DOCKETED

Docket Number:	07-AFC-06C
Project Title:	Carlsbad Energy Center - Compliance
TN #:	211684
Document Title:	Above Ground Fuel Oil Storage Tanks 5, 6, and 7, Soil Assessment Work Plan
Description:	This work plan is limited to assessment of existing above ground fuel oil storage Tanks 5, 6, and 7 (Site) and associated conveyance piping, other appurtenances at the EPS on assessor parcel numbers (APNs) 210- 010-46 and 210-010-00. This Work Plan is submitted under Voluntary Assistance Program (VAP) case No. 113941-004 administered by the San Diego Department of Environmental Health (SDDEH) Site Assessment and Mitigation (SAM) Program. Under the VAP, Cabrillo will submit work plans and reports to the SDDEH for review and concurrence with the objective of obtaining environmental clearance for remedial actions to be undertaken in association with above fuel storage tank removal and site preparation for future industrial use as a power generating facility.
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Organization:	The Source Group, Inc. on behalf of Cabrillo Power I LLC
Submitter Role:	N/A
Submission Date:	5/31/2016 1:42:20 PM
Docketed Date:	5/31/2016

SGI environmental THE SOURCE GROUP, INC.

December 1, 2014

Dr. Nasser Sionit,
Environmental Health Specialist III
5500 Overland Avenue, Suite 170
San Diego, California 92123

Subject: **Above Ground Fuel Oil Storage Tanks 5, 6, and 7, Soil Assessment Work Plan, VAP #113941-004, Encina Power Station, Carlsbad, California**

Dear Dr. Sionit:

On behalf of Cabrillo Power I LLC (Cabrillo), The Source Group, Inc. (SGI) has prepared this Soil Assessment Work Plan (Work Plan) to describe proposed tank farm site assessment activities at the Encina Power Station (EPS) located at 4600 Carlsbad Drive, Carlsbad, California (Figure 1). This work plan is limited to assessment of existing above ground fuel oil storage Tanks 5, 6, and 7 (Site) and associated conveyance piping, other appurtenances at the EPS on assessor parcel numbers (APNs) 210-010-46 and 210-010-00. This Work Plan is submitted under Voluntary Assistance Program (VAP) case No. 113941-004 administered by the San Diego Department of Environmental Health (SDDEH) Site Assessment and Mitigation (SAM) Program. Under the VAP, Cabrillo will submit work plans and reports to the SDDEH for review and concurrence with the objective of obtaining environmental clearance for remedial actions to be undertaken in association with above fuel storage tank removal and site preparation for future industrial use as a power generating facility.

The objective of this work plan will be to define the site assessment work necessary to determine the lateral and vertical extent of soil contamination resulting from on-site applications and releases of petroleum hydrocarbons. To accomplish this, soil borings will be advanced and logged and samples will be collected and analyzed. Soil data will be used to determine corrective action to be performed upon interim report completion, review, and concurrence by SDDEH. Based on facility history and planned site redevelopment (California Energy Commission License (Docket No. 07-AFC-06), soil removal is the presumptive remedial method for soil contamination above the SDDEH site specific cleanup goals established for the facility.

Site History

The EPS is a steam electric power generating station that began operation in 1954. The EPS was constructed and operated by San Diego Gas and Electric until 2000 when it was acquired by Cabrillo Power I LLC. Prior to construction of the power plant facilities and tank farm areas, the site was used as agricultural fields and the southwestern part of the property was also used as a military reservation and later as an industrial rubber plant. The tank farm area east of the rail road was previously only used for agricultural uses. The station consists of five steam turbine generators and one gas turbine unit, various ancillary power generation and distribution equipment, and seven above ground fuel oil storage tanks

1962 Freeman Avenue
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(Figure 2). The project objective is the subsurface assessment of existing surplus fuel oil Tanks 5, 6, and 7 associated conveyance piping and other appurtenances, and the remediation and restoration of subsurface soils in the subject tank areas in the east EPS Tank Farm. Tanks 1 through 7 were constructed from the 1950's to the 1970's to store No. 6 fuel oil used for electric power generation. Until 1984, the power plant was primarily fueled by Bunker C or No. 6 fuel oil. Since 1984, the power plant has been primarily fueled by natural gas, and the majority of the tanks are either empty or were allowed to cool, solidifying the residual fuel. Diesel oil was also present on-site and used for displacing the residual oil in pipelines (to prevent the residual oil from hardening in pipelines and valves as it cools) and as secondary fuel for the gas turbine facility.

The tanks are located within impoundment basins and separated by concrete-coated or riprap earthen berms (Figure 3). The farm basin was excavated into native ground. The upper ground surface elevation is approximately 54-feet above mean sea level (msl) for the eastern tanks. The intermediate berms are constructed at a 1.5 to 1 slope and are approximately 20- to 25-feet high from the bottom of the East Tank Farm impoundment. The western Tank Farm consists of individual basins 8- to 15-feet deep. At the bottom of each impoundment basin, the footprint of each tank is surrounded by a six-inch layer of gravel. Dike drain sump structures, inlets, and 18-inch diameter corrugated metal drainage pipes line the perimeter of each impoundment basin. A four-inch thick drainage rock layer overlays the bottom 15-feet of the slopes of the earthen berms. The slopes of the earthen berms and drain rock layer are covered with a two-inch thick layer of gunite, reinforced with "6 x 6 – 10/10" welded wire fabric. The top of each berm varies in width, from 10- to 16-feet, and is covered with 6 to 9 inches of compacted crushed stone and topped with three- inches of asphalt pavement (Pioneer Service & Engineering Co. [PSE] Drawings, 1970).

