REMEDIATION CLOSURE REPORT FOR SUMPS 15, 21, AND 22

•DRAFT•

Aliso Canyon Gas Storage Facility
12801 Tampa Avenue
Northridge, California 91326

Prepared for:
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ABRREVIATIONS, ACRONYMS, & SYMBOLS

µg/kg	micrograms per kilogram
AETL	American Environmental Testing Laboratory, Inc.
Eco	Eco & Associates, Inc.
EPA	U.S. Environmental Protection Agency
ERRG	Engineering/Remediation Resources Group, Inc.
HSP	Health and Safety Plan
J	analyte concentration is below the method reporting limit and above the detection limit.
mg/kg	milligrams per kilogram
PID	photo-ionization detector
ppm	parts per million
RWQCB	Regional Water Quality Control Board
SCG	Southern California Gas Company
TPH	total petroleum hydrocarbon
TPST	TPST Soil Recyclers of California
VOC	volatile organic compound

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1.0 INTRODUCTION

Eco & Associates, Inc. (Eco) was contracted by the Southern California Gas Company (SCG) to oversee the removal of impacted soil from three abandoned oil field sumps in their Aliso Canyon Gas Storage Facility ("Site"). These sumps, referred to as Sumps 15, 21, and 22, were located within the western portion of the gas storage facility.

In 2006 and early 2007, Eco conducted an environmental investigation (Eco, 2007a) of ten sumps referred to a as sumps 14 through 23. This investigation was initiated with a Site reconnaissance and a review of historical aerial photographs and maps. Based on the results of the initial study, a subsurface investigation was recommended at seven of the oil well sumps. Due to inaccessibility, Sumps 17, 18, and 19 were not included in the subsurface investigation.

The subsurface investigation included the logging and sampling of 33 trenches and 4 borings. Chemical analysis of soil within sumps 15, 21, and 22 revealed the presence of elevated petroleum hydrocarbon and volatile organic compound (VOC) concentrations (Eco, 2007a). Soils containing contaminant concentrations greater than project cleanup levels within these sumps were targeted for removal.

The following sections provide a review of the Site, sump descriptions, and the remediation efforts conducted at Sumps 15, 21, and 22.

2.0 SITE DESCRIPTION

2.1 SITE LOCATION

The Aliso Canyon Gas Storage Facility has a formal address of 12801 Tampa Avenue, Northridge, California (Figure 1). It is located in predominantly undeveloped hillside terrain in an unincorporated territory of Los Angeles County, located immediately north of the community of Northridge. The storage facility, currently owned and operated by SCG, was developed for oil production in the 1940s. The facility has been used for oil production and

gas storage since that time. Privately owned paved and unpaved access roads traverse throughout the facility. Improvements to the facility include oil and gas wells, a natural gas compressor station, aboveground and underground piping, aboveground storage tanks, office buildings, and other ancillary facilities of the oil and gas operation.

2.2 SUMP LOCATIONS

Sump 15 – Sump 15 is located approximately 180 feet north of a well referred to as 'Orcutt - Del Aliso - Sesnon 1' #1 (Figure 2). Prior to remedial activities, it was located within a relatively level area adjoined by ascending slopes on all sides. Cut slopes were located north and west of the sump, while fill slopes were located to the south and east. A vehicle access road had been cut through the fill slope in the southwest portion of the sump. The sump area was in use as a storage area for an oil lease operator. Assorted equipment and supplies were located in the western and northern portions of the sump area.

Sump 21 – Sump 21 is located west of an access road that traverses north and past the well referred to as 'Sesnon Fee' 6 (Figure 3). This sump is located approximately 200 feet southwest of this well. Prior to remedial activities, this sump area was relatively level and covered with a light to heavy growth of vegetation.

Sump 22 – Sump 22 is located approximately 150 feet west of the well referred to as 'Sesnon Fee' 8 (Figure 4). Prior to remedial activities, it was located within a relatively level area immediately south of an access road leading east to this well. The sump area was formerly covered with a moderate growth of coastal shrub.

