Accepted - 09/22/2022 NV

October 7, 2021

Ms. Emily Hernandez
Bureau Chief, Environmental
New Mexico Oil Conservation Division
New Mexico Energy, Minerals, and Natural Resources Department
1220 South St. Francis Drive
Santa Fe, New Mexico 87505

Subject: **Updated Remediation Work Plan**
San Juan 28-6 Unit #31
Hilcorp Energy Company
API #: 30-039-07290
NMOCD Incident Number: NVF1816655680
Rio Arriba County, New Mexico

To Whom it May Concern:

On behalf of Hilcorp Energy Company (Hilcorp), WSP USA Inc. (WSP) has prepared this *Updated Remediation Work Plan* for the San Juan 28-6 Unit #31 (Site) located near Encierro Canyon in Rio Arriba County, New Mexico (Figure 1). Approximately 12 barrels (bbls) of condensate and 2.1 bbls of produced water were released at the Site in 2018 as a result of corrosion at the bottom of the Site production tank (Figure 2). Animas Environmental Services (AES) conducted site characterization and delineation work on behalf of Hilcorp at the Site in 2018 and 2019. Based on multiple sampling events, a *Remediation Plan* (dated November 6, 2018) and subsequent *Revised Site Remediation Plan* (dated December 28, 2018) were submitted to the New Mexico Oil Conservation Division (NMOCD) for review and approval. Hilcorp attempted remediation through soil vapor extraction (SVE) as proposed, but mechanical failures prevented successful startup of the SVE system. The NMOCD issued a notice of violation (NOV) dated September 1, 2021 requiring submittal of delinquent reports, a plan to bring the SVE system into compliance, report of full delineation of impacted soil, and an updated remediation plan detailing and justifying system design, installation, operation, and effectiveness.

Any delinquent reports are submitted under separate cover. This document meets the remaining requirements and documents the following:

- Final delineation sampling events;
- Plan for temporary system installation and permanent system installation as originally designed and approved; and
- Meets the remediation requirements of 19.15.29.11 and 19.15.29.12 of the New Mexico Administrative Code (NMAC) and includes start dates, detailed design with calculations, system operation, system evaluation and verification of performance, proposed closure actions, and estimated remediation timelines.

1.0 SITE BACKGROUND

The *Revised Site Remediation Plan* (dated December 28, 2018 and included as Enclosure A) submitted by AES outlines the release background, site characterization based on potential sensitive receptors and depth to groundwater, site-specific closure criteria, delineation data, and a remediation plan for the Site. Based on the presented information, Hilcorp, the NMOCD, and the Bureau of Land Management (BLM) met on January 31, 2019 to discuss additional sampling requirements for full delineation of the release. Details from this meeting are further discussed below.

1.1 SITE CHARACTERIZATION AND CLOSURE CRITERIA

As documented in the AES reports, the Site was characterized in accordance with *Table 1, Closure Criteria for Soils Impacted by a Release* of 19.15.29.12 of the New Mexico Administrative Code (NMAC). Based on an estimated depth-to-groundwater greater than 250 feet below ground surface (bgs) and no sensitive receptors in close proximity to the Site, the following NMOCD Table 1 Closure

Criteria apply: 10 milligrams per kilogram (mg/kg) benzene; 50 mg/kg total benzene, toluene, ethylbenzene, and total xylenes (BTEX); 1,000 mg/kg total petroleum hydrocarbons (TPH) as gasoline range organics (GRO) and diesel range organics (DRO); 2,500 mg/kg TPH as GRO, DRO, and motor oil range organics (MRO); and 20,000 mg/kg chloride.

1.2 NMOCD JANUARY 2019 CONDITIONS OF APPROVAL

Hilcorp, the NMOCD, and the BLM met on January 31, 2019 to discuss the *Revised Site Remediation Plan* (dated December 28, 2018). The NMOCD provided Hilcorp with the following Conditions of Approval (COAs) for the *Revised Site Remediation Plan* via email:

- ***Hilcorp will have the following items implemented 90 days from meeting (April 30, 2019)***
    - *A full SVE plan must be submitted, approved by the OCD, installed, and operational by the referenced date above. It is HEC's responsibility to ensure these steps happen timely to ensure compliance with the timeframe provided.*
    - *By the referenced date the site must also be fully delineated. As discussed at least two additional investigation wells are required to fully delineate the vertical extent of the contamination in the two suspected source areas. These well locations must also be submitted and approved by the OCD prior to implementation to ensure they meet the requirements discussed.*
- ***Please note below are standard SVE conditions of approval that you may want to include in your plan or they will be added.***
    - *HEC will maintain a SVE runtime greater than or equal to 90% per quarter.*
    - *HEC will collect an initial gas sample for laboratory analysis shortly after the startup of SVE Operations and then a quarterly sample thereafter. The gas sample will be analyzed for EPA Method 8260 Full List and include Carbon dioxide and Oxygen.*
    - *The gas sample port needs to be installed prior to the inlet of the vacuum pump but, after the convergence of all SVE wells.*
    - *HEC will submit to OCD District III a quarterly update report detailing remediation operations the report will include at a minimum.*
        - *Summary of remediation activity for the quarter.*
        - *SVE run time*
        - *SVE mass removal and product recovery.*
        - *Gas Sample Analysis*
    - *HEC will need a full vertical and horizontal delineation of the remediated areas to ensure full remediation. The locations of these wells will be required to be approved by the OCD prior to implementation.*

2.0 DELINEATION SAMPLING

On February 12, 2019, the NMOCD approved four additional delineation borings, as proposed by Hilcorp and presented on a map and emailed to NMOCD. AES conducted the final delineation sampling in April and May of 2019 with the advancement of borings SB-25 through SB-29. Full lateral and vertical delineation of the release was achieved. In total, 34 borings were advanced at the Site, of which 15 borings were completed as soil-vapor extraction (SVE) wells for future remediation of the site impacts. Based on analytical results, approximately 2,600 cubic yards of subsurface soil were estimated to have been impacted by the release at the Site.

Soil sample results from AES work are summarized in attached Table 1, with laboratory analytical reports for this April/May 2019 event included as Enclosure B (laboratory analytical reports for previous sampling events are presented in the AES report included as Enclosure A). Soil boring locations advanced by AES are shown on Figure 3. Boring logs prepared by AES for the final soil borings are presented in Enclosure C. Additionally, cross sections prepared by AES are presented in Enclosure D and include lithology, soil sampling results, and SVE well-screen intervals.

3.0 SYSTEM UPDATE AND RECENT REMEDIAL ACTION

As proposed in the AES *Revised Site Remediation Plan* (dated December 28, 2018), AES and Hilcorp purchased an SVE system from Geotech Environmental Equipment, Inc. (Geotech) in Denver, Colorado to remediate hydrocarbon impacted soil identified at the Site.

