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Subject Revised Work Plan for Historical Water Supply Well Reconnaissance, Topock Compressor Station, Needles, California

Project Name Work Plan for Historical Water Supply Well Reconnaissance, Topock Compressor Station, Needles, California

Attention Mr. Aaron Yue, Project Manager
Geological Services Branch
California Environmental Protection Agency, Department of Toxic Substances Control (DTSC)

From Jacobs Engineering Group (Jacobs) for Pacific Gas & Electric Company (PG&E)

Date April 25th, 2019

On behalf of Pacific Gas and Electric Company (PG&E), Jacobs is submitting this Revised Work Plan for Historical Water Supply Well Reconnaissance (work plan) pursuant to the request in the September 27, 2016 Gathering of Historical Well Information at Pacific Gas and Electric Company (PG&E, Topock Compressor Station, Needles, California (EPA ID NO. CAT080011729) (2016 Letter)¹. This work is being conducted as a Topock Compressor Station (TCS) maintenance activity to verify compliance with the Department of Water Resources, California Well Standards Bulletin 74-90 (California Well Standards). This revised work plan incorporates responses to comments received from DTSC in a Memorandum dated June 13, 2018². The comments and associated responses are summarized in Attachment 1. In response to comment E, PG&E Drawing number 580885 is included as Attachment 2.

1. Background

In September 2011, PG&E submitted a draft well inventory³ to facilitate discussions regarding future well decommissioning activities, which included details for some historical water supply wells (historical wells) discussed in this work plan. The California Environmental Protection Agency, Department of Toxic Substances Control (DTSC) replied on May 22, 2014⁴, and requested additional information. PG&E provided this information on July 18, 2014⁵.

¹ California Environmental Protection Agency, Department of Toxic Substances Control. 2016. Gathering of Historical Well Information at Pacific Gas and Electric Company (PG&E, Topock Compressor Station, Needles, California (EPA ID NO. CAT080011729). September 27.

² California Environmental Protection Agency, Department of Toxic Substances Control. 2018. Memorandum Response to Work Plan For Historical Water Supply Well Reconnaissance, Pacific Gas and Electric Company, Topock Compressor Station Site, Needles, California (EPA ID No. CAT080011729)

³ Pacific Gas and Electric Company. 2011. Well Inventory Data Package to Support Discussion of Future Well Decommissioning Activities. Draft. September.

⁴ California Environmental Protection Agency, Department of Toxic Substances Control. 2014. Request for Information Regarding Historic Pacific Gas and Electric Company (PG&E) Wells, Topock Compressor Station Site, Needles, California (EPA ID NO. CA080011729). May 22.

⁵ Pacific Gas and Electric Company. 2014. *Response to Department of Toxic Substances Control's May 22, 2014 Letter "Request for Information Regarding Historic Pacific Gas and Electric Company (PG&E) Wells, Topock Compressor Station Site, Needles, California (EPA ID NO. CA080011729)." July 18.*

The 2016 Letter requests further clarification regarding some background information for the historical wells and a work plan to attempt to locate, and if found, assess these wells. Specifically, DTSC requested the following:

1. Electronic copies of references used to identify and locate historical wells
2. Notification if any wells other than TCS Well #4 and PGE-8 were historically used for waste disposal
3. Supporting documentation to show methods used to approximate locations for Well #1 and Well #2
4. A review of historical documents to approximate the locations of Well #3 and Well #5
5. A work plan to locate Well #1, Well #2, Well #3, Well #5, and Well No. 2
6. A work plan to locate Topock-1 and assess its usefulness for groundwater monitoring

DTSC, U.S. Department of the Interior (DOI), and PG&E discussed the information in this work plan during several technical teleconferences since November 2016. The purpose of these calls was to review the available background information for the historical wells as a group and reach concurrence on the areas that should be included in this work plan for additional field reconnaissance. During the initial discussions, it was agreed by all parties that the submittal of this work plan should be postponed beyond the November 14, 2016 deadline specified in the 2016 Letter to provide additional time for this review process. The historical documents are discussed in subsequent sections.

This work plan documents transmittal of historical references, methods used to approximate historical well locations, and proposed methods to physically locate them. Table 1, which was initially included in the July 18, 2014 PG&E response letter, summarizes the naming conventions for the historical wells (**bold** formatting has been added to indicate the well locations included for assessment as part of this work plan). The estimated locations of these and other wells are shown on Figure 1.

Table 1: Historical Well Designations

Revised Work plan for historical Water Supply Well Reconnaissance, Topock Compressor Station, Needles, California

	Well Name Used in RFI/RI	Other Commonly Used Well Names	Comments
1	PGE-01	PGE-1, Well No. 1, PGE Well 1	
2	PGE-02	PGE-2, Well No. 2, PGE Well 2	
3	PGE-06	PGE-6, Well #6	
4	PGE-07 (now PGE-07BR)	PGE-7, Well #7	20-inch conductor casing at surface.
5	PGE-08	PGE-8, Disposal well, SWMU-2	
6	PGE-09N	None	
7	Topock-1	New Santa Fe Well, Santa Fe #1, Topock AZ Well No. 1, Well I	Reference documents use the terms "New Well" and "New Santa Fe Well" for both Topock-1 and Topock-2. The actual well referenced can be determined based on the date of the document.
8	Topock-2	Santa Fe #2, Topock AZ Well No. 2, Well II	
9	Topock-3	Santa Fe #3, Well III	
10	#1	Well #1	Exploratory Well.
11	#2	Well #2	Exploratory Well.
12	#3	Well #3	Exploratory Well.

	Well Name Used in RFI/RI	Other Commonly Used Well Names	Comments
13	TCS-4	Well #4, Old well in Bat Cave Wash	Exploratory well, possibly used for disposal in the 1960s
14	#5	Well #5	Exploratory well

Notes: RFI/RI – RCRA Facility Investigation/Remediation Investigation Bold – Wells included for assessment in this Work Plan.

Cable tool was the predominant drilling technology of the 1950s, when these historical wells were constructed. The use of this drilling technology results in a steel-cased borehole, and once a water-bearing zone was selected, this drill casing could be perforated in-situ to function as a “well screen”. Therefore, it is possible that some of these boreholes (particularly Well #3 and Well #5) could have been drilled, tested, and abandoned based on inadequate well performance. While possible, it is difficult to validate this scenario in the absence of documentation. Therefore, all potential historical well locations that have not been previously located are included for additional reconnaissance even with the limited well information available.

2. Submittal of References

As requested by DTSC in the 2016 Letter, the references listed in PG&E July 18, 2014 response letter were transmitted by PG&E to DTSC and DOI electronically on November 17, 2016⁶ (PG&E also submitted an index of references to DTSC⁷). These include historical maps, drawings, well logs, notes, reports, and similar documents from PG&E archives. Resolution of these documents varies because of their condition, and the accuracy of many cannot be verified. As discussed in the following sections, PG&E reviewed these documents in detail to provide a logical approximation of well locations.

In a memorandum dated June 13, 2018, DTSC noted that neither DTSC nor DOI received all the references included in PG&E’s 2014 letter and requested the remaining references that were not transmitted on November 17, 2018 be electronically transmitted to DTSC and DOI. In response, PG&E reiterates the statement from the 2014 letter that all references were not found upon review of the physical and digital archives. If these references are found in the future, PG&E will electronically transmit them to DTSC and DOI.

3. Confirmation of Waste Disposal Wells

Review of available historical records and discussion with PG&E staff at the TCS did not provide any information that wells other than TCS-4 and PGE-8 were historically used to inject wastewater associated with TCS operations.

4. Estimation of Historical Well Survey Areas

Records were reviewed to estimate the potential location of historical wells and the areas that should be surveyed to attempt to locate each in the field. The type and condition of records available for each historical well included text references in drawings or reports and inclusion on scaled drawings. The proposed survey areas were developed primarily by:

- Reviewing historical drawings and overlaying them on current aerial photography – The creation of the overlays includes digitizing figures (scanning), reviewing for reference to the subject wells, scaling, orientating (to determine north), and georeferencing. During the review, the highest quality images were selected to be converted to overlays. Quality is based on scale, including features for scaling and orientation, and surviving landmarks for georeferencing. Several maps contain Public Land

⁶ Pacific Gas and Electric Company. 2016. RE: Information Request on Historical wells at PG&E Topock Compressor Station, Needles, California. Personal communication (email). November 17.

⁷ Pacific Gas and Electric Company. 2016. Index of References for Topock Historic Well Reconnaissance Surveys. PG&E, Topock Compressor Station, Needles, California (EPA ID NO. CAT080011729). November 17.

Survey System (PLSS) coordinates and surveyor’s measurements. PLSS is a way of subdividing and describing land in the United States and is maintained by the Federal Government. When appropriate these coordinates were used to add further control on the well head location estimation process.

