #6 a… -E… er to … -4… to Ne… Tele… able …
5. Telephone Line - field check… - Tap Lin…
6. Fence Line, Portion of Plant Roadway … plotted from field check - 1965.
7. Office Bldg. added - per GM 143029



Notes: Changes due to Freeway Construction

Water Well System: Authorized GM 159114
Relocate Co. Facilities: " GM 159118

1. State Freeway Route relocated as shown, due to revised State Survey leading to new bridge construction - new R./W.-Line shown.
2. Topock Milpitas Gas Line No. 2 [Main 300 B] survey has been changed to conform to Dwg. B-4093, Sh. 1 - change 20.
3. All Company facilitis were removed from within the State Right-of-way boundaries. The Telephone Cable and 4" Gas Line were then placed across the R/W at a specified location. The two Water Wells were abandoned.
4. New Construction: Water Wells #6 and #7 were drilled. - Water Lines - Electric Power to Wells. - New access road to wells. - 4" Gas Line to Needles. - Telephone Poles and Line, Telephone Cable and Conduit. -
5. Telephone Line - field checked - Tap Line to office and Pole numbers added.
6. Fence Line, Portion of Plant Roadway and North Cooling Tower positions plotted from field check 1965
7. Office Bldg added - per G.M. [illegible] - see dwg. 482902

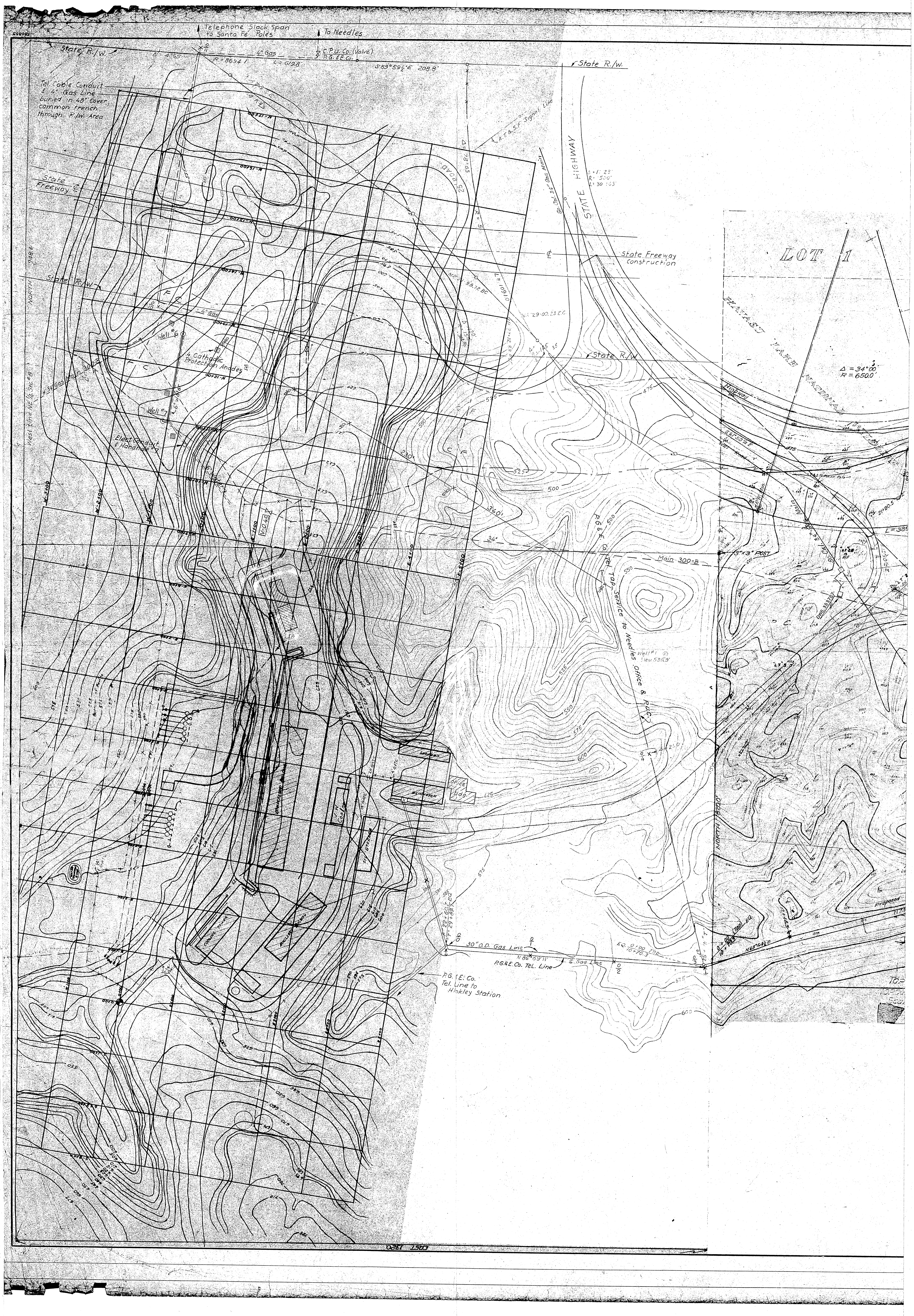
4	See Notes for Change	[illegible]
3	Added Cross-over from 30" P.G. Main 300 B to So. Cal. 24" Gas Main	[illegible]
2	Chd Topo at Sta.	[illegible]