3.1 SVE SYSTEM INSTALLATION AND PILOT TESTING

A total of 21 SVE wells were installed in 15 of the completed borings advanced at the Site during delineation activities (including six nested SVE wells installed within the same boring). In total, 12 SVE wells were installed in “shallow” zones (indicated with an “S”, as in SVE-11S), with screen intervals placed at depths targeting soil impacts between the ground surface and 15 feet bgs. Seven SVE wells have been installed in “deep” zones (indicated with a “D”) with screen intervals placed at depths targeting soil impacts between 15 feet and 30 feet bgs (Figure 3). Additionally, two SVE wells (SVE-1 and SVE-3) have screen intervals that were installed in both zones at depths between 10 and 25 feet bgs. An “as-built”/SVE system layout is presented on Figure 4 showing locations of SVE wells, as well as piping and equipment placement at the Site. SVE well construction information is presented in Table 2, with SVE well construction diagrams included in Enclosure C.

Following successful delineation, Hilcorp and AES presented the design for an SVE system in the December 28, 2018 *Revised Site Remediation Plan* which contained the following components:

- Ametek Rotron model EN656M5XL aluminum fan regenerative blower capable of approximately 100 cubic feet per minute (cfm), 50 inches water column (IWC). The single phase blower is 230 volt/3 horsepower (HP) with thermal overload protection;
- Explosion-proof power disconnect on/off switch;
- Manual dilution air valve;
- Two vacuum gauges;
- Duotec model EI3A-1SL vacuum switch to protect the blower from overheating;
- Moisture separator capable of removing vapor from air flow;
- W.E. Anderson, Flotect model L-6 high liquid level switch system to shut down the blower when the moisture separator is full;
- Metal HazMat Station made with welded steel construction, side vents and added roof vent for passive ventilation;
- 66-gallon sump;
- Onan 20 ES generator with modified Ford, 4-cylinder model LRG-423A natural gas engine to supply electric power.

A schematic of the SVE system, including piping, manifold, knockout tank, vacuum blower, gauges, etc., is presented in Enclosure E. Enclosure E also includes a brochure for the SVE system provided by Geotech, the manual for the Onan generator powering the system, and a photographic log from SVE system installation prepared by AES.

3.1.1 SVE SYSTEM INSTALLATION

AES installed the SVE system with natural gas generator at the Site in June 2019 and startup of the system was attempted in August 2019. At startup, compounding issues with the Ametek Rotron SVE blower were encountered. Throughout winter and spring, multiple repairs, troubleshooting events, and replacement part installations were attempted. A new motor was eventually provided, but also failed. It had to be returned to the manufacturer under warranty. Repairs by the manufacturer required extensive timelines.

WSP began working at the Site to assist Hilcorp with installation of the repaired/new blower in January and started the SVE system in February 2021. Although the blower finally functioned properly, the natural gas generator had not been connected properly, requiring Hilcorp to lock-out-tag-out the system and make electrical repairs. Several parts were needed to correct electrical issues, and repairs were finalized in June 2021. With the generator operational and blower installed, the SVE system was successfully started. Overall, the system functioned and was applying vacuum to the SVE wells at the Site. However, after approximately 1 hour of operation, WSP noticed that the newly repaired blower was making a grinding noise in the fan blades. At that time, the system was shut down and the manufacturer was once again contacted to assess whether further repairs were required. The manufacturer indicated that the blower would have to be shipped back to the factory for assessment. Because of the continued issues, Hilcorp purchased a new regenerative blower and is currently awaiting its arrival. During the manufacture and shipping wait time (expected to be mid- to late-October), Hilcorp has rented a temporary SVE system from Process Technology Support, LLC (Process Tech). consisting of a 2.4 HP regenerative blower capable of producing 71 IWC. The rental SVE system was started on September 28, 2021.

3.2 SVE SYSTEM PILOT TEST

To evaluate the design of the SVE system, WSP conducted a pilot test to determine the flow rate and applied vacuum required to influence the subsurface and cause volatilization of the petroleum hydrocarbons entrained in the soil. Pilot test data was also used to determine specific site design radius-of-influence (ROI) and radius-of-effect (ROE).

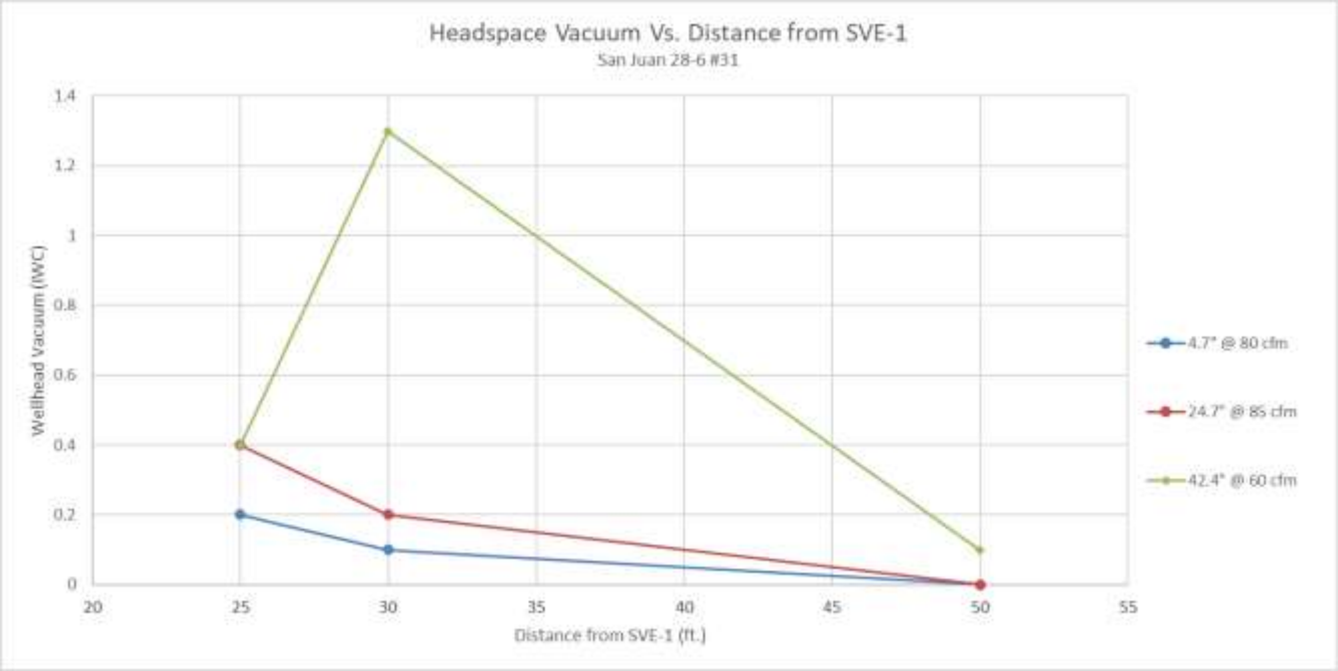
3.2.1 SVE PILOT TEST PROCEDURES

SVE-1, screened from 10 feet to 25 feet bgs in the weathered sandstone encountered onsite, was used as the extraction well during the pilot test. A vacuum truck was used to apply a negative pressure to the pilot testing well. The existing equipment manifold was used to control the vacuum being applied and to collect flow, vacuum, and photo-ionization detector (PID) measurements at the extraction well. Observation wells (SVE-3, SVE11D, and SVE13D), having same screened intervals of 10 feet to 25 feet bgs, 25 feet to 30 feet bgs, and 25 to 30 feet bgs, were used to collect SVE pilot test monitoring data. All wells are screened in the sandstone geology onsite. The SVE well locations are presented on Figure 4. The following list summarizes the procedure of the SVE pilot test:

- Measured the distances from the extraction well to each observation well.
- Collected background VOCs measurements using a PID at the SVE and observation wells.
- Connected the vacuum truck to the extraction well via a flexible hose and manifold. Slowly opened the valve and monitored the vacuum and flow.
- Applied a low vacuum at approximately 5 IWC. Then increasing the vacuum/flow rate until influence is observed
- Tested several vacuums in increasing magnitude based on site response observed. Tested at least three different vacuums for the pilot test.
- Collected at least two rounds of stabilized measurements per vacuum/flow rate. Measured the vacuum and the PID headspace at the observation wells. Recorded readings approximately 15 minutes apart.
- Collected air samples from SVE-1 in 1-Liter Tedlar bag using a high-vacuum air sampler for laboratory analysis.
- All test forms, graphs, and calculations are provided as Enclosure F. The air laboratory analytical reports are provided in Enclosure B and summarized in Table 3.

3.2.2 SVE TEST RESULTS AND CONCLUSIONS

Pilot test data indicates that SVE is a viable technology to remediate the Site. The vacuum response from the pilot test well SVE-1 and observations wells SVE-3, SVE-11D, and SVE-13D is shown below. Observation wells ranged in distance of 25 feet to 50 feet from the SVE test well (SVE-1). Vacuum influence was observed at all the three observation wells as shown on the figure below.



The above figure illustrates that vacuum influence was observed at a distance of 30 feet at 4.7 IWC and 24.7 IWC. When vacuum was increased to 44.2 IWC a vacuum response was observed as a distance of 50 feet. Based on the vacuum observations a ROI of at least 30 feet can be assumed.

Additional calculations were performed to determine the ROE. These calculations are included in Enclosure F. To determine a ROE the annual pore volume exchange was calculated assuming an ROI of 30 feet at two different flow rates of 60 standard cubic feet per minute (scfm) and 80 scfm. Both the pore volumes calculated indicated an annual pore volume exchange of 2,974 and 4,214, respectively. The pore volume exchange meets literature values of at least 500 pore volume exchanges annually. To further verify that the ROE corresponds with the ROI, the pore velocity was calculated at the ROI of 30 feet for both flow rates. The calculated pore velocity was 122 feet per day (ft/day) and 173 ft/day, which is above a recommended velocity of 3 ft/day. Current SVE research indicates that it is desirable to achieve pore-gas velocities throughout the treatment zone in excess of 0.001 cm/sec or ~3 ft/day (DiGiulo and Ravi 1999).

The blower on order, a 3 horsepower Rotron EN 656, is capable of producing 200 scfm at 5 IWC, which at the site elevation of 5,700 feet above mean sea level (AMSL) is 160 cfm. At the elevation corrected flow rate, with two wells operating at 80 scfm each, the system can achieve an ROE of 30 feet and will achieve the required pore volume exchange and velocity at 3,996 annual exchanges and 163 ft/day, respectively. Based on pilot test results, a relatively high flow rate is required per well to achieve this exchange rate. In order to achieve this flow rate, multiple wells can be operated at once, but not the full system. Throughout the pilot test period, the applied vacuum increased and the measured air flow removal rate decreased. This indicates the overlying clay soil may restrict movement of air from the surface. This will generally improve SVE performance, but cycling between the SVE wells may be beneficial. To be conservative, with five active extraction wells operating at 32 cfm per well(assuming the system can achieve an ROE of 30 feet), the calculated pore volume exchange and velocity are 1,586 annual exchanges and 65 ft/day, respectively.

Based on the pilot test data, WSP suggests a cycled approach to well operation to isolate five to six SVE wells at a time. Wells would then be cycled on a monthly or quarterly basis to target different impacted areas of the Site. Additionally, WSP recommends the re-testing of ROI and ROE when the new blower arrives to determine an optimal operational plan. With the new blower, WSP will test if a lower flow rate can achieve at least a 30 foot ROI and ROE over a longer time period. The ROI and ROE for the shallow and deep zones are presented on Figures 5 and 6, respectively. Pilot test information is presented in Enclosure F.

During the pilot test, WSP also collected an air sample from the pilot test manifold, on the influent side attached to the wellhead, via high vacuum air sampler. The air sample was collected in a 1-Liter Tedlar bag and submitted to Hall for analysis of volatile organic compounds (VOCs) by EPA Method 8260, fixed gas analysis of oxygen and carbon dioxide, and TVPH by EPA Method 8015. Prior to collection, the air from the influent side was field screened with a PID for organic vapor monitoring (OVM). The pilot test air sample results indicate a TVPH concentration 250,000 µg/L. Table 3 presents a summary of analytical data collected during the pilot test, with the full analytical laboratory report included in Enclosure B.

4.0 PLAN FOR COMPLIANCE AND UPDATED REMEDIATION WORK PLAN

The following information is provided to document a plan for compliance with the conditions of approval applied to the initial approved remediation work plan. With the startup of the rental system, the remediation start date for the Site SVE system is September 28, 2021. The new blower for the originally designed system is anticipated to be delivered in October of 2021. Hilcorp will perform installation immediately and anticipates minimal downtime. Hilcorp will also notify NMOCD when installation begins and when it is completed. The as-built SVE system layout is shown on Figure 4, and a schematic of the originally designed SVE system (including piping, manifold, knockout tank, vacuum blower, gauges, etc.) is presented in Enclosure E. Figures 5 and 6 present the estimated ROI and ROE for the shallow and deep zones at the Site based on the pilot testing performed, as described in Section 3.2 above.

4.1 AIR SAMPLING AND REPORTING

Upon startup of the rental system, an air sample was collected on September 28, 2021 from the inlet side of the SVE blower and analyzed for BTEX and TVPH. Analytical results are summarized in Table 3, with the analytical laboratory report included in Enclosure B. During the first three months of operation (October, November, and December 2021), air samples will be collected monthly and submitted for laboratory analysis, then reduced to quarterly for the first year of operation to monitor the effective reduction and remediation of soil impacts. Initial and annual air samples will be submitted for analysis of VOCs, TVPH, oxygen, and carbon dioxide. Additionally, regular quarterly samples will be analyzed for BTEX and TVPH. WSP will submit quarterly reports to the NMOCD presenting analytical results and effective runtime to document hydrocarbon mass recovery, system runtime, and air sample analysis. Based on runtime, airflow, and contaminant concentrations measured during each quarter, Table 4 will be updated to calculate total mass removal and emissions over time.