3.0 SOIL REMEDIATION

Based on the findings of the previous Site investigation conducted by Eco (Eco, 2007a), soils containing elevated petroleum hydrocarbon concentrations (diesel to oil range) were present within Sumps 15, 21, and 22. The reported petroleum hydrocarbon concentrations exceeded established cleanup levels. The project cleanup levels for petroleum hydrocarbons were as follows:

- TPH in the C4-C12 range - 100 milligrams per kilogram (mg/kg)
- TPH in the C13-C22 range - 1,000 mg/kg
- TPH in the C23-C40 range - 10,000 mg/kg

These targeted cleanup levels were based on those established by the Regional Water Quality Control Board (RWQCB) for general remediation of TPH-impacted soils.

Prior to the start of remedial activities, a Soil Removal Plan and Health and Safety Plan (HSP) were prepared and submitted to the SCG for review and comment (Eco, 2007b). The Soil Removal Plan described the approach for remediation of on-site impacted soil. The Soil Removal Plan and HSP were reviewed and approved by the SCG prior to the start of remedial activities.

A permit was obtained from the South Coast Air Quality Management District (AQMD) prior to the start of excavation activities. A copy of this permit, dated May 13, 2008, is provided in Appendix A. Before clearing of vegetation within Sumps 21 and 22, a biologist from Science Applications International Corporation (SAIC) surveyed and approved these areas for clearing. The SAIC biologist observed all vegetation clearing activities. Due to the absence of vegetation within Sump 15, this area was not observed by the biologist prior to or during remedial activities.

All remedial operations performed between May 12 and July 11, 2008 were managed by Engineering/Remediation Resources Group, Inc. (ERRG). Eco provided oversight of the remedial activities. Soil excavation was conducted using an excavator, backhoe, and loader. A review of the remedial activities is provided in the following sections. Eco's logs of the daily field activities are provided in Appendix B.

3.1 SUMP 15 SOIL REMOVAL

The excavation of impacted soil within Sump 15 took place between May 12 and 19, 2008. During this period, a total of 266.71 tons of impacted soil were removed from this sump. The final excavation covered approximately 3,040 square feet of area (Figure 5). The excavation's depth varied between 2.6 and 3.2 feet.

Excavation activities within Sump 15 included the removal of the approximately 3 feet of impacted soil. Bedrock was located at the bottom of this excavation. A relatively small portion of this sump's northern area was not excavated due to the presence of filled water and oil tanks. The excavated soil was stockpiled within the sump and loaded onto trucks (12 truckloads total) for transport to the recycling facility.

Water was used as a dust and VOC suppressant during excavation activities at Sump 15. A photoionization detector (PID) was used during excavation activities to monitor for the presence of VOCs per the AQMD permit. Logs of these measurements are presented in Appendix C. VOCs were not detected during the excavation of Sump 15 (all PID measurements were 0.0 parts per million [ppm]).

3.1.1 WASTE TRANSPORTATION

Soil excavated from Sump 15 was transported to TPST Soil Recyclers of California (TPST), located at 12328 Hibiscus Avenue, Adelanto, California. This facility is state-certified and approved to receive hazardous materials such as those generated from the subject Site.

All transportation activities were performed in strict compliance with State and local regulations and ordinances. The selected transportation company (Belshire Environmental) was certified by the Environmental Protection Agency (EPA) and the State of California as a hazardous waste hauler.

A total of 12 truckloads of impacted soil were transported from Sump 15 to TPST on May 19, 2008. The soil was loaded from the sump directly onto trucks setting in the adjoining roadway. The soil in each truck was covered with tarps prior to leaving the Site. Waste manifests from TPST for the soil removed from Sump 15 are provided in Appendix D.

3.1.2 CONFIRMATION SAMPLING AND ANALYSIS

Prior to backfilling of the Sump 15 excavation, ten confirmation soil samples were collected from its bottom and sidewalls. The locations of these samples are shown on Figure 5. Three soil samples were collected from the excavation's sidewalls, and seven soil samples were collected from the excavation's bottom. These collected soil samples were delivered to American Environmental Testing Laboratory, Inc. (AETL) and analyzed for total petroleum hydrocarbons (TPH) and VOCs using EPA Methods 8015 (carbon chain) and 8260B, respectively. A summary of these results is provided in Tables 1 and 2. The associated laboratory report is provided in Appendix E.