Design drawings provided by Cabrillo depict the tanks constructed on top of a six-inch thick, oil-impregnated sand cushion which is surrounded by a concrete perimeter ring wall. The oil-impregnated sand cushion is comprised of No. 2 fuel oil thoroughly mixed with sand at a rate of 22 gallons of No. 2 fuel oil per cubic yard of sand (PSE, 1970). This is roughly equivalent to 66,278 gallons of fuel, assuming the same mixing ratio is applied to all subject tank (5, 6, and 7) sand cushions.

Tank 5
No.6 fuel oil storage Tank 5 was constructed in 1971 with a pontoon floating roof and holds a nominal net capacity of 250,000 bbls or 10,500,000 gallons. The tank has a 240-foot diameter and a 32-foot height, with a minimum roof height of 4.6-feet.

Tank 6
No.6 fuel oil storage Tank 6 was constructed in 1973 with a double deck floating roof and holds a nominal net capacity of 445,000 bbls or 18,690,000 gallons. The tank has a 315-foot diameter and a 32-foot height, with a minimum roof height of 5.5-feet.

Tank 7
No.6 fuel oil storage Tank 7 was constructed in 1977 with a double deck floating roof and holds a nominal net capacity of 450,000 bbls or 18,900,000 gallons. The tank has a 318-foot diameter and a 32-foot height, with a minimum roof height of 6-feet. .

Previous site assessments

Various site assessments have been performed at the EPS dating back to at least 1995. Relevant excerpts from available reports are provided in Appendix B. The following paragraphs discuss findings from these assessments, and Figure 3 shows previous sampling locations throughout the subject Site area.

Groundwater Technology, Inc., (GTI) conducted a Phase I Environmental Site Assessment in 1998. A Phase II Environmental Site Assessment (ESA) was conducted by GTI in 1998. The Phase II subsurface investigation completed in 1998, included soil borings and temporary groundwater monitoring points in the east tank farm area. Soil and groundwater samples were collected and analyzed for a selection of analytes based on the types of potential contaminant releases within each Tank Farm area. The Phase II site assessment concluded that a release of fuel oil from Tank 7 piping and valves had occurred within the containment area. No other uncontrolled releases of TPH from tanks, piping, and valves onto soil were detected in the locations sampled during the Phase II investigations. However, because diesel fuel was spread on the soil beneath the tanks of the East Tank Farm area prior to their construction to inhibit corrosion and/or for dust suppression, the presence of diesel in the soil is unknown and remains a potential environmental condition to be addressed and investigated in this site assessment.

TPH was not identified in any groundwater samples collected during the GTI Phase II site assessment. Nickel exceeded the background concentration and the screening criteria used to determine the potential for impact of groundwater on surface water. The source of nickel could not be identified as either an elevated natural concentration or related to a contaminant source. Fate and transport modeling of nickel in groundwater concluded that it would not move more than 15-feet for the next 100 years and would not reach surface water bodies at concentrations exceeding ambient water quality criteria for marine waters. Therefore, nickel in groundwater was not considered further as a potential environmental condition in the GTI Phase II report.

GTI also made remediation recommendations in a Phase III report in 1998. The Phase III report recommended remediation around Tanks 7. Table 1 shows results from previous site assessments and remedial action confirmation samples. It should be noted that Tank 5 and 6 showed detected levels of total extractable hydrocarbons (TEH), however, based on cleanup goals of 1,000 m/kg for soil these areas were never recommended for remediation.

RBF Consulting conducted a Phase I Environmental Site Assessment in 2006, and contracted a Geology, Soils, Seismicity, and Environmental Site Assessment for the San Diego County Water Authority to assess portions of the east and west tank farm for the proposed Encina Seawater Desalination Project. Specifically, Tanks 2, 3, 4, and 5 and a proposed water pipeline route were evaluated. The Phase I reported findings of surficial staining, asbestos containing materials (ACMs), lead based paint, and potentially mercury containing gauges. The Phase I recommended removal and replacement of stained concrete and sampling of all subsurface soils for proper characterization and remediation. The geological assessment concluded that the desalinization project could be constructed within the proposed site. The environmental assessment concluded that shallow and scattered TPH in soil was present and that these findings were consistent with other previous investigations. TPH was detected in only 8 of the 88 samples collected. The analytes VOCs, PCBs, and polycyclic aromatic hydrocarbons (PAHs) were not detected, with the exception of anthracene (0.058 mg/kg) from a sample collected in the Tank 5 basin at a depth of 0.25-feet. Metals results were generally all below industrial and residential PRGs, with the exception of arsenic, which at the level detected, may be attributed to naturally occurring background. No TPH, VOCs, PCBs, pesticides, or PAHs were detected in groundwater in any of the grab samples collected.

Previous Soil Remediation

Previous remedial action has been enacted at the EPS over the past 30 years related to either uncontrolled releases of petroleum hydrocarbons, or closure of industrial process equipment. Remedial actions have been carried out within the tank farm area. Relevant information from previous remedial action reports are summarized in the following paragraphs.

Based on recommendations provided in the GTI Phase II ESA, soil remediation activities were conducted at various site specific locations throughout the EPS in October through December, 2003. The soil remediation was performed in accordance with the Remedial Action Work Plan (IT, June 2001) which was approved by the SDDEH under the VAP (H13941-003).

The remediation goals set forth in those remedial action work plans consisted of the limited removal and off-site treatment or disposal of free product; soil that had the potential to generate free product; and soil impacted with 1,000 mg/kg or greater of Total Extractable Hydrocarbons (TEH). The cleanup criteria used for the project was in accordance with the Remedial Action Work Plan (IT, June 2001) which was approved by the DEH. These criteria were based on the SDDEH SAM Manual (DEH, 2002), the San Diego Regional Water Quality Control Board (RWQCB) guidance (RWQCB, 1994, 1996a, 1996b), and internal management policies.