4.2 OPERATIONS AND MAINTENANCE PLAN

During the operation of the SVE system, regular operation and maintenance (O&M) visits will be conducted semi-monthly (twice per month) by WSP and/or Hilcorp personnel. During O&M visits, personnel will ensure that the generator and SVE system are operating within normal working temperature, pressure, and vacuum range. System runtime will be recorded and vapor concentrations will be measured from a sampling port located on the inlet side of the blower motor using a PID. Vacuum, temperature, and flow measurements indicated on the SVE system gauges will also be recorded. The generator will also be checked for normal operation and the following parameters will be recorded: oil pressure, coolant temperature, alternating current (AC) current output, output voltage, and runtime. An initial operational schedule for cycling operations between the wells will be established by evaluating the first quarter of system operational results. Changes to operating wells will be completed during O&M visits. Any deviations from normal operating parameters will be recorded and corrected by onsite personnel, if possible. In addition to routine O&M visits, the SVE system will be connected to Hilcorp's telemetry network. If the system experiences downtime, a Hilcorp environmental manager will be notified via email immediately. Immediate notification will allow for quick response to maximize system runtime. An O&M form to be used during semi-monthly visits is attached in Enclosure G. An *Operations and Maintenance Manual* is also attached in Enclosure G, to be used as guidance for performing O&M.

4.3 FUTURE RUN TIME CALCULATIONS AND PROPOSED REMEDIATION TIMELINE

The SVE system is powered by a dedicated natural gas generator able to run 24 hours per day. Based on 24 hours of available run time, to maintain a 90% runtime, the system will have to operate a minimum of 7,884 hours per year. Using the installed run-time meter on the SVE unit, WSP will report system run time quarterly. The 90% runtime accounts for downtime related to regular maintenance of the generator and SVE system. Downtime outside of Hilcorp's control (i.e., equipment failure) will be accounted for and the total available annual runtime hours will be adjusted. This information will be reported in the quarterly reports.

The US Army Corps of Engineers, *Soil Vapor Extraction and Bioventing – Engineer Manual*, dated June 3, 2002 states 'Unless target cleanup goals are low or initial concentrations are very high, 1,000 to 1,500 pore volumes would be a good estimate of the required air exchanges'. The pilot test results indicate a relatively high flow rate is required for system operation. This will be verified when the new system arrives. If pilot test results are confirmed, operation of the site will be divided into four separate areas, each to be operated independently on a monthly or quarterly rotation. Even with system rotation, the system will be able to achieve 1,500 pore volume exchanges over the entire site within 24 to 36 months. With a system currently operational at the site, and a run time of 90%, the estimated remediation end date is currently September 2024. Based on pore volume exchanges and recommended well rotation, WSP anticipates that system will operate at the Site for 24 to 36 months (6 to 9 months per area). WSP will also assess air concentrations of TVPH from the system and if these become asymptotic before the anticipated closure date, then sampling will commence per the schedule below. The SVE system will remain at the Site full time until remediation is complete.

Based on the above assumption, WSP anticipates that the system will operate at the Site for approximately 3 years to remediate impacted soils to below NMOCD Table 1 Closure Criteria. As additional air samples are collected over the next year, WSP will present an updated remediation timeline after four quarters of monitoring and sampling of the system. However, the following general timeline is proposed with day 0 being the day this document is submitted to the NMOCD. Additionally, quarterly reporting will be conducted to keep the NMOCD informed on major site advancements and SVE system operations.

- Months 1, 2, and 3 – Air sample collection monthly, perform system maintenance, and optimize system operation, as necessary;
- Month 3 through Year 1 – Semi-monthly O&M visits, quarterly air sample collection to monitor system efficacy, and quarterly system monitoring. Quarterly reporting;
- Years 1 to 3 – Assess system performance and collect quarterly air samples to assess system efficacy. Update remediation timeline based on quarterly sampling analytical results after one year of operation. At any point, if air concentrations of TVPH collected from the system become asymptotic and/or are below 1.0 milligrams per liter (mg/L), soil samples will be collected to determine if concentrations are below NMOCD Table 1 Closure Criteria. If soil concentrations are above Closure Criteria, the system will be adjusted to maximize performance and address areas with remaining soil impacts. Continue quarterly air sample collection, monitoring, and reporting as necessary;
- Year 3 – Soil confirmation sampling. Request for site closure if soil sample results are below NMOCD Table 1 Closure Criteria. If soil concentrations are above Closure Criteria, the system will be adjusted to maximize performance and address areas with remaining soil impacts. Continue quarterly air sample collection, monitoring, and reporting as necessary.

4.4 CONFIRMATION SOIL SAMPLING

When a significant decline in air sample concentrations is observed, indicating sufficient mass source removal (air concentrations of TVPH collected from the system become asymptotic and/or are below 1.0 milligrams per liter), confirmation soil samples will be collected via hollow-stem auger. Proposed boring/sampling locations are presented on Figure 7 and are generally in areas containing the highest TPH and benzene concentrations encountered during Site delineation. If the soil samples indicate hydrocarbon impacts have been reduced to below Table 1 Closure Criteria, WSP will present the confirmation laboratory analysis data in a report and request closure of the release. Should the results indicate that analytes in the soil exceed Table 1 Closure Criteria, WSP will continue to operate the system and make operational adjustments based on results of the sampling.

5.0 REFERENCES

DiGiulio, D., Ravi, V., & Brusseau, M., 1999. Evaluation of mass flux to and from ground water using a vertical flux model (VFLUX): application to the soil vacuum extraction closure problem. Ground water monitoring & remediation, 19, 96-104. doi: 10.1111/j.1745-6592.1999.tb00210.x

United States Army Corps of Engineers (USACE), 2002. Engineering and Design, Soil Vapor Extraction and Bioventing - Engineer Manual, Document EM 1110-1-4001. June 3.

WSP appreciates the opportunity to provide this report to you. If you have any questions or comments regarding this report, do not hesitate to contact Stuart Hyde at (970) 903-1607 or at stuart.hyde@wsp.com, or Lindsay Dosescu at (281)-794-9159 or at ldumas@hilcorp.com.

Kind regards,

Stuart Hyde, L.G.
Senior Geologist

Ashley L. Ager

Ashley Ager, M.S., P.G.
Managing Director, Geologist

Robert T Rebel

Robert Rebel, P.E.
Technical Principal, Lead Consultant

Enclosed:

Figure 1: Site Location Map
Figure 2: Site Map
Figure 3: Soil Boring and SVE Well Locations
Figure 4: SVE System Layout
Figure 5: SVE System – Shallow Zone Wells
Figure 6: SVE System – Deep Zone Wells
Figure 7: Proposed Confirmation Soil Sample Locations

Table 1: Soil Analytical Results
Table 2: SVE Well Construction Information
Table 3: Soil Vapor Extraction System Analytical Results
Table 4: Soil Vapor Extraction System Recovery and Emissions Summary

Enclosure A: Animas Environmental Services *Revised Site Remediation Plan*
Enclosure B: Analytical Laboratory Reports
Enclosure C: Boring Logs and SVE Well Construction Diagrams
Enclosure D: Animas Environmental Services Cross Sections
Enclosure E: SVE System Diagram, SVE System Brochure, and Generator Manual
Enclosure F: Pilot Test Data
Enclosure G: Operation and Maintenance Form and Manual

Form C-141

State of New Mexico
Oil Conservation Division

Incident ID	NVF1816655680
District RP	
Facility ID	
Application ID	

Site Assessment/Characterization

This information must be provided to the appropriate district office no later than 90 days after the release discovery date.