- Analyzing topographic maps to identify suitable well locations based on documented well head elevations – As noted in the 2016 Letter, Wells #3 and #5 are not shown on available historical maps. Available well information was summarized in the PG&E July 2014 response and included top of casing elevations. These are listed in Table 2 of that document as 475 feet above mean sea level (amsl) for Well #3 and 553 feet amsl for Well #5.⁸ Using a modern digital elevation model in combination with the best professional judgement, outlined below, areas where the wells could have been constructed were identified.
- Utilizing professional judgement to refine and/or eliminate survey areas – As potential historical well locations were identified, the areas were refined, and eliminated or included as a proposed survey area in this work plan based on best professional judgement. Specifically, logical and practicability considerations that would have informed the drilling locations were considered. Key considerations and assumptions include:
 - Available historical well head elevation details are incomplete. It is most likely that the wells were completed above grade. For Wells #3 and #5, where elevation information is available, consideration was given to the fact that surface topography may have changed since these wells were constructed. Therefore, the survey areas were not rigidly defined by to the specific elevation contours referenced, and a broader area was defined.
 - Drilling equipment of the era was most likely truck-mounted. Drill rigs and associated equipment would have been mobilized along roads, so areas adjacent to roads are considered preferential.
 - A relatively flat area would have been required to stabilize the drill rig and provide a working zone. Preference was given to flat areas large enough to support a drilling operation.
 - Piping would have been constructed from the well to a holding tank on the TCS before being applied for industrial use. Therefore, an additional criterion for selecting well locations would be a practical route for support piping.

5. Proposed Survey Areas

Proposed survey areas are depicted in Figure 1 through 4. Areas are named based on the digit of the well and a letter indicating separate areas for the same well. Based on professional judgement, these areas are listed in order from the most likely to least likely well construction location (“A” being used for the most likely, or only, location). The boundaries of the proposed survey areas were selected to be as comprehensive as possible. As discussed in Section 7, the entirety of the proposed areas might not be surveyed depending on site access or discoveries made during early phases of investigation.

Well #1 - Area 1A

Well #1 is plotted on historical drawings R-2538 (1950), 580808 (1950)⁹ and 580855 (1957).¹⁰ These drawings place Well #1 in the area of the site referred to as the Transwestern Bench and predate the facility constructed there (before 1950). PG&E owned the property at the time of well construction and the estimated location makes logistical sense for the well location. The approximately 0.4-acre survey area is depicted on Figure 2. When plotted on the same image, the independent locations from each historical map form a tight cluster (approximately 35 feet). Area within the Transwestern facility are excluded due to the extensive ground disturbance that was required for its construction. The north border of the survey area is intended to be the PG&E property line. Key observations made during review of the historical drawings include:

⁸ Dames and Moore. 1969. Appendix Logs of Wells.

⁹ In a memorandum dated June 13, 2018 DTSC, Comment E, it was stated that DTSC did not have the version of drawing 580855 included in Figure 2. This drawing is included with this Revised Work Plan.

¹⁰ Historical Drawing 580855. 1957. *Topography, Colorado River Crossing to Topock Compressor Station*. January 17.

- Drawing R-2538 contains a north arrow for orientation, PLSS section boundaries for scaling and georeference. In addition, ravine topography, a surviving concrete culvert, property lines, and a surveyor's transect increase confidence in the accuracy of the map and resulting historic image overlay.
- Drawing 580855 contains PLSS quadrant borders for orientation and scaling. Depiction of the TCS and associated access road allow for accurate georeference.
- Both drawings R-2538 and 580855 list the elevation for Well #1 as 535.9 feet (datum not reported). This elevation suits the surface of the Transwestern Bench area estimated between 520 and 540 feet in elevation.

Well #2 - Area 2A

Well #2 is visible on one historical drawing, R-2538 (1950), which was used to prepare a historic map overlay (Figure 3). R-2538 also includes a well elevation of 493.3 feet (datum not reported). The survey area is estimated at 0.8 acre. Several surviving land marks near survey area 2A are used for georeference. Specifically, the intersection of the east and west forks of the abandoned highway, the topography of the ravine to the west of the marked location of Well #2, the BNSF railway south of the marked well location and the cement culvert crossing the ravine. This method places Well #2 on the shoulder of a dirt road, a logical location. The elevation of this road shoulder is estimated to be between 488 and 498 feet, which correlates well with the well elevation annotated on R-2538.

In addition, historical drawing R-2538 contains a surveyor's measurements from the southwest corner of section 5 and the northwest corner of section 8 (T7N R24E San Bernardino Base and Meridian). Trigonometry calculations show that the well head is approximately 260 feet trending 113° off north from that point. The projection of this line places Well #2 on the same road shoulder as the overlay method. See the red circle on Figure 3 marked "Estimated Location Method 2".

The location of Well #1 taken from historical drawing R-2538 is in close agreement with the other maps used for that location, suggesting that the overlay methodology is a reasonable approach. Surveyor's measurements included in R-2538 are recorded down to the 1/100th of a foot and 1 degree, indicating the precision of the mapper's methods. Therefore, if the accuracy of the Well #1 effort is high, and if the author of historical map R-2538 was capable of the recorded precision, it is reasonable to conclude the location for Well #2 is accurate. The estimated location of Well #2 is a practical location to place a well based on flat topography, road access for equipment, and route for support piping.

Well #3

Five potential survey areas were identified for Well #3 and one of these has been eliminated. Each of the identified areas and the index contour for the well head elevation referenced in the historical drawings (475 feet amsl) are depicted on Figure 1.

Area 3A

Much of this area is relatively flat land and the elevation correlates to that included in the reference. It is along a road and Bat Cave Wash (BCW), which provide logical equipment mobilization routes and a plausible piping route back to the TCS.

Area 3B

This area is south of Area 3A (adjacent 2A) and is focused along BCW channel. Thus, it was identified as a location for reasons like Area 3A. This location is considered less likely than 3A because the current elevation does not correlate as closely to the referenced elevation.

Area 3C

This area is adjacent National Trails Highway and bound to the northwest by the Colorado River and was identified because it is relatively flat and the elevation correlates to that included in the reference. Further, review of historical aerial photographs suggests that this area had been physically disturbed. Though the location is along a road, which represents a logical route for mobilization of equipment and potential (albeit unlikely) pipeline routing, this area is considered less likely based on distance from TCS and proximity to the Colorado River.

Area 3D (Eliminated)

This area is west of Area 3C and was identified based on a DTSC comment that a well casing of unknown origin is in the vicinity (west of the existing concrete pad). Like Area 3C, the area is flat and physically disturbed, but is considered less likely based on the distance from TCS. This area has been eliminated because there is no documentation suggesting that this well was installed by PG&E and the casing diameter is smaller than that of known historical TCS water supply wells from same era (e.g., TCS-4). Historical water supply well TCS-4 (now decommissioned) was a ten-inch diameter mild steel casing with a twelve-inch conductor casing. Other historical supply wells of this era are expected to be similar diameter.¹¹ During field activities, the smaller diameter well in this area will be measured and documented.

Area 3E (Eliminated)

This area was identified because the elevation correlates to that included in the reference. Based on review of historical aerial photography from before channelization of the Colorado River, it was determined that at least portions of this would be underwater depending on river stage. Since this would not be a logical location to construct a well, this area has been eliminated.

Well #5

Five potential survey areas were identified for Well #5 and two of which have been eliminated. Each of the identified areas and the index contour for the well head elevation referenced in the historical drawings (553 feet amsl) are depicted on Figure 1.

Area 5A (Partially Eliminated)

Area 5A is comprised of an east and a west area. These areas were identified because the elevation correlates to that included in the reference, they are located along roads for access, which would provide a logical equipment mobilization route, and are proximate a gas pipeline corridor, which could have been a route for supply well piping. In communication with DTSC and DOI, it was agreed that the eastern area should be eliminated based on the steepness of the slope across this area and because no evidence of a supply well or associated piping was observed during the construction of the IM3 pipeline, which would have disturbed the majority of this eastern area. Observation of the eastern area of Area 5A will be conducted during IM3 pipeline decommissioning and groundwater remedy construction to confirm the well is not present in this area.

Areas 5B and 5C

Areas 5B and 5C were identified because the elevation correlates to that included in the reference, the generally flat site topography and the proximity to roads and the TCS. This well would have been installed before the construction of Interstate 40 (I-40), which separates these two areas and construction of I-40 could have impacted Well #5 if it was within the highway footprint. The south-central portion of area 5B was excluded from survey area as it was previously excavated (and a well was not encountered). Likewise, the southern portion of Area 5C is being excluded from the survey area because a surface

¹¹ PG&E's July 2014 Letter reference 37, *Draft Design Criteria and Specification Summary Industrial Water Well Supply Well Installation Project*. (no date). Includes specifications interpreted as standard for industrial supply wells installed at TCS. The specifications include 10-inch casing diameters.

geophysical survey was conducted for this area as part of the Topock Soil Resource Conservation and Recovery Act (RCRA) Facility Investigation and Remedial Investigation (RFI/RI). Anomalies detected as part of this survey were potholed and a well was not encountered.