Confirmation soil samples from Sump 15 were all reported with no detectable VOC concentrations (Table 1). As noted in Table 2, petroleum hydrocarbons (diesel and heavy hydrocarbons; C13-C40 range) were detected in five confirmation samples (BS-4, BS-7, EW-1, NW-1, and SW-1). Petroleum hydrocarbons were not reported at concentrations that exceeded the cleanup levels established for the Site.

3.1.3 BACKFILL

Backfill and grading of Sump 15 took place on July 11, 2008. No soil was imported into this sump excavation. Vertical walls (up to 3 feet in height) were sloped and the resulting soil was placed on to the excavation's bottom. A gradual slope was established from the excavation bottom up to the original grade. Grading of soil in the north side of the excavation was not conducted due to the presence of filled drums and tanks.

3.2 SUMP 21 SOIL REMOVAL

Excavation of soil from Sump 21 took place on May 20 and 21, 2008. A total of 156.10 tons of impacted soil were removed from this sump. The excavation's depth varied between 18 and 24 inches. The final excavation covered approximately 2,500 square feet of area (Figure 6).

Dust and VOC suppression was conducted during excavation activities at Sump 21. Elevated VOC concentrations (PID readings greater than 50 ppm) were not measured during remedial activities at this sump.

3.2.1 WASTE TRANSPORTATION

A total of seven truckloads of impacted soil were transported from Sump 21 to TPST on May 20 and 21, 2008. The soil was loaded from the sump directly onto trucks setting in the adjoining roadway. The soil in each truck was covered with tarps prior to leaving the Site (see Appendix D for TPST waste manifests).

3.2.2 CONFIRMATION SAMPLING AND ANALYSIS

Six confirmation soil samples were collected from the bottom and sidewalls of the Sump 21 excavation. The locations of these samples are shown on Figure 6. Four soil samples were collected from the excavation's sidewalls, and two soil samples were collected from the excavation's bottom. These collected soil samples were delivered to AETL and analyzed for TPH and VOCs using EPA Methods 8015 (carbon chain) and 8260B, respectively. A summary

of these results is provided in Tables 3 and 4. The associated laboratory report is provided in Appendix E.

Confirmation soil samples from Sump 21 were all reported with no detectable VOC concentrations (Table 3). As noted in Table 4, petroleum hydrocarbons (diesel and heavy hydrocarbons, C13-C40 range) were detected in four confirmation samples (BS-1, BS-2, EW-1, and SW-1). Petroleum hydrocarbons were not reported at concentrations exceeding the cleanup levels established for the Site.

3.2.3 BACKFILL

Backfill and grading of Sump 21 took place on July 8 and 10, 2008. No soil was imported into this sump excavation. Vertical walls of the sump were sloped, and the resulting soil was placed into the excavation's bottom. A gradual slope was established from the excavation's bottom up to the original grade.

3.3 SUMP 22 SOIL REMOVAL

Excavation of soil from Sump 22 and a smaller adjoining sump (designated Sump 22a) took place between May 21 and July 10, 2008. A total of 13,987.06 tons of impacted soil were removed from this sump. The depth of this excavation extended up to 20.5 feet, and covered an area of approximately 13,956 square feet (Figures 7 and 8). The excavated soil was stockpiled near the roadway to the north of the excavation. Stockpiled soil was loaded daily onto trucks for transport to the recycling facility. Any remaining soil at the end of each day was stockpiled and covered with plastic.

Dust and VOC suppression was conducted during excavation activities at this sump. Elevated VOC concentrations (PID readings greater than 50 ppm) were not measured during remedial activities in this sump area.