What is the shallowest depth to groundwater beneath the area affected by the release?	250 (ft bgs)
Did this release impact groundwater or surface water?	☐ Yes ☒ No
Are the lateral extents of the release within 300 feet of a continuously flowing watercourse or any other significant watercourse?	☐ Yes ☒ No
Are the lateral extents of the release within 200 feet of any lakebed, sinkhole, or playa lake (measured from the ordinary high-water mark)?	☐ Yes ☒ No
Are the lateral extents of the release within 300 feet of an occupied permanent residence, school, hospital, institution, or church?	☐ Yes ☒ No
Are the lateral extents of the release within 500 horizontal feet of a spring or a private domestic fresh water well used by less than five households for domestic or stock watering purposes?	☐ Yes ☒ No
Are the lateral extents of the release within 1000 feet of any other fresh water well or spring?	☐ Yes ☒ No
Are the lateral extents of the release within incorporated municipal boundaries or within a defined municipal fresh water well field?	☐ Yes ☒ No
Are the lateral extents of the release within 300 feet of a wetland?	☐ Yes ☒ No
Are the lateral extents of the release overlying a subsurface mine?	☐ Yes ☒ No
Are the lateral extents of the release overlying an unstable area such as karst geology?	☐ Yes ☒ No
Are the lateral extents of the release within a 100-year floodplain?	☐ Yes ☒ No
Did the release impact areas **not** on an exploration, development, production, or storage site?	☐ Yes ☒ No

Attach a comprehensive report (electronic submittals in .pdf format are preferred) demonstrating the lateral and vertical extents of soil contamination associated with the release have been determined. Refer to 19.15.29.11 NMAC for specifics.

Characterization Report Checklist: ***Each of the following items must be included in the report.***

☒ Scaled site map showing impacted area, surface features, subsurface features, delineation points, and monitoring wells.
☒ Field data
☒ Data table of soil contaminant concentration data
☒ Depth to water determination
☒ Determination of water sources and significant watercourses within ½-mile of the lateral extents of the release
☒ Boring or excavation logs
☒ Photographs including date and GIS information
☒ Topographic/Aerial maps
☒ Laboratory data including chain of custody

If the site characterization report does not include completed efforts at remediation of the release, the report must include a proposed remediation plan. That plan must include the estimated volume of material to be remediated, the proposed remediation technique, proposed sampling plan and methods, anticipated timelines for beginning and completing the remediation. The closure criteria for a release are contained in Table 1 of 19.15.29.12 NMAC, however, use of the table is modified by site- and release-specific parameters.

State of New Mexico
Oil Conservation Division

Incident ID	NVF1816655680
District RP	
Facility ID	
Application ID	

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to OCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the OCD does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to groundwater, surface water, human health or the environment. In addition, OCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.

Printed Name: ____Lindsay Dumas________________________ Title: ______Environmental Specialist_____________

Signature: ___Lindsay Dumas _________________________ Date: __10/5/2021___________

email: ____ldumas@hilcorp.com_____________________ Telephone: ____832-839-4585______________

OCD Only

Received by: ____ Date: _________________

State of New Mexico
Oil Conservation Division

Incident ID	NVF1816655680
District RP	
Facility ID	
Application ID	

Remediation Plan

Remediation Plan Checklist: ***Each of the following items must be included in the plan.***

- ☒ Detailed description of proposed remediation technique
- ☒ Scaled sitemap with GPS coordinates showing delineation points
- ☒ Estimated volume of material to be remediated
- ☒ Closure criteria is to Table 1 specifications subject to 19.15.29.12(C)(4) NMAC
- ☒ Proposed schedule for remediation (note if remediation plan timeline is more than 90 days OCD approval is required)

Deferral Requests Only: ***Each of the following items must be confirmed as part of any request for deferral of remediation.***

☐ Contamination must be in areas immediately under or around production equipment where remediation could cause a major facility deconstruction.

☐ Extents of contamination must be fully delineated.

☐ Contamination does not cause an imminent risk to human health, the environment, or groundwater.

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to OCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the OCD does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to groundwater, surface water, human health or the environment. In addition, OCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.

Printed Name: ____Lindsay Dumas________________________ Title: ______Environmental Specialist_____________

Signature: ___Lindsay Dumas _________________________ Date: __10/5/2021___________

email: ____ldumas@hilcorp.com_____________________ Telephone: ____832-839-4585______________

OCD Only

Received by: ____ Date: __________________

☐ Approved ☐ Approved with Attached Conditions of Approval ☐ Denied ☐ Deferral Approved