Areas 5D and 5E (Eliminated)

Areas 5D and 5E were identified because the elevation correlates to that included in the reference. However, these areas are not flat and are not logical locations for the placement of a drill rig and well head. For example, area 5E is on the road that has always been used for compressor station access, which would be a poor location for a well. For these reasons the areas have been eliminated. Observation of the eastern area of Area 5D will be conducted during groundwater remedy construction to confirm the well is not present in this area.

PGE-02

This survey area is co-located with Area 5B.

The construction of well PGE-02 postdates Wells #1 through #5 and higher quality historical maps depict the well location. Historical drawings 481911 (1957), 482629 (1957) and 482557 (original 1943, updated 1971) each depict well PGE-02, contain PLSS coordinates, surveyor's measurements to the well head, and surviving land marks. These drawings depict the well as Well No. 2 and were used to create historic map overlays (Figure 4). The historical maps depict the well as being to the west of an unpaved road and the west of cliffs along bat cave wash. The service road shown on drawings are visible on current aerial photos and portions of the road and cliff are visible in the field to this day. For these reasons, the location of PGE-02 is considered well defined. Historical drawings also depict a four-inch diameter water line leading from PGE-02 and connecting to a six-inch line that also connects Well #1. During the 2015 Area of Concern 14 soil investigation, a conduit and electrical cables were discovered during trenching activities. Geophysical assessment of these lines and conduit may assist in the location the PGE-02 wellhead.

Well survey coordinates on historical drawings are assumed to be accurate and will be verified during field activities. Coordinates on drawings are marked to the 100th of a foot.

By these same methods it has been determined that well PGE-1 is in the active footprint of Interstate 40 (I-40) and would have been removed during its construction. While well destruction details for PGE-1 are not available, investigation within the active I-40 footprint is not feasible.

6. Historical Well Area Evaluation

In the absence of documented well destruction details, PG&E will attempt to locate Well #1, Well #2, Well #3, Well #5 and PGE-02 using the procedures outlined in this section. The general procedure that will be used to locate and develop plans for decommissioning of the wells, if found, will include the following steps:

1. Conduct pre-survey activities.
2. Conduct non-intrusive surface geophysical survey.
3. Evaluate geophysical results to determine if detected anomalies require confirmation using intrusive methods (e.g., potholing).
4. Confirm anomalies, as determined necessary.
5. If located, assess well condition to the extent practicable without mobilizing a drill rig to the site.

6. Reporting the results of the evaluation, including the development of plans for subsequent evaluation of well condition and decommissioning, as necessary.

6.1 Pre-survey Activities

Key planning activities that will be conducted before and upon mobilization for fieldwork include:

- Access Agreements. PG&E will obtain access agreements from land owners including United States Fish and Wildlife Service, United States Bureau of Reclamation, Caltrans, and the Fort Mojave Indian Tribe, as work on these parcels is determined necessary.
- Archaeological and Historical Resource Survey. Percurrent practice for the remediation project, the immediate survey areas and all associated access routes will be field verified before field activities to ensure no resources will be impacted. For federal lands, PG&E will comply with the Archaeological Resources Protection Act (ARPA), the National Historic Preservation Act (NHPA), and applicable agreements such as the Bureau of Land Management National Programmatic Agreement and California State Protocol Agreement.
- Biological Resource Survey. A biological resource survey will be conducted for the work areas and all associated access routes prior to historical well area evaluation activities to determine if any impacts to natural resources exist. PG&E will comply with all State and Federal laws pertaining to the proposed project, including, but not limited to, the Federal Endangered Species Act, the California Endangered Species Act, Section 404 and 401 of the Clean Water Act and the Fish and Game Code.

Implementation of this work plan will begin following concurrence from DTSC and once the required access agreements are obtained from effected land owners. Once the field team is mobilized, the initial geophysical survey work is estimated to require 2 to 3 weeks to complete. The duration of any additional field work that may result from review of the geophysical survey results will be estimated at that time.

6.2 Non-Intrusive Geophysical Survey

Each of the investigation areas detailed above (excluding those that were eliminated) will be surveyed using non-intrusive surface geophysical methods. Selected geophysical methods for this work may include magnetometer, electronic terrain conductivity, and ground penetrating radar. In addition, handheld magnetic locators (Schonstedt or equivalent) will be on site and available for use. These methods typically extend up to 6 feet belowground surface, inbased on the geophysical properties of the soil and other site conditions, these methods may have diminished usefulness. A licensed surface geophysical contractor will oversee the survey for each site. It is anticipated that geophysical surveys will be conducted in three phases.

First, estimated well locations and proposed boundaries of survey areas will be identified in the field. Field staff will evaluate the survey areas to eliminate portions that are not physically suitable for survey (e.g., areas of steep topography or areas that are constrained by infrastructure), and in coordination with the field biologist and cultural resources specialist, portions that need to be protected due to the presence of sensitive biological and/or cultural resources. A grid of transects approximately 10 feet apart will be set up across the refined area to guide the geophysical survey.

Second, a preliminary geophysical survey will be conducted using a handheld magnetic locator, a magnetometer, and terrain conductivity methods. Using the grid established in the first step, these instruments will be moved in parallel transects across the refined survey area. The preliminary data will be processed in the field to identify geophysical anomalies.

Third, based on the interpretation of preliminary data, a detailed geophysical survey will be conducted at select anomalies. Understanding the type of infrastructure that is being located, the environmental condition at the site (e.g., soil type and proximity to infrastructure) and the advantages and limitations of the geophysical tools, the licensed geophysicist will guide the selection of anomalies for detailed survey. During this stage, equipment such as a magnetic detector (Schonstedt or equivalent) and ground penetrating radar may be used.

Based on review of historical records, locations Well #1, Well #2, and PGE-02 have been estimated with more confidence. Similarly, survey areas identified for Well #3 and #5 have been prioritized. The geophysical surveys will be sequenced either within survey areas or by survey area when there are multiple. This approach will utilize the early geophysical data collected from the most likely areas or portions of areas to inform the need for surveys of the larger area or deprioritized areas. DTSC and DOI will be notified prior to surveys and prior to eliminating survey areas or significantly reducing survey area.

6.3 Evaluation of Geophysical Survey Results

Findings of the geophysical surveys will be compiled and evaluated with DTSC, DOI and effected land owners within 8 weeks of field demobilization. In some cases, it may be prudent to review the data earlier in the reporting process, or contemporaneously with field work, should data suggest a well has been located prior to the survey of all areas or portions of areas. The following information will be summarized for this evaluation:

- A summary of the geophysical methods utilized for each area
- Figures detailing the extent of each survey area and a summary of the geophysical data collected for each method (including depiction of anomaly areas)
- A table summarizing the detected anomalies (location, depth, size, shape, etc.), which will include a proposal for confirmation of the anomaly using intrusive methods or a rationale for not.

6.4 Confirmation of Anomalies

Following discussion with DTSC, DOI and effected land owners, a field team will mobilize to confirm (i.e. expose) the selected anomalies using intrusive methods. Intrusive methods used to expose the anomalies may include excavation using machinery or hand tools. Given that the effective detection depth of surface geophysical tools at the site is less than 10 feet below ground surface, a typical rubber-tire backhoe (or equivalent) will be used for excavation. Removed material will be temporarily stockpiled directly adjacent the excavation, and once observations have been made, this material will be replaced in the same excavation. The following best management practices will be followed during all excavation activities:

- Excavation will be conducted in a manner than minimizes the generation of persistent visual dust, and the use of dust suppression measures will be implemented, as necessary.
- Excavation equipment will be staged on plastic or similar leak protection during operation and when idle on site for more than 1 hour.
- The active work area will be demarcated to control unauthorized access to the excavation.
- Excavations conducted within areas of concern associated with the Topock RFI/RI investigation will be conducted in accordance with hazardous waste operations (HAZWOPER) guidelines

6.5 Well Condition Assessment

The condition of each well found by excavation will be evaluated to the extent practicable without the mobilization of additional equipment (e.g., drill rig). The purpose of this evaluation is to collect the information required to develop a plan for well decommissioning in accordance with the California Well Standards. Evaluation of found wells will be conducted as follows:

- Access to the inside of the well will be gained by excavating around the feature as determined necessary for workers to safely remove any cap that may exist and prevent material from falling into the well.
- The inside of the well will be evaluated to determine details such as total depth, well diameter, and casing material and condition. This evaluation will be conducted using borehole geophysical logging tools including, but not limited to, caliper logging, borehole televiewer/camera logging, and cement bond logging, as determined appropriate and practicable.

- Once the borehole geophysical logging is complete, the well head will be secured such that surface water cannot enter the well and any remaining excavation around the well/pipe is backfilled using the originally removed material. If the well is located greater than a few feet below ground surface, a temporary well casing extension may be installed to bring the top of casing near or above ground surface so future excavation to gain access inside the well can be minimized.