The remediation activities were performed by Haley and Aldrich in eight distinct areas, including a paved area southeast of Tank 7 and an unpaved area northwest of Tank 7, designated in the Phase II investigation as Area 5 and Area 6, respectively.

Approximately 236 tons of soil was removed from the Area 5 (Tank 7) excavation, which extended approximately 2.5-feet bgs. Two of eleven final confirmation samples obtained from the Area 5 remedial excavation contained TEH at concentrations greater than the 1,000 mg/kg cleanup goal. Foundations for an above ground pipe precluded further extension of the excavation in the area of these samples toward the northwest. An estimated volume of approximately 12 cubic yards of soil remains in place in this area, with concentrations of TEH of approximately 1,600 to 1,900 mg/kg. Free product or soil considered capable of generating free product was not observed during the remediation activities in Area 5.

Approximately 172 tons of soil was removed from the Area 6 (Tank 7) excavation, which extended approximately 2.5-feet below ground surface. Three of nine final confirmation samples obtained from the Area 6 remedial excavation contained TEH at concentrations greater than the 1,000 mg/kg cleanup goal. One of the eleven final confirmation samples was also analyzed for Total Lead and was reported as non-detect. The excavation was extended approximately 0.5-feet further west beyond these sample locations, however, a concrete lined v-ditch precluded further extension of the excavation. An estimated volume of approximately 4 cubic yards of soil remains in place in this area with concentrations of TEH of approximately 1,100 to 3,030 mg/kg. Free product or soil considered capable of generating free product was not observed during the remediation activities in Area 6.

In summary several investigative soil borings and remedial efforts have been performed throughout the tank farm area. The proposed site investigation sample locations and methods described in the following sections seek to confirm remediation, and characterize areas that have not been previously assessed.

Local Geology

The Site is located on a coastal plain on the edge of the Peninsular Ranges physiographic province of Southern California. The coastal plain area has undergone several episodes of marine inundation and subsequent marine regression during the last 54 million years resulting in the deposition of a thick sequence of marine and non-marine sedimentary rocks on the uplifted and eroded high relief basement terrain. Accelerated fluvial erosion during periods of heavy rainfall, coupled with the lowering of the base sea level during the quaternary, has resulted in the rolling hills, mesas, and deeply incised valleys that are present in the area (Geo-Logic, 2004). The tank sites are located on a marine terrace bluff approximately 30- to 50-feet above mean sea level (msl) with each tank site situated in hydraulically isolated graded berm areas with fairly flat topography in the bottom. Previous geotechnical investigations performed at the Site describe the soil as predominantly fine- to medium grained sand with some silt and clay (Geo-

Logic Associates, 2004). Geologic units at the site consist of Quaternary Artificially Compacted Fill, Quaternary Older Paralic deposits of mostly poorly sorted, moderately permeable, reddish-brown, interbeds of strandline, beach, estuarine and colluvial deposits composed of siltstone, sandstone, and conglomerate, and Santiago Formation (middle Eocene) consisting of buff and brownish gray, massive, coarse-grained, poorly sorted arkosic sandstone, and sandstone conglomerates. The upper two to five feet across the Site consist of engineer fill material.

Hydrogeolgy

The Site is located in the Los Monos Hydrologic Subarea 904.31 in the Agua Hedionda Hydrologic Area 904.30 within the Carlsbad Hydrologic Unit 904.00 as defined by the San Diego Regional Water Quality Control Board Basin Plan. The Aqua Hedionda Hydrologic Area is flanked by the Encinas Hydrologic Area to the south and the Buena Vista Creek Hydrologic Area to the north. The Site area groundwater is listed as having beneficial uses for agricultural and industrial use, however, it is specifically exempted for use a municipal or domestic supply. Regionally the groundwater basins discharge to the Pacific Ocean. The ground surface across the site varies from mean sea level (MSL) to 55-feet above MSL. Groundwater in the subject Site area is encountered at approximately 20-feet below ground surface (bgs) in the east tank farm, and typically flows to the west toward the ocean and down the topographical gradient. Groundwater samples recently collect near the former Tank 3 area indicated groundwater elevations ranging between 33-43-feet above MSL (SCS Engineers, 2013).

Proposed Scope of Work

The primary sources of contaminants beneath the site are from the application of No. 2 diesel fuel during the construction of the AST's as a hydrocarbon sealant below AST's in the six-inch thick sand cushion immediately beneath the tank bottoms, the uncontrolled release of No. 6 fuel oil during the operation of the tank farm, and the application of diesel fuel as a dust suppression agent during construction. Diesel fuel and No.2 fuel oil are middle distillates contain paraffin's (alkenes), cycloparaffin's (cycloalkanes), aromatics, and olefins, from approximately carbon range C9 to C20. Aromatic compounds of concern include alkyl benzenes, toluene, naphthalene's, and polycyclic aromatic hydrocarbons (PAHs). No. 6 Fuel oil is a heavy distillate (C20 to C70), also known as Bunker C fuel, and is composed of asphaltenes, polar aromatics, naphthalene aromatics, aromatics, saturated hydrocarbons, and heteromolecules containing sulfur, oxygen, nitrogen and metals. No. 6 Fuel oil at ambient temperature is very viscous and typically requires heating for storage at 100 degrees Fahrenheit (°F), and heating to 150°F for pumping. Volatile organic compounds (VOCs) benzene, toluene, ethelbenzene, and xylenes (BTEX) may be present in soils. To a lesser extent heavy metals may be present due to fuel composition. The metals of concern would include nickel (Ni), vanadium (Vn), molybdenum (Mo), lead (Pb), Chromium (Cr), and cobalt (Co).