Signature: ____ Date: ________________________

FIGURES

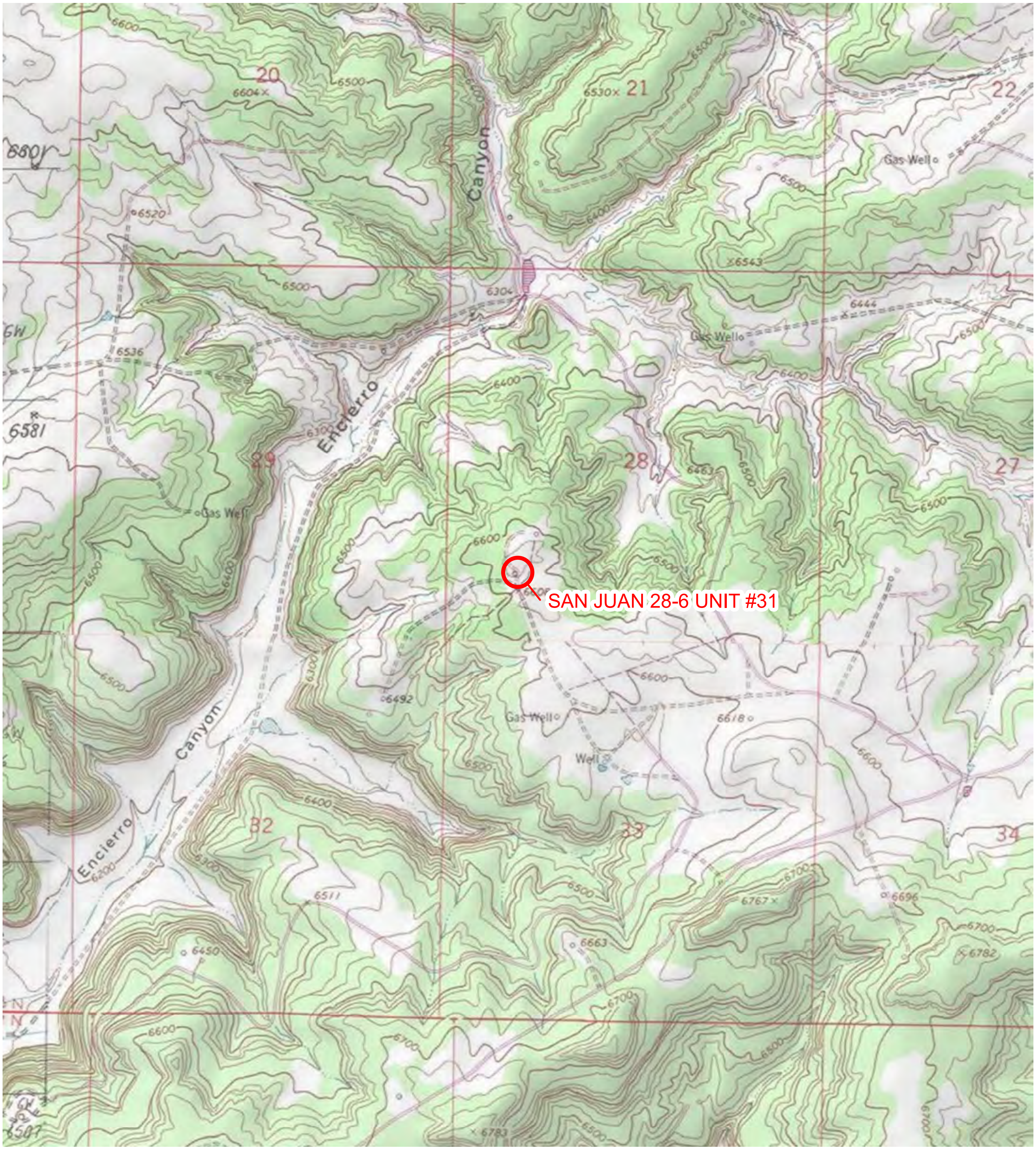


IMAGE COURTESY OF ESRI/USGS

LEGEND

○ SITE LOCATION

0 2,000 4,000

Feet

N

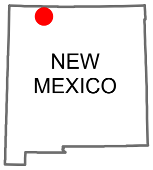


FIGURE 1
SITE LOCATION MAP
SAN JUAN 28-6 UNIT #31
SWSW SEC 28-T28N-R6W
RIO ARRIBA COUNTY, NEW MEXICO
HILCORP ENERGY COMPANY