In addition to evaluation the condition of wells found by excavation, the condition well Topock-1 will also be evaluated. Well Topock-1 was located on the Arizona side of the Colorado River after receipt of the 2016 Letter (Figure 1). At the location of well Topock-1, ground surface elevation may have been significantly modified since 2016 due to recent grading of the surrounding area. If needed, a geophysical survey will be conducted to relocate Topock-1. In accordance with the 2016 Letter, and once access is granted by the land owner, PG&E will assess the condition of Topock-1 for its potential use in groundwater monitoring using the following methods:

- Well head conditions will be observed and recorded.
- The depth to water and the depth to the bottom of the well will be measured.
- If appropriate, a video survey of the well will be conducted to assess the condition and determine well construction details.
- If appropriate, a limited well test will be conducted to assess hydraulic performance of the well.

6.6 Reporting and Well Decommissioning Work Planning

PG&E will develop a technical memorandum that summarizes the reconnaissance work conducted, evaluation of field observations and the data collected (including summary of discussions with DTSC, DOI and the effect land owner), and the recommendations for use or decommissioning of each well. In addition, PG&E will update the Topock Well Inventory for each of the wells cited in this work plan to indicate whether the well was found and any relevant well information collected. After the development of the technical memorandum, PG&E will develop a work plan for well decommissioning, as determined necessary. Well decommissioning work plan(s) will be developed in accordance with the California Well Standards and the standard operating procedures established for the Topock site.

Attachment 1
Tabulated Response to Comments

Table 2: Tabulated Response to Comments

Revised Work Plan for Historical Water Supply Well Reconnaissance, Topock Compressor Station, Needles, California

	Comment ⁱ	Response to Comment
A	Include page numbers on all pages. Only the first page is numbered.	Page numbers added.
B	Renummer or add a section heading since Section 2 is not present.	Section 2 added and remaining sections renumbered.
C	<p><u>Page 3, Section 1 Background</u>: revise the sentence as follows since some well construction information is available in the form of a boring log, total depth, well yield, and survey data: <i>Therefore, all potential historical well locations are included for additional reconnaissance even with the limitedin the absence of well constructioninformation available.</i></p>	<p><u>Section 1. Background</u></p> <p>Text added to the last sentence of the last paragraph:</p> <p><i>Therefore, all potential historical well locations that have not been previously located are included for additional reconnaissance even with the limited well information available.</i></p>
D	<p><u>Page 3, Section 3 Submittal of References</u>: The section should indicate that many of the references listed in PG&E's July 14, 2014 response letter were not transmitted to DTSC or the Department of the Interior. DTSC requests that these references be provided to the agencies electronically.</p>	<p><u>Section 2. Submittal of References</u></p> <p>Text added:</p> <p><i>In a memorandum dated June 13, 2018, DTSC noted that neither DTSC nor DOI received all the references included in PG&E's 2014 letter and requested the remaining references that were not transmitted on November 17, 2018 be electronically transmitted to DTSC and DOI. In response, PG&E reiterates the statement from the 2014 letter that all references were not found upon review of the physical and digital archives. If these references are found in the future, PG&E will electronically transmit them to DTSC and DOI.</i></p>
E	<p><u>Page 4, Section 6 Proposed Survey Areas, Well #1 - Area 1A</u>: Figure 2 shows Well #1 located within both the Transwestern facility as well as on PG&E property south of the Transwestern facility. Using image overlays, the GSU independently found Well #1 to be located at the northeast</p>	Drawing 580885 included as an attachment.

	<p>corner of the work trailer as pictured on the middle illustration in Figure 2. The middle illustration appears to fit the main access road overlay image best. The GSU did not receive Drawing 580855 as pictured on Figure 2 (only the eastern portion of the drawing was received). DTSC requests that Drawing 580885 be provided electronically.</p>	
<p>F</p>	<p><u>Page 5, Section 6 Proposed Survey Areas, Well #2 - Area 2A:</u> The GSU recommends that handheld magnetic locators also be utilized for locating this well in the immediate area surrounding the circles pictured in Figure 3 as the area is not greatly disturbed and the handheld Schonstedt units used previously at the well TCS-4 area performed quite well in the field. The Recon Work Plan should specify that handheld magnetic locators will be onsite and available for assessing all wells.</p>	<p><u>Section 6.2. Non-intrusive Geophysical Survey</u></p> <p>Paragraph 1, sentence 3 was edited as follows:</p> <p><i>In addition, handheld metal detectors <u>magnetic locators (Schonstedt or equivalent)</u> and other tools may be used.</i></p> <p>Paragraph 3, sentence 1 was edited as follows:</p> <p><i>Second, a preliminary geophysical survey will be conducted using <u>a handheld magnetic locator, a magnetometer, and terrain conductivity methods.</u></i></p>
<p>G</p>	<p><u>Page 5. Section 6 Proposed Survey Areas, Well #3 - Area 3D:</u> This section eliminates the existing well near the former resort from further consideration largely due to its smaller well diameter. For completeness, the Recon Work Plan should be revised to specify the diameter of the existing well in this area and the known and anticipated diameters of all the 1950 era wells. Should it turn out that smaller diameter historic wells be discovered in the future at other survey areas, this existing well may need to be reevaluated.</p>	<p><u>Section 5. Proposed Survey Areas, Area 3D (Eliminated)</u></p> <p>Text and citation added:</p> <p>This area is west of Area 3C and was identified based on a DTSC comment that a well casing of unknown origin is in the vicinity (west of the existing concrete pad). Like Area 3C, the area is flat and physically disturbed, but is considered less likely based on the distance from TCS. This area has been eliminated because there is no documentation suggesting that this well was installed by PG&E and the casing diameter is smaller than that of known historical TCS water supply wells from same era (e.g., TCS-4). Historical water supply well TCS-4 (now decommissioned) was a ten-inch diameter mild steel casing with a twelve-inch conductor casing. Other historical supply wells of this era are expected to be similar diameter¹². During field activities, the smaller diameter well in this area will be measured and documented.</p> <p>Citation added to footnotes:</p> <p>¹² PG&E's July 2014 Letter reference 37, <i>Draft Design Criteria and Specification Summary Industrial Water Well Supply Well Installation</i></p>

		<i>Project.</i> (no date). Includes specifications interpreted as standard for industrial supply wells installed at TCS. The specifications include 10-inch casing diameters.
H	<p><u>Page 6, Section 6 Proposed Survey Areas, Well #5 -Area 5A:</u> The Recon Work Plan should specify that if Well 5 has not been located, then the eliminated eastern portion of Area 5A should be closely examined during earth work during remedy construction and IM3 decommissioning. A similar issue exists for the less likely well location Area 5D.</p>	<p><u>Section 5. Proposed Survey Areas, Area 5A:</u></p> <p>Text added:</p> <p><i>Observation of the eastern area of Area 5A will be conducted during IM3 pipeline decommissioning and groundwater remedy construction to confirm the well is not present in this area.</i></p> <p><u>Section 5. Proposed Survey Areas, Area 5D and 5E (Eliminated)</u></p> <p>Text added:</p> <p><i>Observation of the eastern area of Area 5D will be conducted during groundwater remedy construction to confirm the well is not present in this area.</i></p>
I	<p><u>Page 6, Section 6 Proposed Survey Areas, PGE-02:</u> In this section, please document the infrastructure associated with this well as it may assist in its discovery. Specifically, the 4-inch and 6-inch water lines leading to PGE-02 (and PGE-01) should be mentioned (see Drawing 482629) so that geophysical assessment can plan for the evaluation of the water lines which should lead to the well head. Similarly, the electrical cable and conduit discovered in the freeway cut during the soil investigation of Area of Concern 14 should be mentioned as it may also lead to the well head. Finally, please clarify in the Recon Plan if the well survey coordinates documented on drawings can be used to precisely locate well PGE-02. The Recon Work Plan should incorporate the items discussed above.</p>	<p><u>Section 5. Proposed Survey Areas, PGE-02:</u></p> <p>Text added to paragraph 2:</p> <p><i>Historical drawings also depict a four-inch diameter water line leading from PGE-02 and connecting to a six-inch line that also connects Well #1. During the 2015 Area of Concern 14 soil investigation, a conduit and electrical cables were discovered during trenching activities. Geophysical assessment of these lines and conduit may assist in the location the PGE-02 wellhead.</i></p> <p>Text added to paragraph 3:</p> <p><i>Well survey coordinates on historical drawings are assumed to be accurate and will be verified during field activities. Coordinates on drawings are marked to the 100th of a foot.</i></p>
J	<p><u>Page 8, Section 7.2. Non-Intrusive Geophysical Survey, Paragraph 5:</u> The section language should be modified as suggested to notify agencies on the need for surveys: "This approach will utilize the early geophysical data collected from the</p>	<p><u>Section 6.2. Non-Intrusive Geophysical Survey</u></p> <p>Text added to the last paragraph:</p>

	most likely areas or portions of areas to inform the need for surveys of the larger area or deprioritized areas. <i>Agencies will be notified prior to surveys and prior to eliminating survey areas or significantly reducing survey area.</i> "	<i>DTSC and DOI will be notified prior to surveys and prior to eliminating survey areas or significantly reducing survey area.</i>
K	Page 9, Section 7.5 Well Condition Assessment. <u>Topock-1</u> : The paragraph for well Topock 1 should be revised to address the great potential that this well site has been modified significantly by recent grading in the area. A geophysical survey will be needed if the well has been covered during grading.	Section 6.5. Well Condition Assessment, <u>Topock-1</u> Text added: <i>At the location of well Topock-1, ground surface elevation may have been significantly modified since 2016 due to recent grading of the surrounding area. If needed, a geophysical survey will be conducted to relocate Topock-1.</i>

¹ Department of Toxic Substances Control. 2018. Memorandum Response to Work Plan For Historical Water Supply Well Reconnaissance, Pacific Gas and Electric Company, Topock Compressor Station Site, Needles, California (EPA ID No. CAT080011729)

Attachment 2
Drawing Number 580885

Telephone Slack Span
to Santa Fe Poles

To Needles

P.G. & E. Co. (Valve)
P.G. & E. Co.