3.3.1 WASTE TRANSPORTATION

A total of 522 truckloads were loaded with soil for transport to TPST. from are provided in (see TPST waste manifests, Appendix D.) Trucks used for the off-site transportation of contaminated soil were loaded on the roadway adjacent to the sump. The soil in each truck was covered with tarps prior to leaving the Site.

3.3.2 CONFIRMATION SAMPLING AND ANALYSIS

Prior to backfilling, 40 confirmation soil samples were collected from the bottom and sidewalls of the Sump 22 and 22a excavations. The locations of these samples are shown on Figures 7 and 8. Nineteen soil samples were collected from the excavations' sidewalls, and twenty-one soil samples were collected from the excavations' bottoms. These collected soil samples were delivered to AETL and analyzed for TPH and VOCs using EPA Methods 8015 (carbon chain) and 8260B, respectively. A summary of these results is provided in Tables 5 and 6 (see associated laboratory report, Appendix E.)

With one exception (Sample B-11), confirmation soil samples from Sump 22 were reported with no detectable VOC concentrations (Table 5). Benzene was detected at a concentration of 8.50J[1] micrograms per kilogram (µg/kg) in sample B-11.

As noted in Table 6, petroleum hydrocarbons (diesel and heavy hydrocarbons, C13-C40 range) were detected in five confirmation samples (B-1, B-21 [Sump 22a], EW-5, EW-7, and SW-1). Petroleum hydrocarbons were not reported at concentrations exceeding the cleanup levels established for the Site.

3.3.3 BACKFILL

Portions of Sump 22 were filled before excavation of the entire sump was completed. A part of the excavation near the roadway was filled to create a stockpile pad and/or loading area. This took place after confirmation sample results were obtained for the portion to be filled. The final back filling activities began on July 8, 2008 following the cessation of excavation in Sump 22a. No backfill soil was imported to Sump 22. Backfill soil used for Sump 22 was generated from the cleared area south of the sump. The level of the surrounding area was uniformly lowered while the excavation bottom was brought up to a corresponding elevation. Following backfilling and grading, stockpiled vegetation (removed prior to remedial activities began) was spread evenly throughout the filled sump area (see Site Photographs, Appendix F).

4.0 CONCLUSIONS AND RECOMMENDATIONS

Eco was contracted by SCG to oversee the removal of impacted soil from three abandoned oil field sumps referred to as Sumps 15, 21, and 22 located within the western portion of their Aliso Canyon Gas Storage Facility. A soil investigation conducted by Eco revealed the presence of elevated petroleum hydrocarbon and VOC concentrations within these sumps. Soil containing concentrations greater than established cleanup levels was targeted for removal.

A total of 14,409.87 tons (541 truckloads) of impacted soil were removed from Sumps 15, 21, and 22 between May 12, 2008 and July 11, 2008. Based on a review of the excavated areas and results of the confirmation soil sample analyses, impacted soil in the former sump areas has been successfully removed. Further soil investigations and/or remediation are not considered warranted and are not recommended for these areas.

5.0 LIMITATIONS AND EXCEPTIONS

Because field conditions are variable and sampling is limited by practicality, assumptions have been made as to the TPH and VOC concentrations in areas between and around sampling locations. Certainty of these assumptions decreases as the distance between sampling points increases. The contamination gradient is assumed to be fairly constant in and around the sampling area. No absolute declaration can be made about the contamination or lack thereof for the Site in its entirety. An adequate number of samples taken at specific

[1] J = analyte concentration is an estimated value below the method reporting limit and above the detection limit.

chosen locations allow the assumptions to be made with a high level of confidence, barring unusual circumstances.

6.0 REFERENCES

Eco & Associates, Inc. (Eco), 2007a. *Oil Well Sump Reconnaissance and Investigation Report, Aliso Canyon Gas Storage Facility, 12801 Tampa Avenue, Northridge, California,* Project No. Eco-05-205, October 4, 2007.

_____, 2007b. *Soil Removal Plan Sumps 15, 21, and 22, Aliso Canyon Gas Storage Facility, 12801 Tampa Avenue, Northridge, California,* Project No. Eco-05-205, November 15, 2007.