wsp

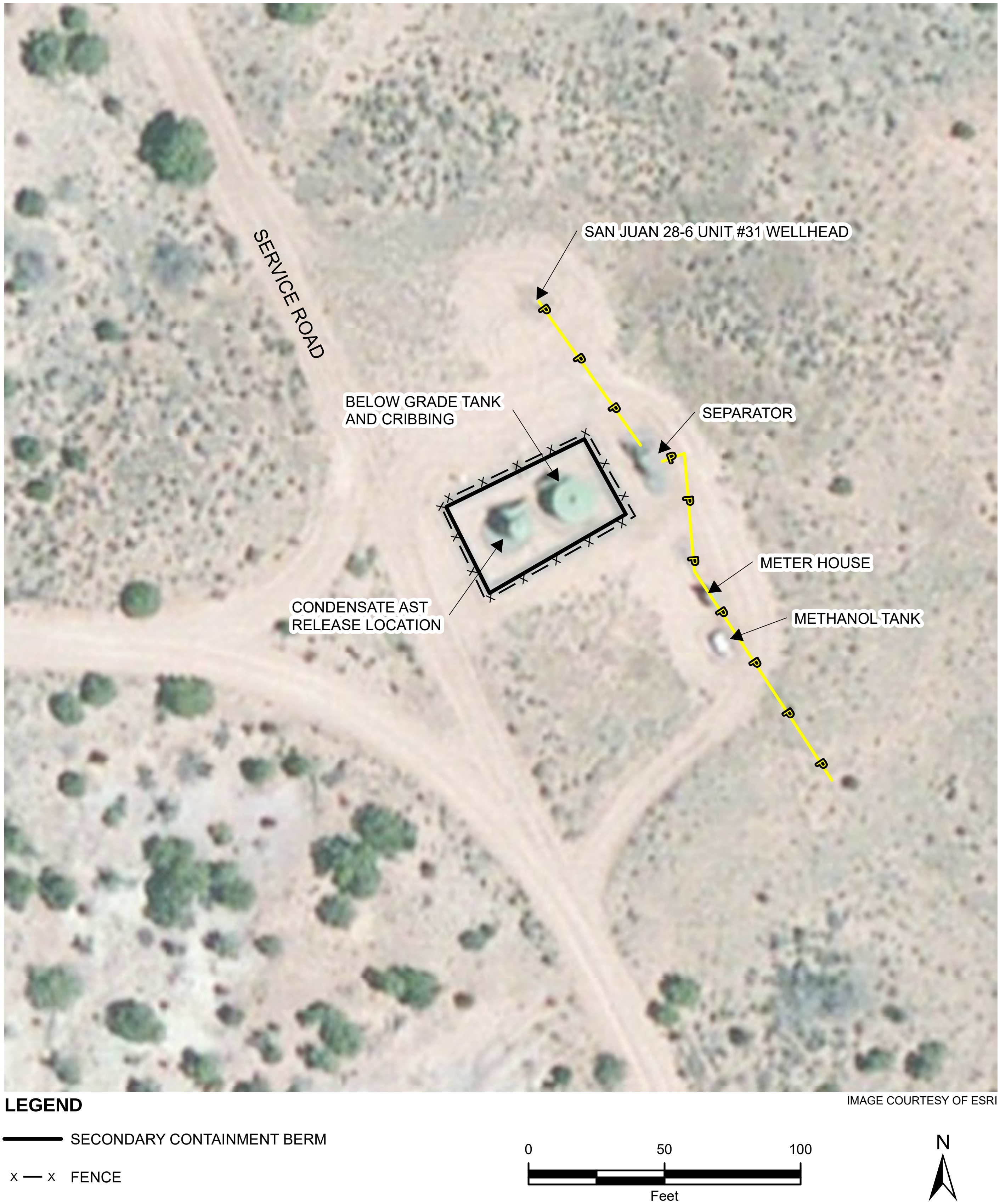


IMAGE COURTESY OF ESRI

AST: ABOVEGROUND STORAGE TANK

FIGURE 2
SITE MAP
SAN JUAN 28-6 UNIT #31
SWSW SEC 28-T28N-R6W
RIO ARRIBA COUNTY, NEW MEXICO
HILCORP ENERGY COMPANY

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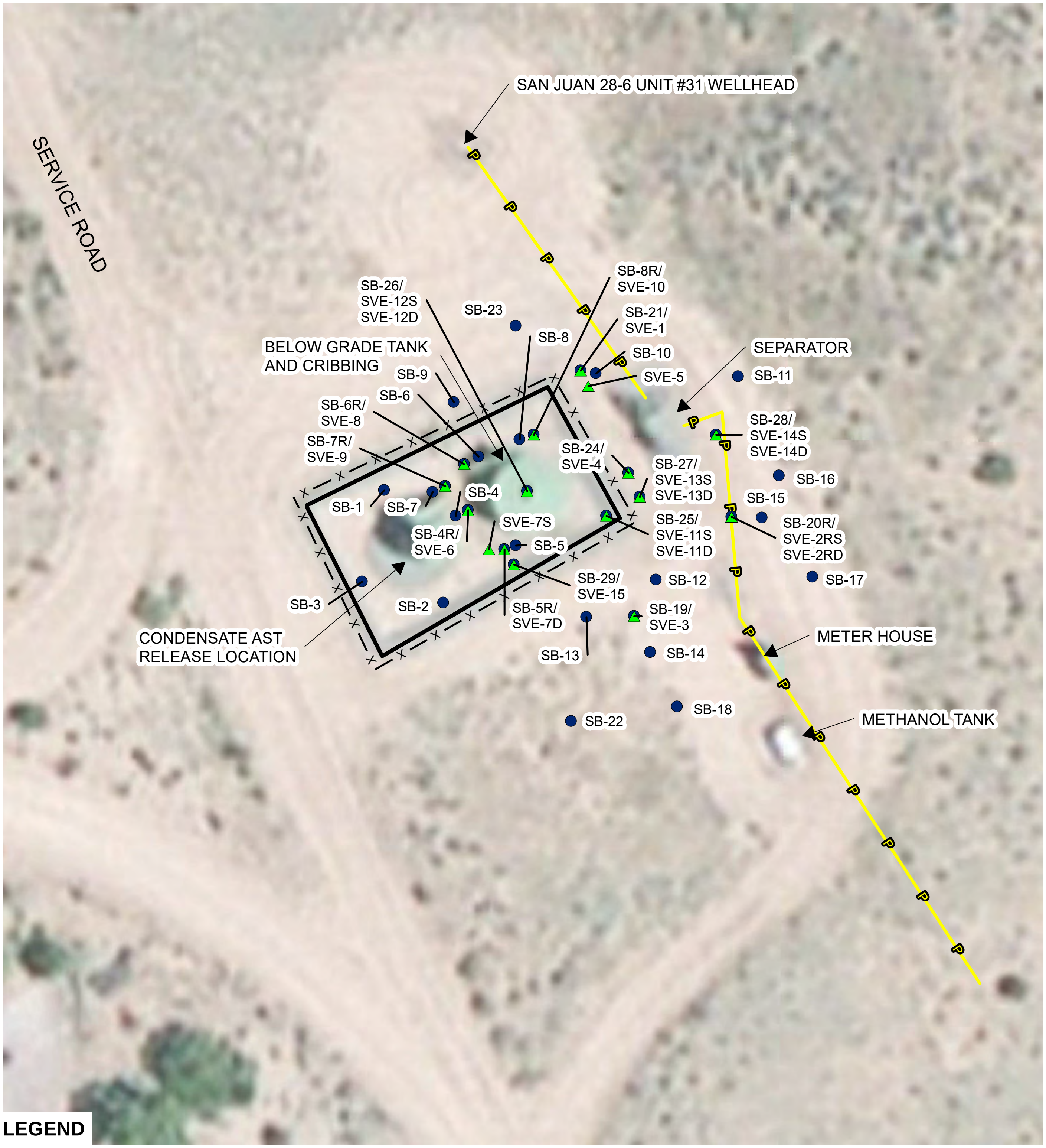

IMAGE COURTESY OF ESRI

LEGEND

● SOIL BORING

▲ SVE WELL

P APPROXIMATE PIPELINE

━ SECONDARY CONTAINMENT BERM

X — X FENCE

AST: ABOVEGROUND STORAGE TANK
SVE: SOIL VAPOR EXTRACTION

0 30 60
Feet

N

FIGURE 3
SOIL BORING AND SVE WELL LOCATIONS
SAN JUAN 28-6 UNIT #31
SWSW SEC 28-T28N-R6W
RIO ARRIBA COUNTY, NEW MEXICO
HILCORP ENERGY COMPANY

wsp

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IMAGE COURTESY OF ANIMAS ENVIRONMENTAL SERVICES

LEGEND

▲	SVE WELL
▨	GENERATOR AND SVE BLOWER

0 10 20

Feet

N

SVE: SOIL VAPOR EXTRACTION

FIGURE 4
SVE SYSTEM LAYOUT
SAN JUAN 28-6 UNIT #31
SWSW SEC 28-T28N-R6W
RIO ARRIBA COUNTY, NEW MEXICO
HILCORP ENERGY COMPANY

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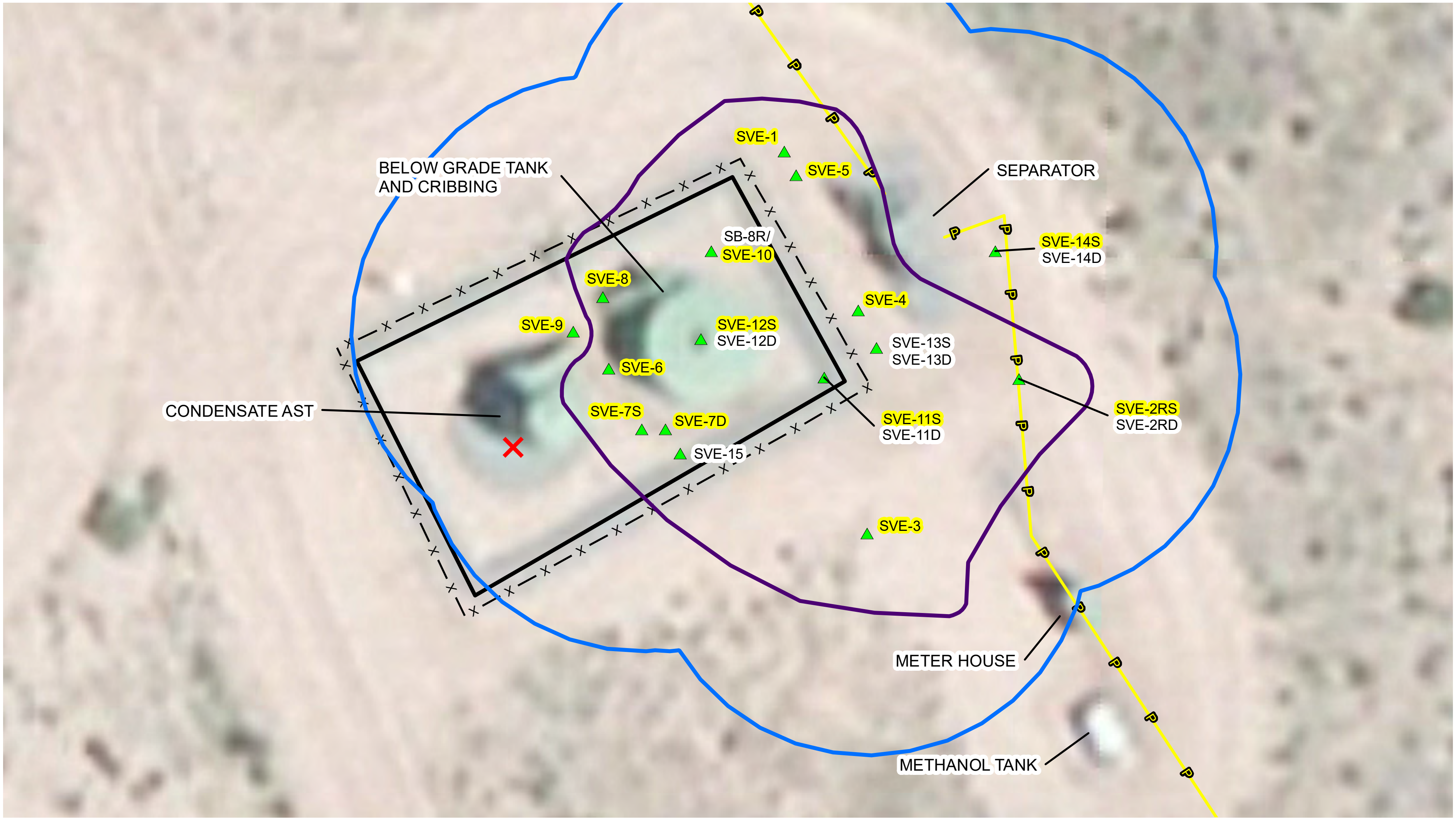