$S 89^{\circ} 59' 4" 208.8'$

State R/W

10' Cable Conduit
4" Gas Line
buried in 48" cover
common trench
through P.W. Area

State
Freeway E

State R/W

STATE HIGHWAY

State Freeway
Construction

State R/W

LOT 1

$\Delta = 34^{\circ} 00'$
 $R = 6500'$

Main 300-E

P.G. & E. Co. Tel. Tap Service to
Needles Office & Plant

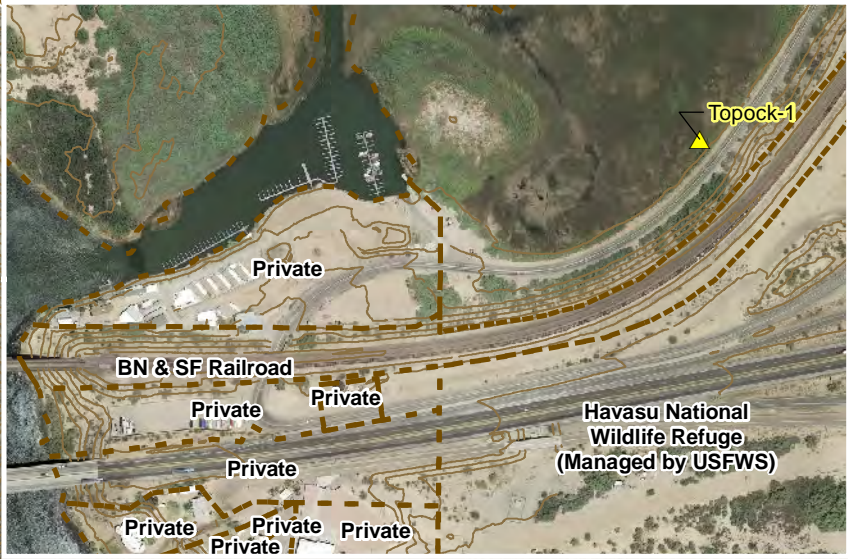
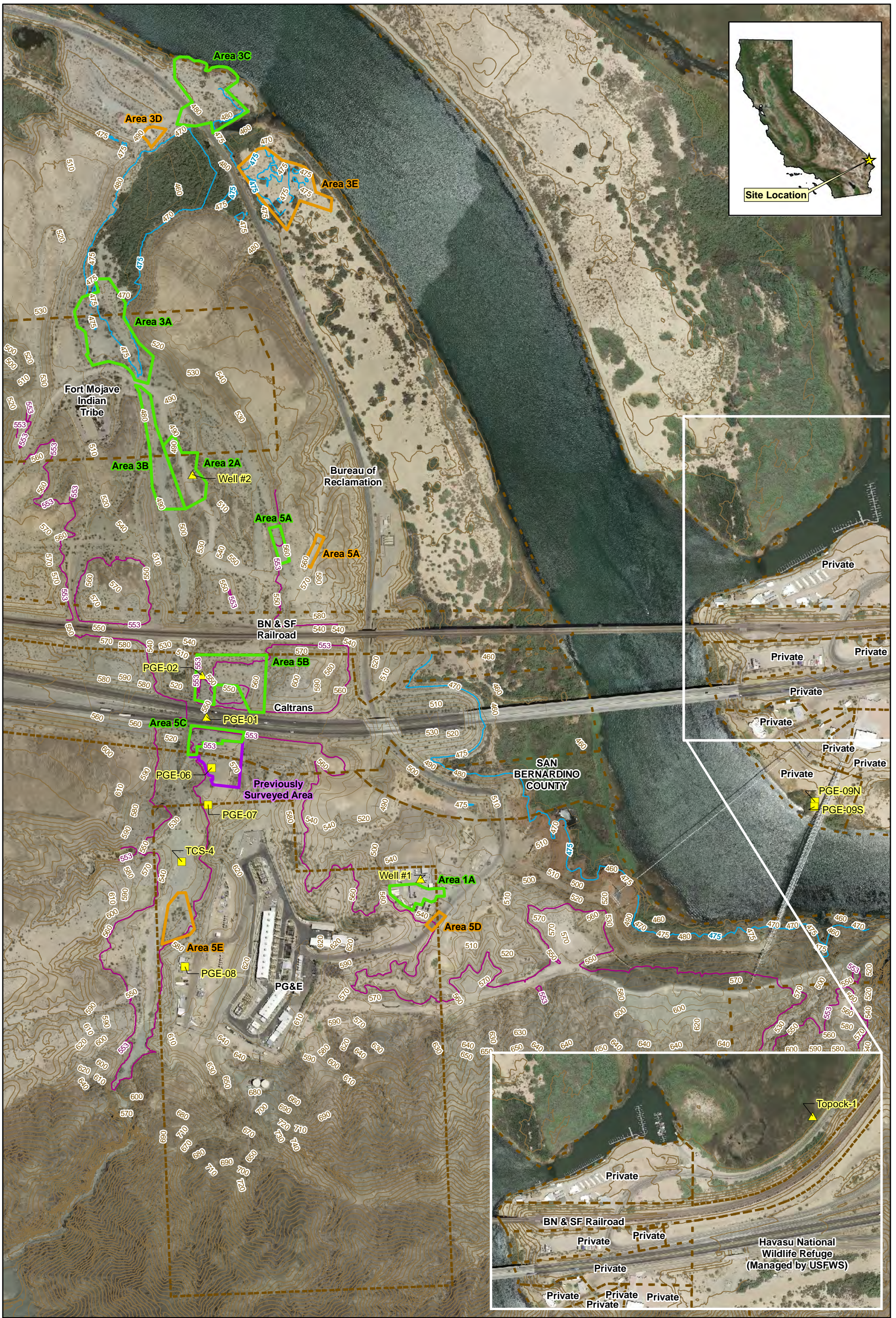
P.G. & E. Co.
Tel. Line to
Hinkley Station

30" O.D. Gas Line

P.G. & E. Co. Tel. Line

E. Gas Line

Figures



Legend

- Well Location with Known Coordinates
- ▲ Well Location - Estimated
- Proposed Survey Area
- Eliminated Survey Area
- Previously Surveyed Area
- Property Owner Area
- Elevation (10-foot contour)