ORIGINAL

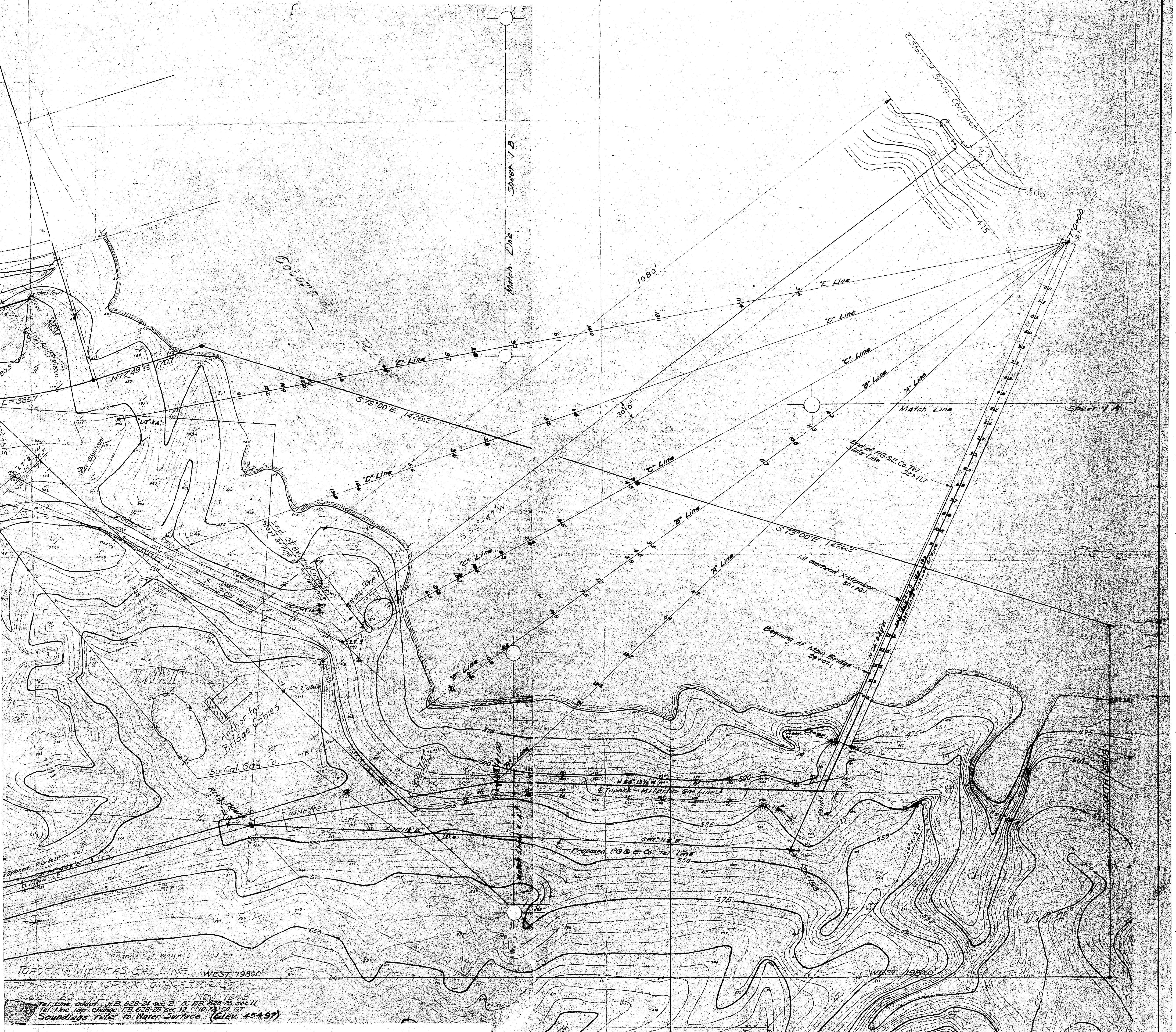
TOPOGRAPHY COLORADO RIVER CROSSING
TO TOPOCK COMPRESSOR STATION
TOPOCK COMPRESSOR STATION
DEPARTMENT OF GAS OPERATION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