The primary source of contamination related to the site is identified as adsorbed-phase hydrocarbons in soil from either the construction of the engineered tank bottoms or releases of fuel oil from the tank systems. The secondary source of contamination are from hydrocarbons released into the underlying soil and potentially leached downward into groundwater and/or dissolved into groundwater within the tank basins. However, due to the physical properties of the petroleum hydrocarbons, and in this case diesel and fuel oil, contamination is commonly limited to soil and shallow groundwater aquifers and generally has limited vertical impacts.

Pathways of contaminant migration are air diffusion, groundwater transport, and surface water transport. The air diffusion pathway is through interconnecting soil pore space. Adsorbed-phase hydrocarbons can volatilize and migrate (as vapor phase) both laterally and vertically from the source area. Additionally,

utility trenches (zones of higher relative permeability) adjacent and near the site can provide conduits for vapor transport; however, no soil or groundwater data collected to date support this scenario.

Proposed Soil Sampling

The environmental assessment proposed for this site will assess engineered and native soils beneath each subject tank bottom, and beneath the ancillary equipment and piping routes, and in areas previously identified as having experienced a release, or remedial actions. The following tasks are planned for the assessment.

- Advance 27 soil borings through the tank bottom structures to a depth of 15-feet below grade and the collection of soil samples at 0.5-, 3-, 5-, 10-, and 15-foot intervals for laboratory analysis;
- Advance 12 soil borings beneath ancillary equipment and former fuel pipelines to a depth of 5-feet below grade and the collection of soil samples at 0.5-, 5-foot intervals for laboratory analysis;
- Advance 8 soil borings to a depth of 15-feet below grade in areas within the tank basins that have previous sample data that indicate contaminants are present implying potential releases or have had remedial actives, and collect soil samples at 0.5-, 3-, 5-, 10- and 15-foot intervals for laboratory analysis.
- Borings will be advanced to planned depths unless evidence of contamination is observed (discoloration, odor, VOC detection by PID), then borings will be advanced until visibly clean soil is encountered and sampled. Samples below planned depths will be collected every two-feet until total depth is achieved. Any boring with the potential to encounter groundwater will be terminated until a permit is obtained from DEH.
- Prepare an interim report summarizing the limited site assessment, and recommendations on remedial actions, if necessary.

The Site will be made clear of equipment and fully accessible prior to site assessment. The soil borings will be advanced by direct-push drill rig operated by a State licensed well drilling contractor (C57 license) with OSHA 29 CFR 1910.120, 40 hour trained field crew. Soil samples will be collected from each borehole for visual field inspection at prescribed intervals in acetate sleeves. Soil samples will be inspected for lithologic description using the Unified Soil Classification System (USCS). In addition, field volatile organic compound (VOC) headspace readings will be taken using a field photoionization detector (PID) calibrated to 100 parts per million by (ppmv) of isobutylene calibration gas.

Groundwater is not anticipated to be encountered during soil boring advancement. Per the San Diego County Site Assessment Manual, Section 5, II, A, 3 boring permits will not be required for these borings. Additional soil sample collection may be warranted based on field observations.

Analytical Methods

Soil samples will be collected from all borings at approximately 2- to 5-foot intervals. All samples will be analyzed by the analytical methods per SAM guidance. All samples will be submitted to the laboratory for analysis per Table 2. The sample sleeves will be covered on both ends with Teflon sheeting and sealed with plastic end caps. Each soil sample will be labeled and placed on ice in a thermally insulated cooler pending transport to a State-certified laboratory (following strict chain-of-custody procedures).

Soil samples will be analyzed by the following methods:

- TPH as diesel (-d) and TPH as oil (-o) by EPA Method 8015M,
- VOC chemicals BTEX by EPA Method 8260B,
- PAHs by EPA Method 8270C,
- Heavy Metals (specifically Ni, Vn, Mo, Pb, total Cr, and Co) by EPA Method 6010B, and

- Ionic activity (pH) by EPA Method 9045D.

One soil sample from the eastern tank farm area will be analyzed for soil physical properties, including hydraulic conductivity, intrinsic permeability to water (native state, vertical or horizontal orientation), total porosity, air-filled porosity, dry bulk density, volumetric moisture content, according to the ASTM 2216 and API RP 40 test methods, and Fraction Organic Carbon (FOC) according to the Walkley-Black method.

EnCoreTM samples or equivalent will be prepared and preserved in accordance with EPA Method 5035 for all soil VOC samples. All other analytical test methods will follow those specified in Table 2 and will be performed in accordance with EPA methods per the SAM Manual Guidance. All laboratory analysis reports will be provided in Level II data packages.

Waste Management

All investigation-derived waste (soil cuttings, used PPE, and decontamination rinseate) will be placed in Department of Transportation-approved 55 gallon drums and stored on site pending characterization for disposal. All drummed waste will be characterized per the SAM guidance Section 5, XI, B. A label will be placed on each drum to indicate its contents (including depth intervals for soil cuttings), date generated, site address, and consultant's name and telephone number.

As appropriate, the respective waste streams will be characterized through the collection and analysis of various waste characterization samples. Following receipt of the analytical results, from a state-certified analytical laboratory, the wastes will be profiled for disposal under a manifest or bill-of-lading prepared and signed by a Cabrillo representative. All wastes will be profiled according to California Code of Regulations, Title 22, Division 4.5, Chapters 10 through 32, and federal RCRA regulations.

The PPE and contaminated general site waste will be profiled as such, and will be disposed of as a non-hazardous solid waste.

Disposal

Following characterization and profiling, the respective waste streams will be manifested (or bill-of-lading) for off-site disposal or recycling, as appropriate. The disposal of wastes, or recycling of such wastes, will occur only at U.S. Environmental Protection Agency approved and State Licensed facilities. A Cabrillo representative will sign all manifests or bills-of-lading as generator.