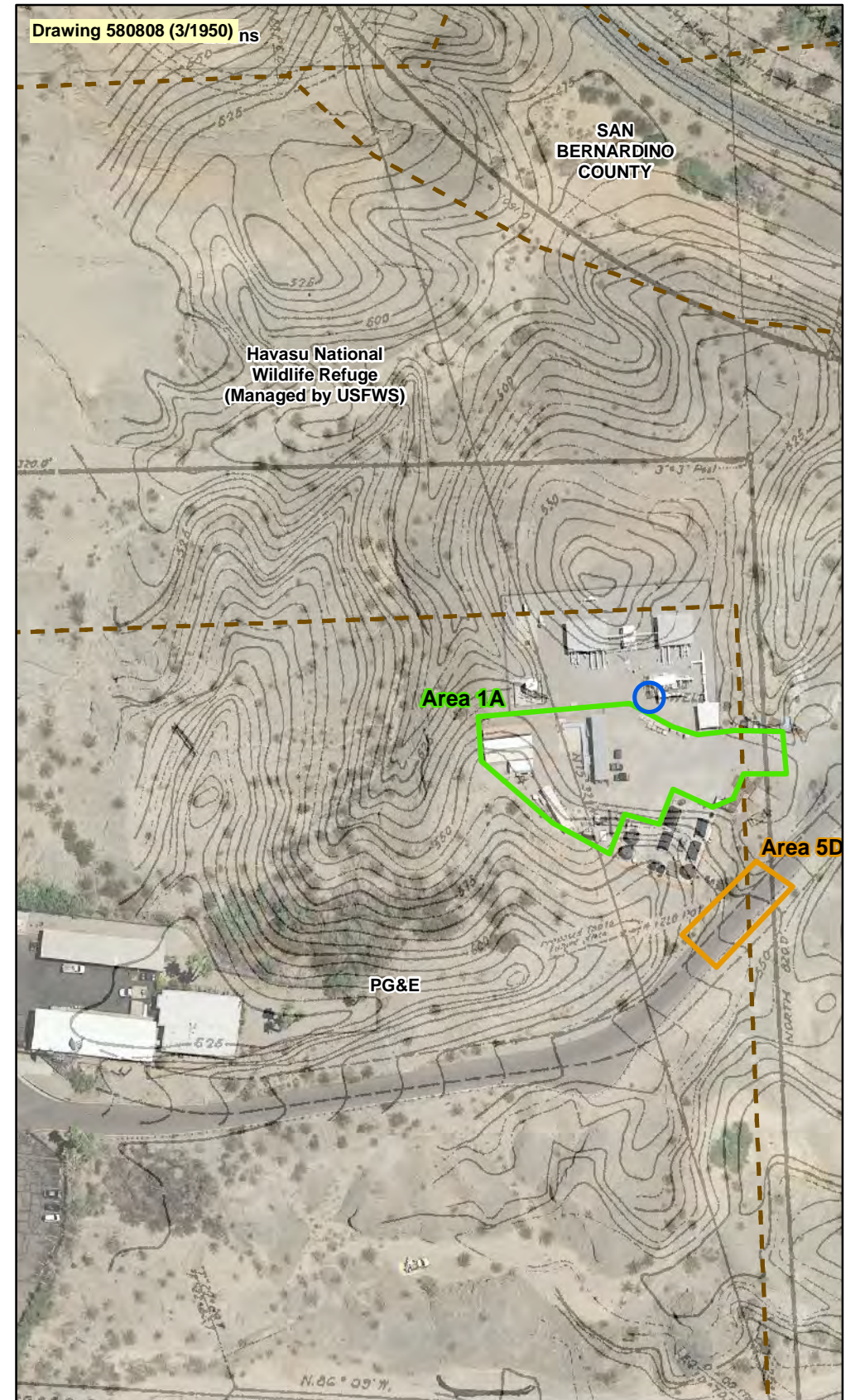
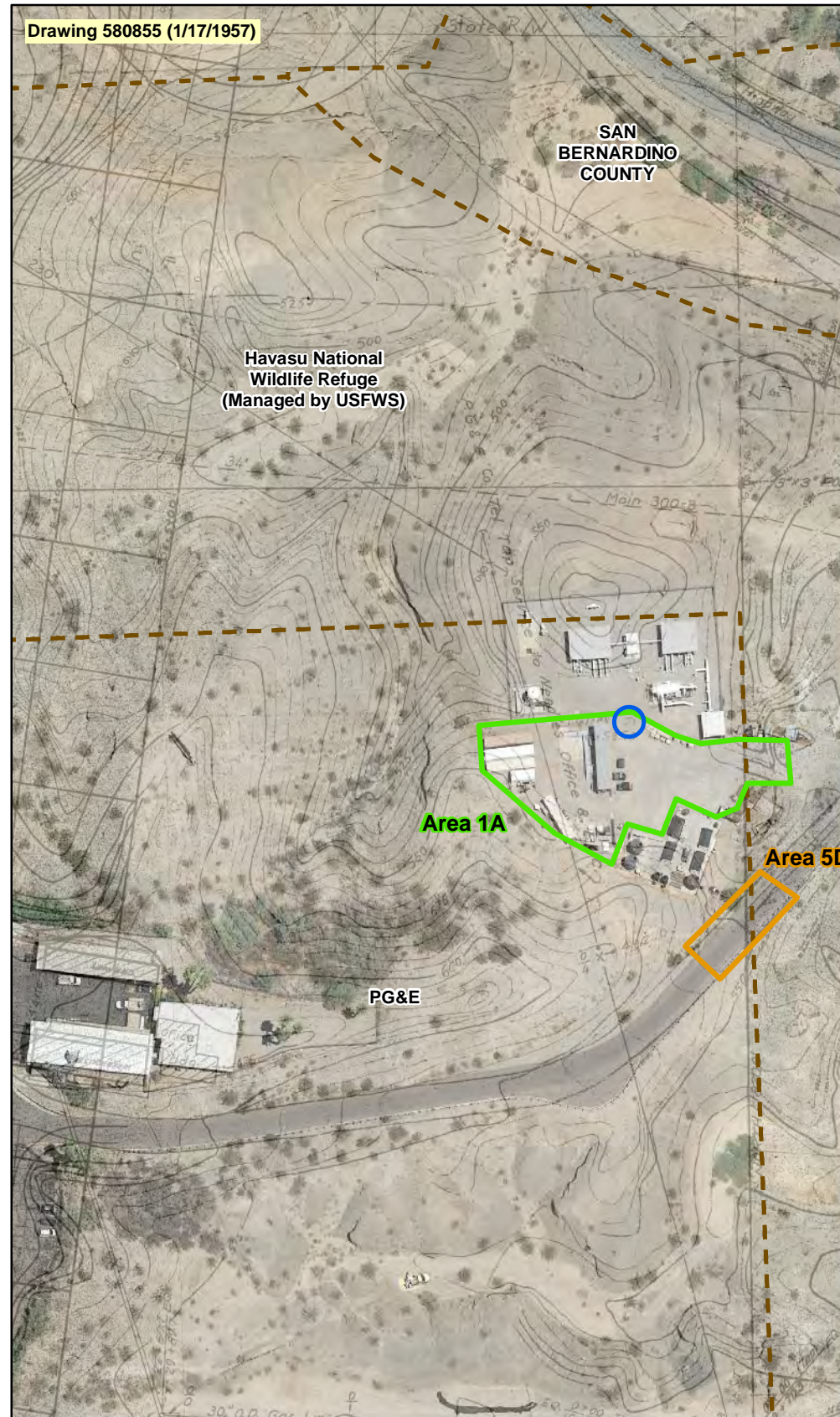
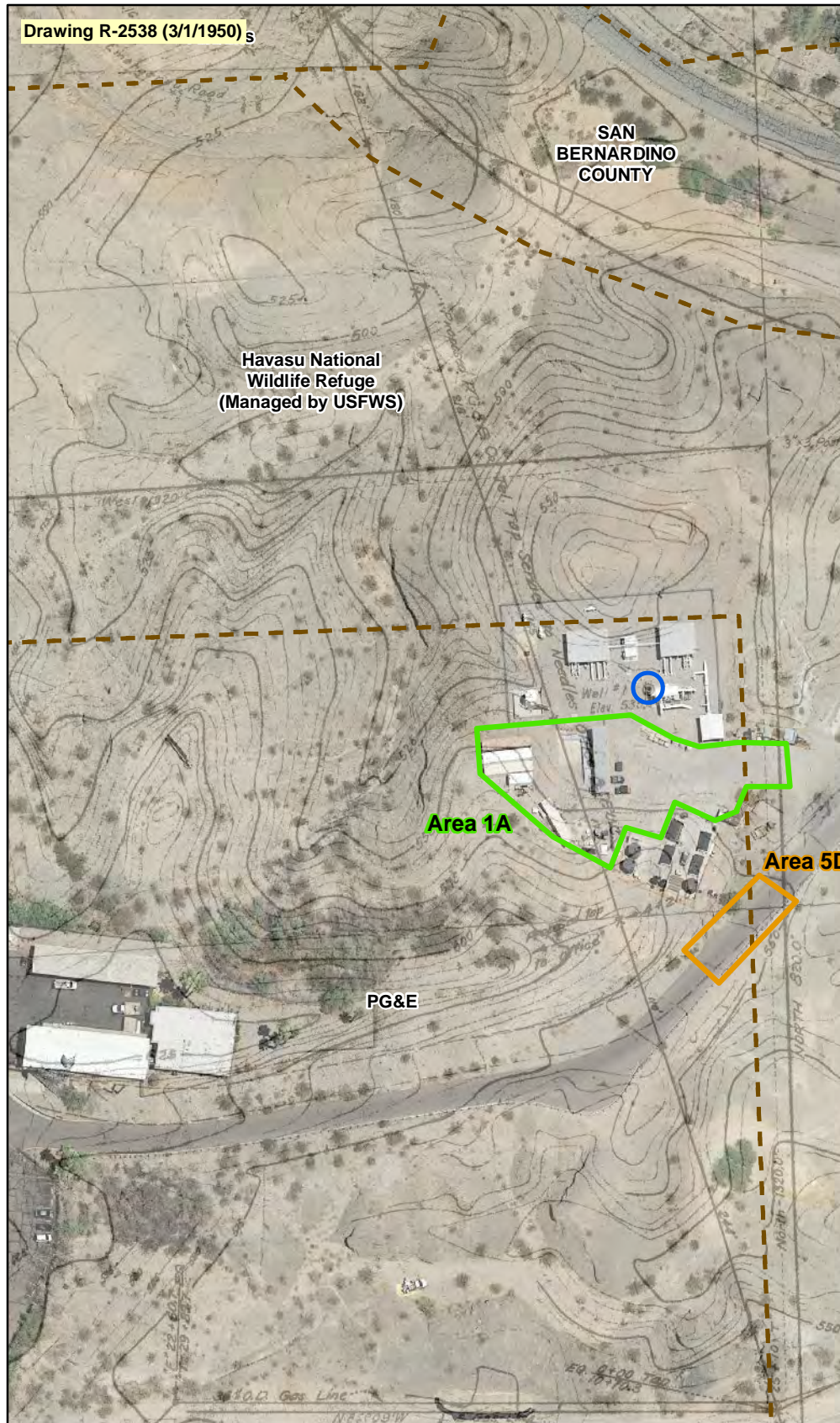
Elevation Contour (feet AMSL)

- 475 ft
- 553 ft

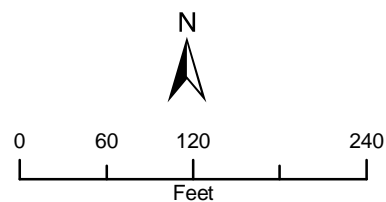
Note: Well Topock-1 Located on Private Land.