DATE 1-17-57
SCALE 1"=60'

580859 4



Telephone Slack Span to Santa Fe Poles
To Needles
State R/W.
4" Gas
C.P.U. Co. (Valve)
P.G.&E.Co.
S 89°59½'E 208.8'
State R/W.
Tel. Cable Conduit & 4" Gas Line buried in 48" Cover common trench through R/W. Area
State Freeway ℄
State R/W.
STATE HIGHWAY
State Freeway Construction
LOT 1
Well #6
4 Cathodic Protection Anodes
Well #7
Elect. Conduit & Handhole
State R/W.
Δ = 34°00'
R = 650.0'
Main 300-B
P.G.&E. Tel. Tap Service to Needles Office & PUC
Well #1
Office Bldg.
30" O.D. Gas Line
P.G.&E. Co. Tel. Line
P.G.&E. Co. Tel. Line to Hinkley Station
NORTH 2000'
Proposed



Notes: Changes due to Freeway Construction

Water Well System: Authorized GM 159114
Relocate Co. Facilities: " GM 159118

1. State Freeway Route relocated as shown, due to revised state Survey leading to new bridge construction - new R./W.-Line shown.
2. Topock-Milpitas Gas Line No. 2 [Main 300-B] survey has been changed to conform to Dwg. B-4093, Sh. 1-change 20.
3. All Company facilitis were removed from within the State Right-of-Way boundaries. The Telephone Cable and 4" Gas Line were then placed across the R./W. at a specified location. The two Water Wells were abandoned.
4. New Construction: Water Wells #6 and #7 were drilled. - Water Lines. - -Electric Power to Wells. - New access road to wells. - - 4" Gas Line to Needles. - Telephone Poles and Line, Telephone Cable and Conduit. -
5. Telephone Line - field checked - Tap Line to office and Pole numbers added.
6. Fence Line, Portion of Plant Roadway and North Cooling Tower positions plotted from field check - 1965.
7. Office Bldg. added - per G.M 143029, see dwg. 482902

V580855

SECTION 8
SECTION 9

ORIGINAL DO NOT MUTILATE OR DESTROY

4	See Notes for Change	CJT	WR
3	Added Cross-over from P.G.&E. Main 300 B to So. Cal. 34" Gas Main		WR
2	CHD TOPO AT STA.		WR

APPROVED BY: GM

DRAWING LIST

BY DEPT. OF G.O.
DR.
CH.
O.K.
DATE 1-17-57
SCALES 1" = 60'

TOPOGRAPHY COLORADO RIVER CROSSING TO TOPOCK COMPRESSOR STATION
TOPOCK COMPRESSOR STATION
DEPARTMENT OF GAS OPERATION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

BILL OF MATERIAL
SUPERSEDES
SUPERSEDED BY
SHEET NO. SHEETS
DRAWING NUMBER 580855
CHANGE 4