Documentation and Reporting

Field data will be reviewed in the field to determine the need for possible additional sampling to ensure complete delineation. Upon completion of the field activities and receipt of the analytical laboratory reports a Site Assessment Report will be prepared and submitted to DEH. The report will provide recommendations for additional subsurface assessment to delineate the horizontal and vertical extent of impacted soil if necessary, and waste management. A health risk analysis will be included if warranted. The Site Assessment Report will be signed and stamped by the Professional Geologist overseeing the project.

Health and Safety

A Worker Health and Safety Plan (HASP) and Community Health and Safety Plan will be submitted under separate covers. The HASP will be specifically prepared for the site assessment of the tank farm area at the EPS facility, will apply to the site assessment work crew, and only addresses the potential

environmental and physical hazards of the field investigation. The HASP will contain at a minimum the following information:

- Project and emergency contact information and define the lines of communication.
- Prior to beginning on-site work, the Project Manager will ensure all employee training and medical clearances are confirmed, including subcontractors. Utility clearances will be verified.
- The Site Health and Safety Officer (SHSO) will ensure air monitoring equipment is available and calibrated, monitoring logs are kept current, a daily Health and Safety briefing is held, all field personnel and subcontractors agree to and sign the Health and Safety Plan, and acknowledgement and agreement form for the first day of on-site work.
- The Site Health and Safety Officer will oversee the overall Plan. SHSO has the authority to stop work or prohibit any personnel from working on the site at any time for not complying with any aspect of the Plan.
- All Subcontractor Field Supervisors are responsible for implementing this plan for his/her own employees.
- Each person on the site has responsibility for their own health and safety, as well as assisting others in carrying out the Plan. Any person observed to be in violation of the Plan should be assisted in complying with the Plan, or reported to the Site Health and Safety Officer or the Subcontractor Field Supervisor.
- Any site personnel may shut down field activities if there is a real or perceived immediate danger to life or health.

Minimum Training, Respirator Fit-Testing, and Medical Surveillance Requirements for Site Personnel (for all field people working with any hazardous materials):

- 40 hr. Hazardous Waste Operations Training (HAZWOPER) 29CFR1910.120
- 8 hr. Annual HAZWOPER Refresher Training (current)
- 8 hr. Supervisor HAZWOPER Training for Site Health and Safety Officer
- Annual Respirator Fit Testing
- Annual Medical Clearance and respirator clearance by a physician.

All site work will be performed in accordance with EPS health and safety program.

Community Health and Safety Plan

The Community Health and Safety Plan (CHASP) will be prepared with the intent of public distribution to promote a safe and healthy environment for the public in areas where soils and other materials contaminated with hazardous substances are excavated, removed, or handled. The goal of the community Health and Safety Plan is to identify and address potential environmental exposures hazards posed by the site assessment work. The CHASP will address all the requirements of a CHASP as defined in the SAM guidance Section 4, IV.

Schedule

Field work will commence after DEH approval of this Work Plan. Field activities are anticipated to take up to two week to complete with final laboratory analytical reporting to follow within four weeks of the date of the last sample submittal. The Site Assessment Report will be submitted to the DEH within four weeks after receipt of the final laboratory analytical reports.

If you have any questions regarding any aspect of our proposal or require additional information, please call me at (562) 597-1055.

Sincerely,

The Source Group, Inc.

Scott Seipel, C.HG, P.G.
Principal Hydrogeologist

Attachments: Figure 1 – Site Location Map
Figure 2 – Vicinity Map
Figure 3 – Historical Site Assessment
Figure 4 – Proposed Investigation Locations

Table 1 – Tank 5, 6, and 7 Sample Results Greater Than 100 mg/kg
Table 2 – Sampling and Analysis Plan

References

Cc: Jerry Carter, Cabrillo Power I LLC
Sheila Henika, Cabrillo Power I LLC
Tim Sisk, NRG Energy
George Piantka, NRG Energy

SCALE 1:24000

1 1/2 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

N

SGI environmental

THE SOURCE GROUP, INC.