0 195 390 780 Feet

FIGURE 1
Water Supply and Historical Well Locations
 Historical Water Supply Well Reconnaissance
 Pacific Gas and Electric Company Topock Compressor Station, Needles, California

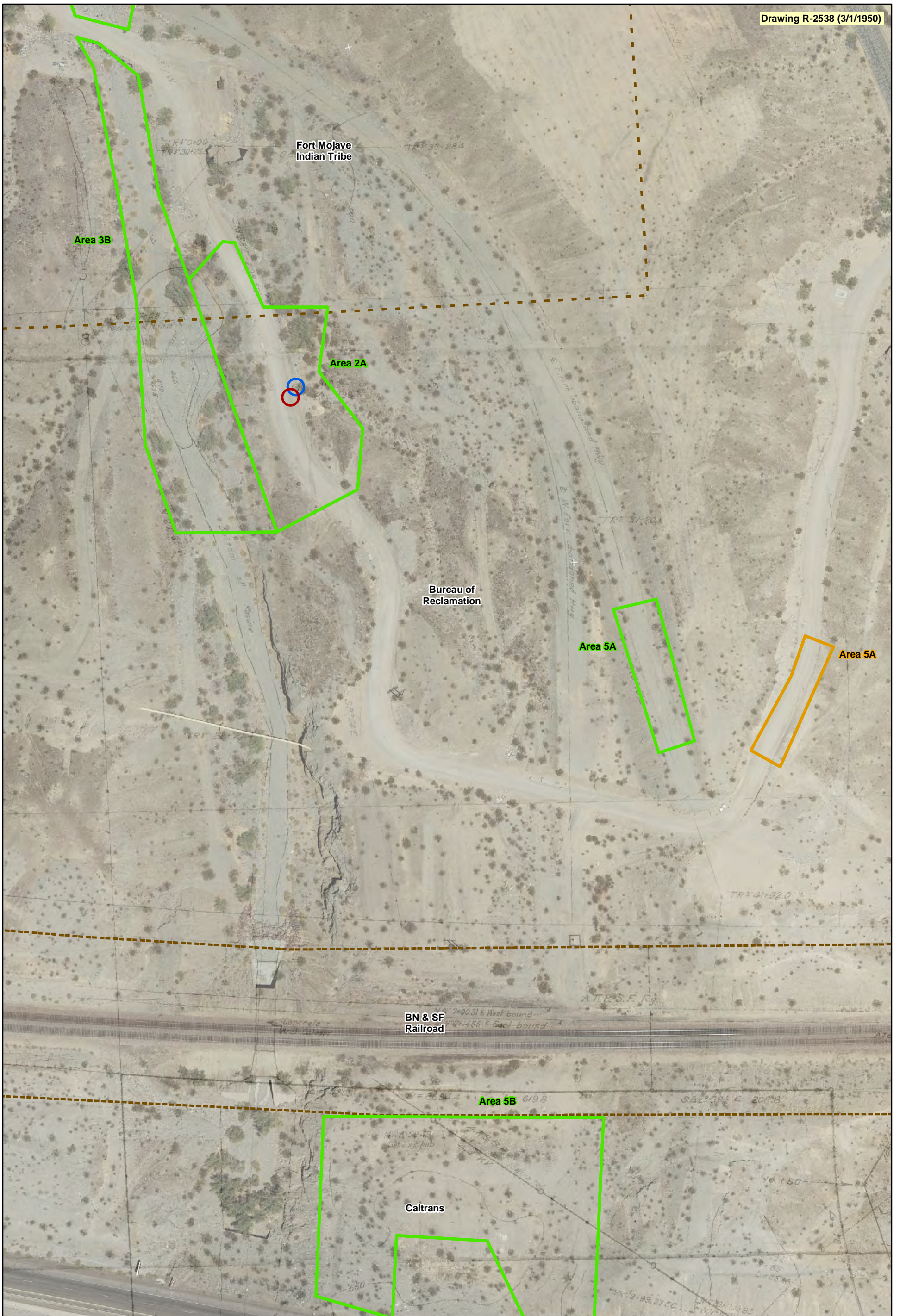


- Legend**
-  Location of Well on Drawing
 -  Proposed Survey Area
 -  Eliminated Survey Area
 -  Previously Surveyed Area
 -  Property Owner Area



- Notes:
1. Drawing R-2538 is dated March 1, 1950.
 2. Drawing 580855 is dated January 17, 1957.
 3. Drawing 580808 is dated March, 1950.

FIGURE 2
Well #1 Historic Map Overlays
 Historical Water Supply Well Reconnaissance
 Pacific Gas and Electric Company Topock Compressor
 Station, Needles, California



Legend

- Location of Well on Drawing
- Estimated Location Method 2
- Proposed Survey Area
- Eliminated Survey Area
- Property Owner Area