FILE NAME:	DATE:
NRG-SL	11/2014

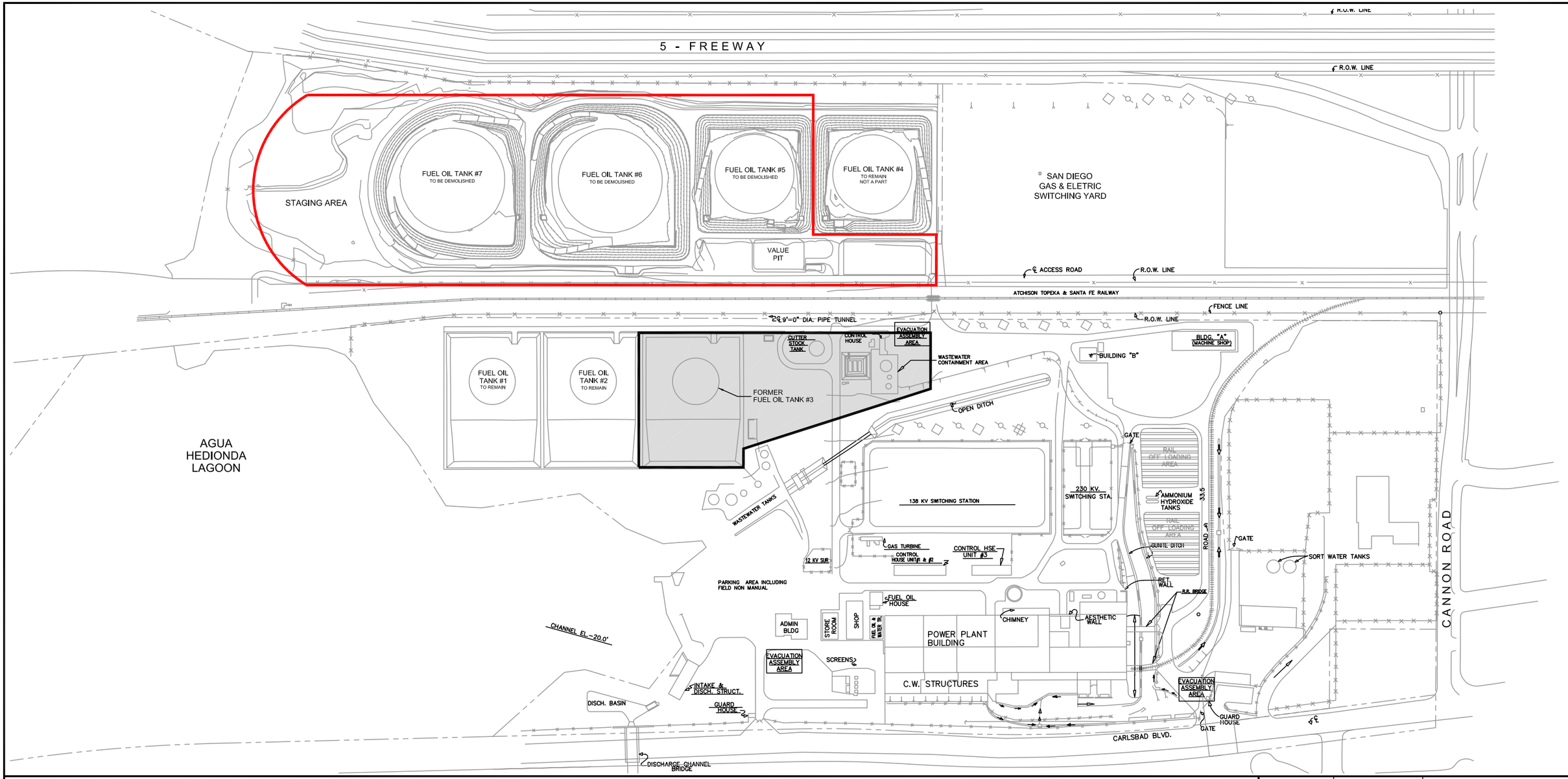
SOURCE:
U.S.G.S. 7.5 MINUTE
TOPOGRAPHIC QUADRANGLE MAP
SAN LUIS REY, CA

SITE LOCATION MAP

ENCINA TANK FARM 5, 6, AND 7
SITE ASSESSMENT WORK PLAN
4600 CARLSBAD BOULEVARD
CARLSBAD, CALIFORNIA

FIGURE

1



LEGEND

SUBJECT SITE AREA

0 300 600

APPROXIMATE SCALE IN FEET

DATE:	FILE NAME:	SOURCE:
12/12/2007	NRG-ST.DWG	

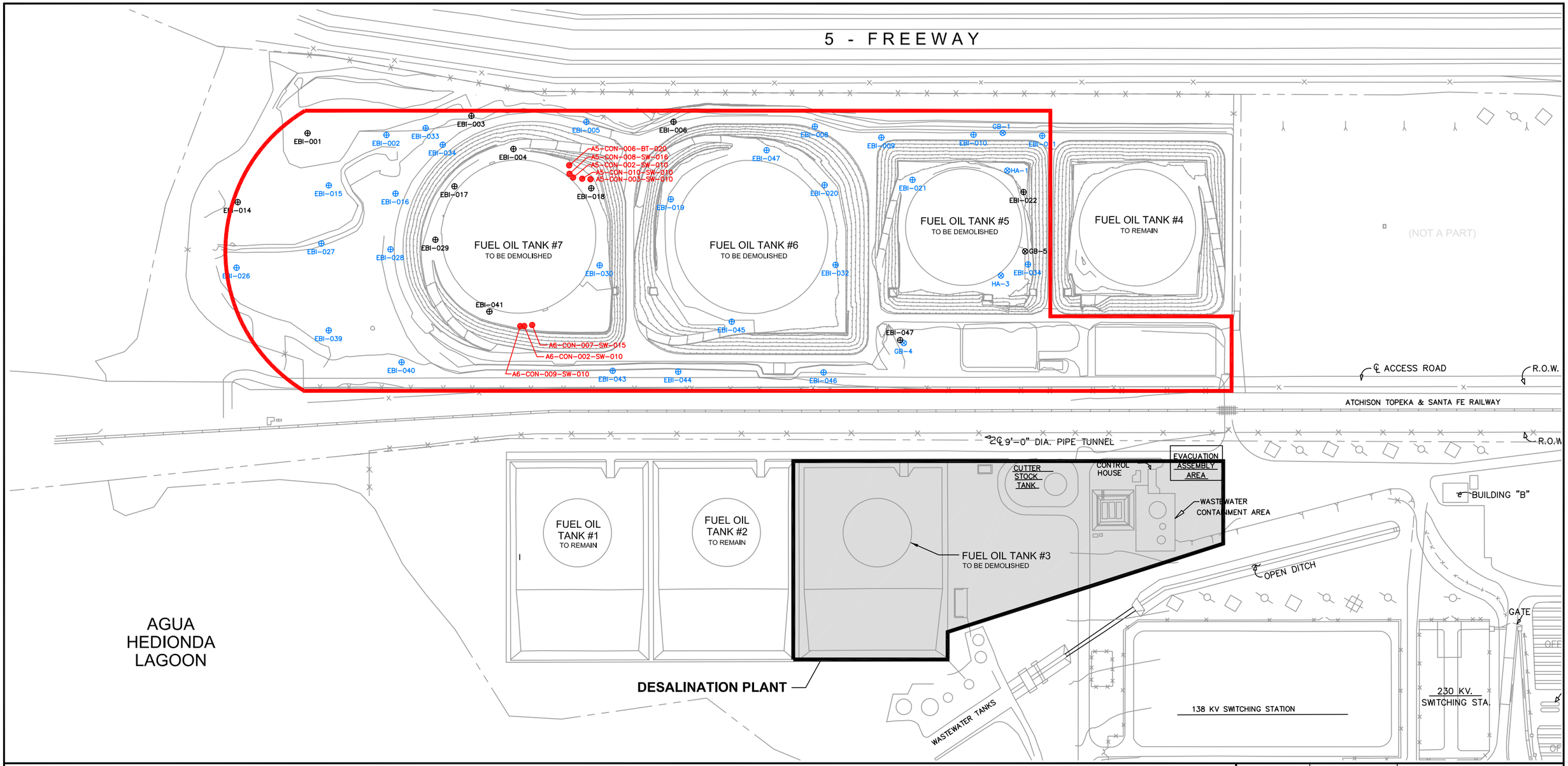
VICINITY MAP

ENCINA TANKS 5, 6, AND 7
SITE ASSESSMENT WORK PLAN

4600 CARLSBAD BOULEVARD
CARLSBAD, CALIFORNIA

SGI environmental THE SOURCE GROUP, INC.

FIGURE 2



LEGEND

- PREVIOUS RELEASE/INVESTIGATION SOIL BORINGSS
- SAMPLE LOCATION WITH DETECTABLE CONCENTRATION OF TPH AFTER REMEDIATION
- HAND AUGER BORING–ANALYTICAL RESULTS ABOVE CLEAN UP GOAL
- SOIL BORING LOCATIONS–BELOW PREVIOUS CLEAN UP GOAL
- SOIL BORING LOCATIONS WITH DETECTABLE CONCENTRATION OF TPH ABOVE 100 mg/kg
- SUBJECT SITE AREA

0 200 400

APPROXIMATE SCALE IN FEET

DATE:	FILE NAME:	SOURCE:
12/12/2007	NRG-ST.DWG	

HISTORICAL SITE ASSESSMENT

ENCINA TANKS 5, 6, AND 7
SITE ASSESSMENT WORK PLAN
4600 CARLSBAD BOULEVARD
CARLSBAD, CALIFORNIA

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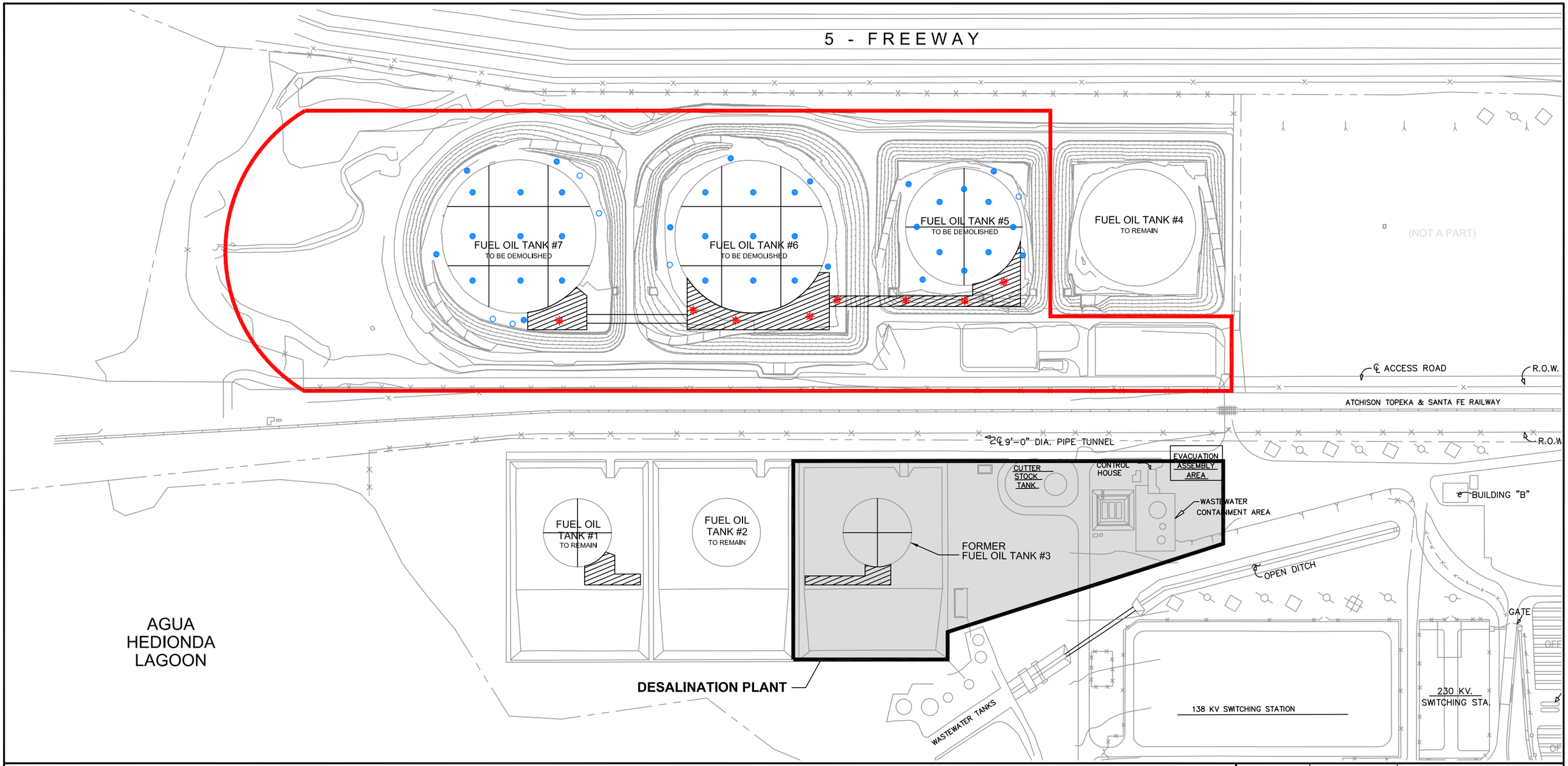
FIGURE 3