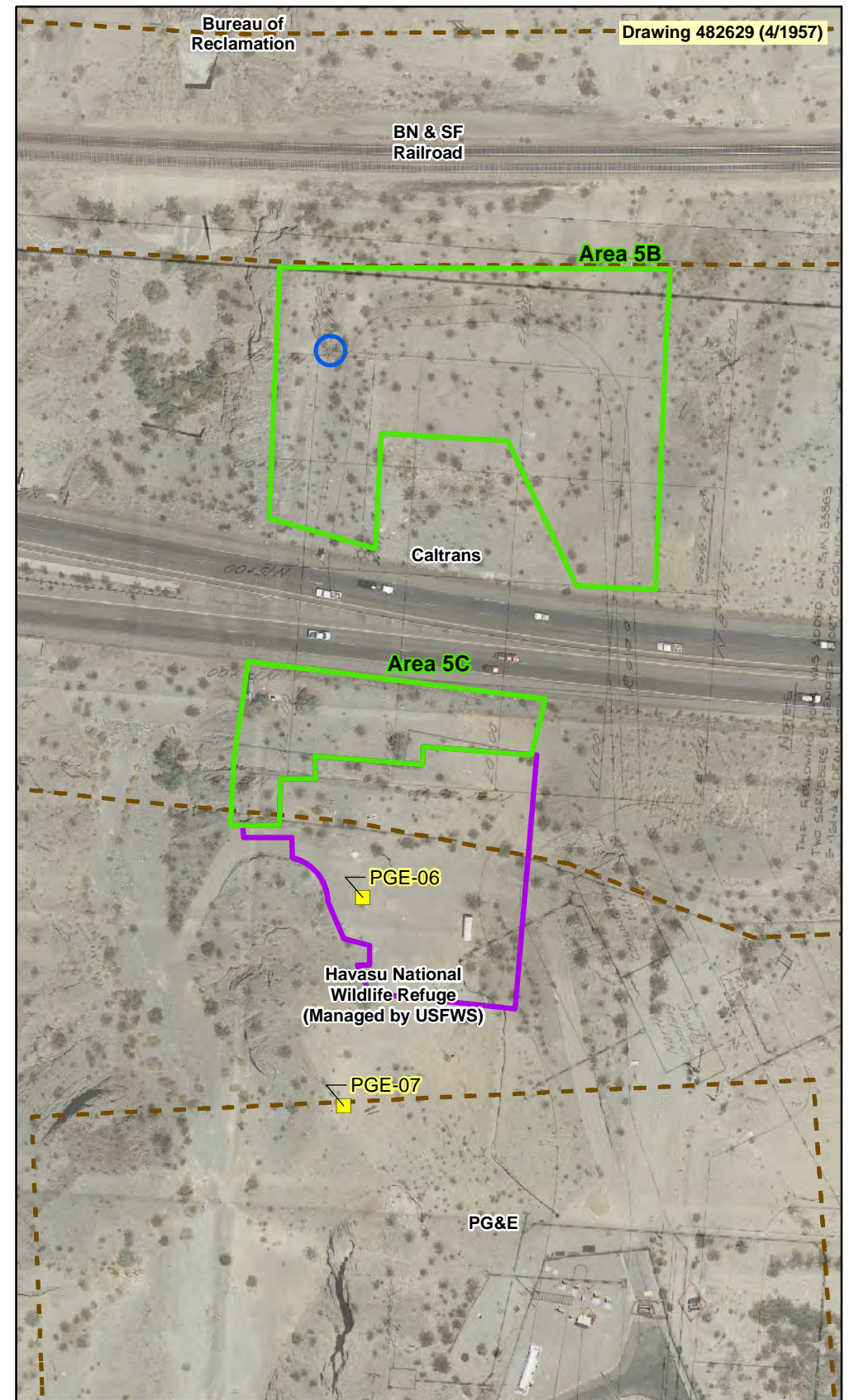
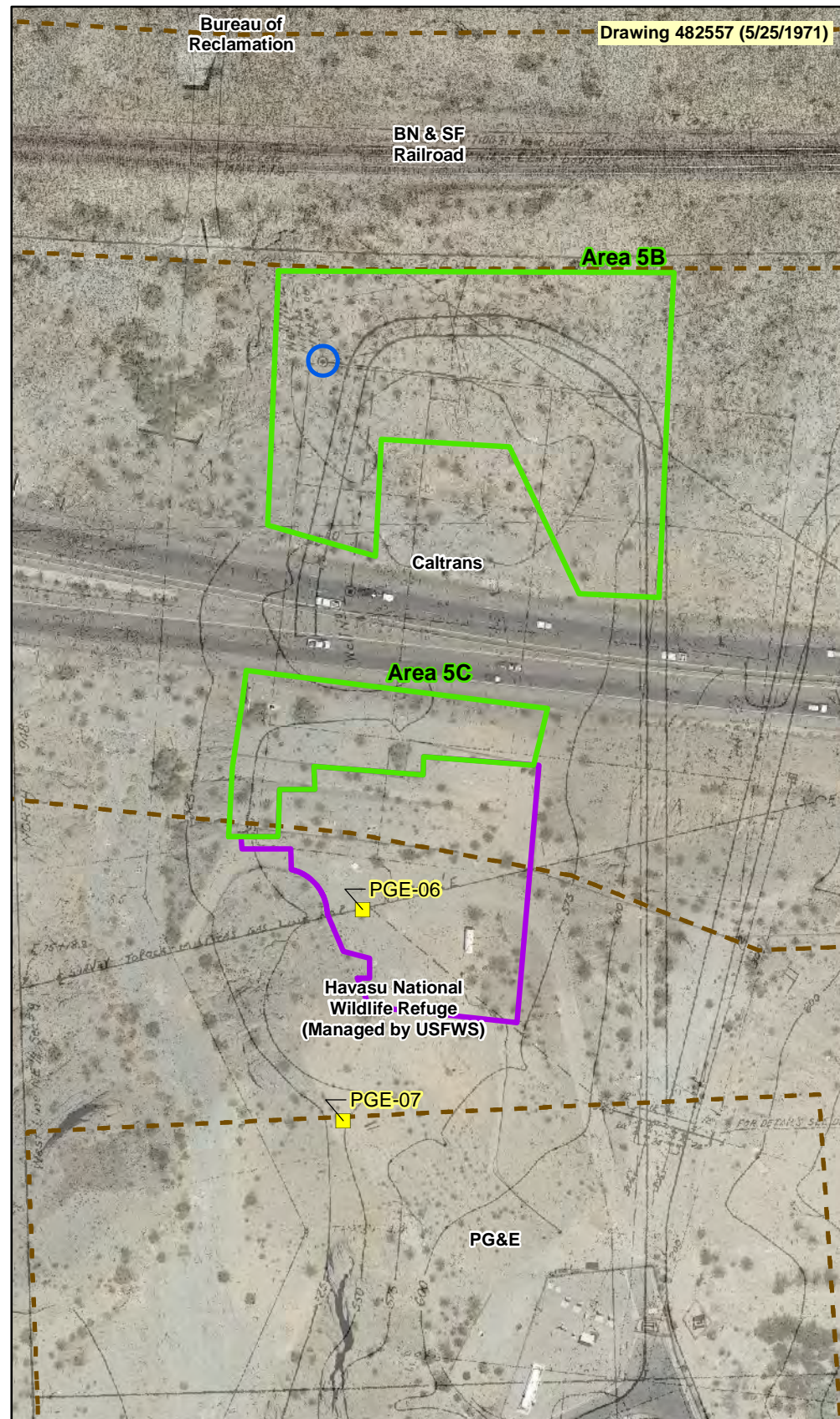
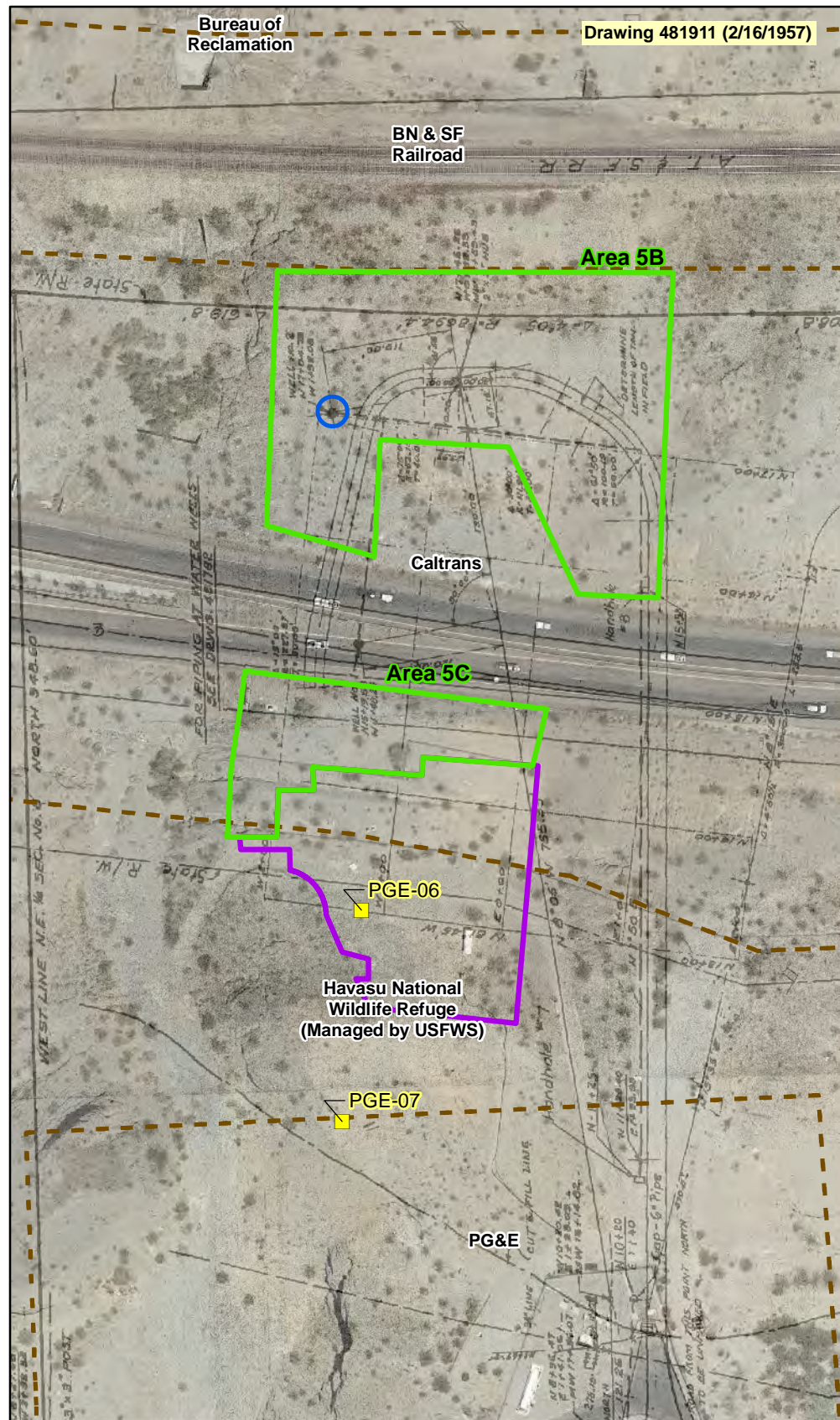
Notes:
1. Drawing R-2538 is dated March 1, 1950.

N

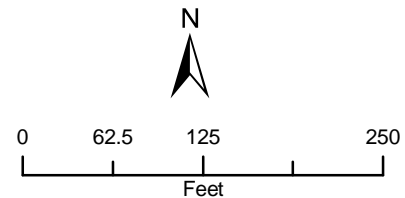
0 45 90 180

Feet

FIGURE 3
Well #2 Historic Map Overlays
Historical Water Supply Well Reconnaissance
Pacific Gas and Electric Company Topock Compressor Station, Needles, California



- Legend**
- Location of Well on Drawing
 - Well Location with Known Coordinates
 - Survey Area
 - Previously Surveyed Area
 - Property Owner Area



- Notes:**
1. Drawing 481911 is dated February 16, 1957.
 2. Drawing 482557 is dated May 25, 1971.
 3. Drawing 482629 is dated April 1957

FIGURE 4
Well PGE-2 Historic Map Overlays
 Historical Water Supply Well Reconnaissance
 Pacific Gas and Electric Company Topock Compressor
 Station, Needles, California