LEGEND

- SUBJECT TANK AREAS
- PIPING AND ANCILLARY EQUIPMENT CURIDOR
- PREVIOUS ASSESSMENT LOCATION SOIL BORINGS
- PROPOSED SAMPLE LOCATIONS
- PIPELINE CORRIDOR SAMPLE LOCATIONS

0 200 400

APPROXIMATE SCALE IN FEET

DATE:	FILE NAME:	SOURCE:
11/2014	NRG-ST.DWG	

PROPOSED INVESTIGATION LOCATIONS

ENCINA TANKS 5, 6, AND 7
SITE ASSESSMENT WORK PLAN

4600 CARLSBAD BOULEVARD
CARLSBAD, CALIFORNIA

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FIGURE 4

TABLE 1
TANK 5, 6, and 7 SAMPLE RESULTS GREATER THAN 100 mg/kg
4600 Carlsbad Blvd., Carlsbad, California

Location	Sample ID	Depth	Year	Petroleum Hydocarbons Range	Petroleum Hydocarbons (mg/kg)	Anthracene mg/kg	Consultant
Tank 5	EB1-022	1	1998	TEH	140	--	GTI
	GB-5	0.5	2005	TPH (C23-C44)	419	0.058	GM
Tank 6	EB1-031	5	1998	TEH	680	--	GTI
	EB1-006	1	1998	TEH	300	--	GTI
Tank 7	EB1-003	1	1998	TEH	300	--	GTI
	EB1-004	1	1998	TEH	920	--	GTI
	EB1-017	1	1998	TEH	970	--	GTI
	EB1-018	1	1998	TEH	3300	--	GTI
	EB1-029	1	1998	TEH	110	--	GTI
	EB1-041	1	1998	TEH	1600	--	GTI
	EB1-042	1	1998	TEH	330	--	GTI
	A5-CON-006-BT-020	2	2003	TEH	61	--	HA
	A5-CON-003-SW-010	1	2003	TEH	3300	--	HA
	A5-CON-010-SW-010	1	2003	TEH	1500	--	HA
	A5-CON-002-010	1	2003	TEH	1900	--	HA
	A5-CON-008-SW-015	1.5	2003	TEH	554	--	HA
	A6-CON-007-SW-015	1	2003	TEH	1400	--	HA
	A6-CON-009-SW-010	1	2003	TEH	3030	--	HA
North Tank 7	EB1-002	15	1998	TEH	170	--	GTI
	EB1-014	5	1998	TEH	100	--	GTI
	EB1-001	5	1998	TEH	190	--	GTI
West Tank 7	EB1-043	15	1998	TEH	130	--	GTI

NOTES:

All analytical results presented in micrograms per kilogram (mg/kg)

Blank cells indicate detected value below screening value or reporting limit for the reporting period.

Blank cells do not indicate non-detect values in all occurances.

TEH = Total Extractable Hydorcarbons (EPA Method 8015M)

TPH (C#-C#) = Total Petroleum Hydorcarbons (EPA Method 8015M)

Polynuclear Aromatic Hydorcarbons analyzed (EPA Method 8310)

TABLE 2
SAMPLING AND ANALYSIS PLAN
ENCINA POWER STATION, TANKS 1, 3, 5, 6, and 7
Carlsbad, California

Area	Sample Locations	Depth Intervals	Soil Analysis				
			TPH-d, TPH-o by EPA Method 8015B	BTEX by EPA Method 8260B	PAHs by EPA Method 8270C	Metals (Ni, Vn, Mo, Pb, Cr, Co) by EPA 6010B/7471A	Soil Physical Properties
Tank 5 Bottom [1]	9	0.5, 3, 5, 10, and 15	45	45	1	1	--
Tank 5 Basin [2]	4	0.5, 3, 5, 10, and 15	20	20	1	1	--
Tank 5 Piping [3]	3	0.5, 5	12	12	--	--	--
Tank 6 Bottom [1]	9	0.5, 2.5, 5, 10, and 15	45	45	1	1	1
Tank 6 Basin [2]	4	0.5, 3, 5, 10, and 15	20	20	1	1	--
Tank 6 Piping [3]	4	0.5, 5	8	8	--	--	--
Tank 7 Bottom [1]	9	0.5, 2.5, 5, 10, and 15	45	45	1	1	--
Tank 7 Basin [2]	4	0.5, 3, 5, 10, and 15	20	20	1	1	--
Tank 7 Piping [3]	1	0.5, 5	2	2	--	--	--

Note: [1] Sample locations based on a maximum 100 X 100 foot grid
[2] Sample locaitons based previous investigations or remediation confirmation samples
[3] Sample locaitons based on 1 sample every 100 linear feet of pipe run.

TABLE 3
ANALYTICAL METHODS
ENCINA TANK FARM
CARLSBAD, CALIFORNIA

Source Type	Media	Contaminant	Test Method
Kerosene, Heating Fuel , Bunker Fuel	Soil	Total Petroleum Hydrocarbons (TPH) Gasoline and Deisel Range (C4-C32)	EPA 8015B or DHS-TPH Method
	Soil	Poly Aromatic Hydrocarbons (PAHs)	EPA 8310 or 8270
	Soil	Volatile Organic Hydrocarbons (VOCs)	EPA 8620B
	Soil	Metals	EPA 6010B
	Soil/Waste	pH	EPA 9045D

Note: Hold times will be based on EPA SW-846 guidance.

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