IMAGE COURTESY OF ESRI

LEGEND

❌	RELEASE LOCATION
▲	SVE WELL
P	APPROXIMATE LOCATION OF PIPELINE
—	SECONDARY CONTAINMENT BERM
X — X	FENCE
▭	INTERPRETED EXTENT OF SOIL IMPACTS BETWEEN 0 AND 15 FEET BGS
▭	RADIUS OF INFLUENCE AND EFFECT

YELLOW : SHALLOW ZONE SVE WELLS
AST: ABOVEGROUND STORAGE TANK
BGS: BELOW GROUND SURFACE
SVE: SOIL VAPOR EXTRACTION

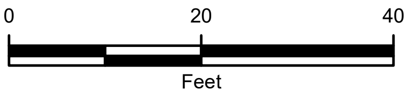

FIGURE 5
SVE SYSTEM - SHALLOW ZONE WELLS
SAN JUAN 28-6 UNIT #31
SWSW SEC 28-T28N-R6W
RIO ARRIBA COUNTY, NEW MEXICO
HILCORP ENERGY COMPANY

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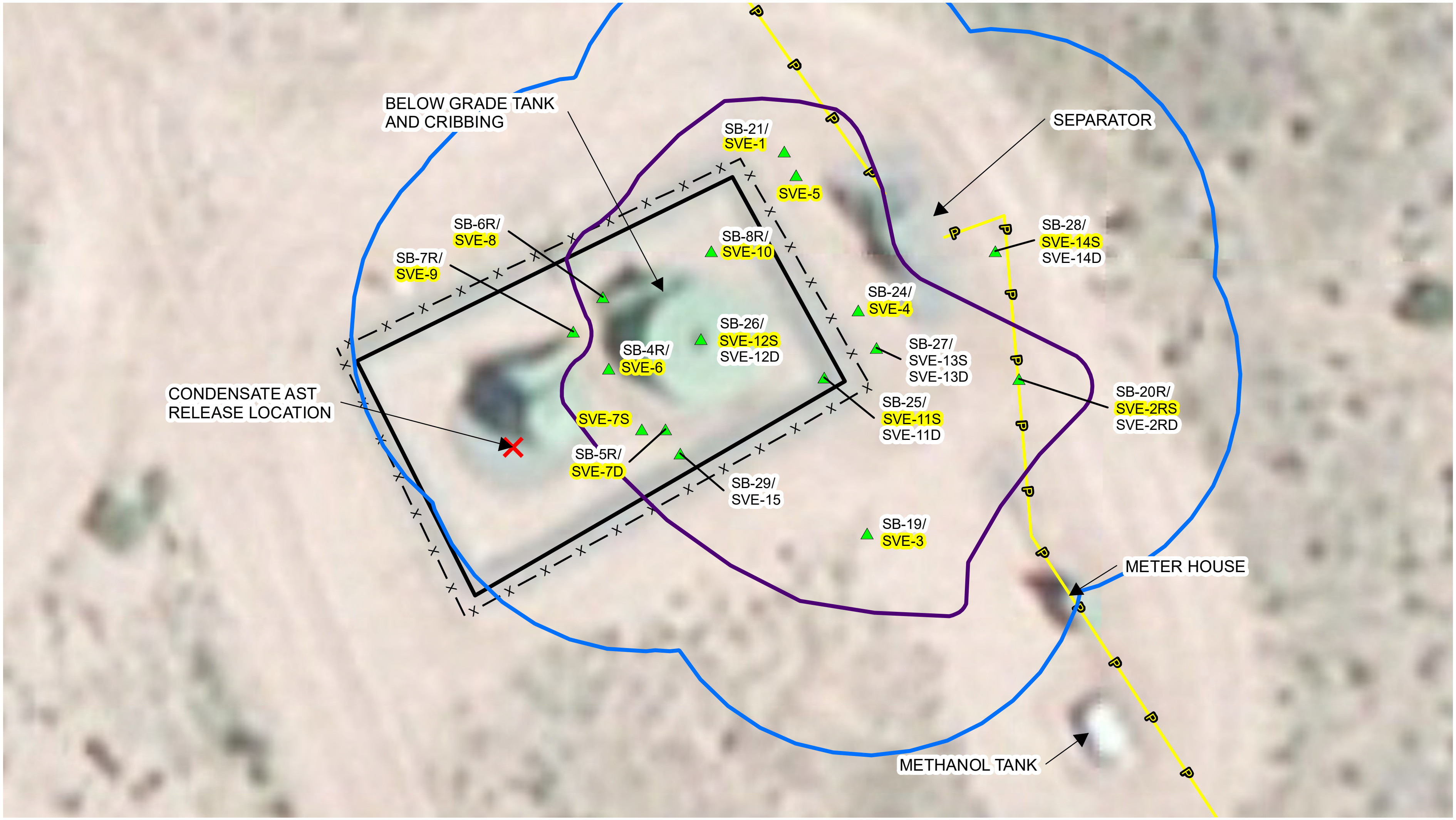

LEGEND

✗	RELEASE LOCATION
▲	SVE WELL
—P—	APPROXIMATE LOCATION OF PIPELINE
—	SECONDARY CONTAINMENT BERM
x — x	FENCE
▭	SOIL IMPACTS BETWEEN 0 AND 15 FEET BGS
▭	RADIUS OF INFLUENCE AND EFFECT

YELLOW : DEEP ZONE SVE WELLS
AST: ABOVEGROUND STORAGE TANK
BGS: BELOW GROUND SURFACE
SVE: SOIL VAPOR EXTRACTION

0 20 40
Feet

N

FIGURE 5
SVE SYSTEM - SHALLOW ZONE WELLS
SAN JUAN 28-6 UNIT #31
SWSW SEC 28-T28N-R6W
RIO ARRIBA COUNTY, NEW MEXICO
HILCORP ENERGY COMPANY

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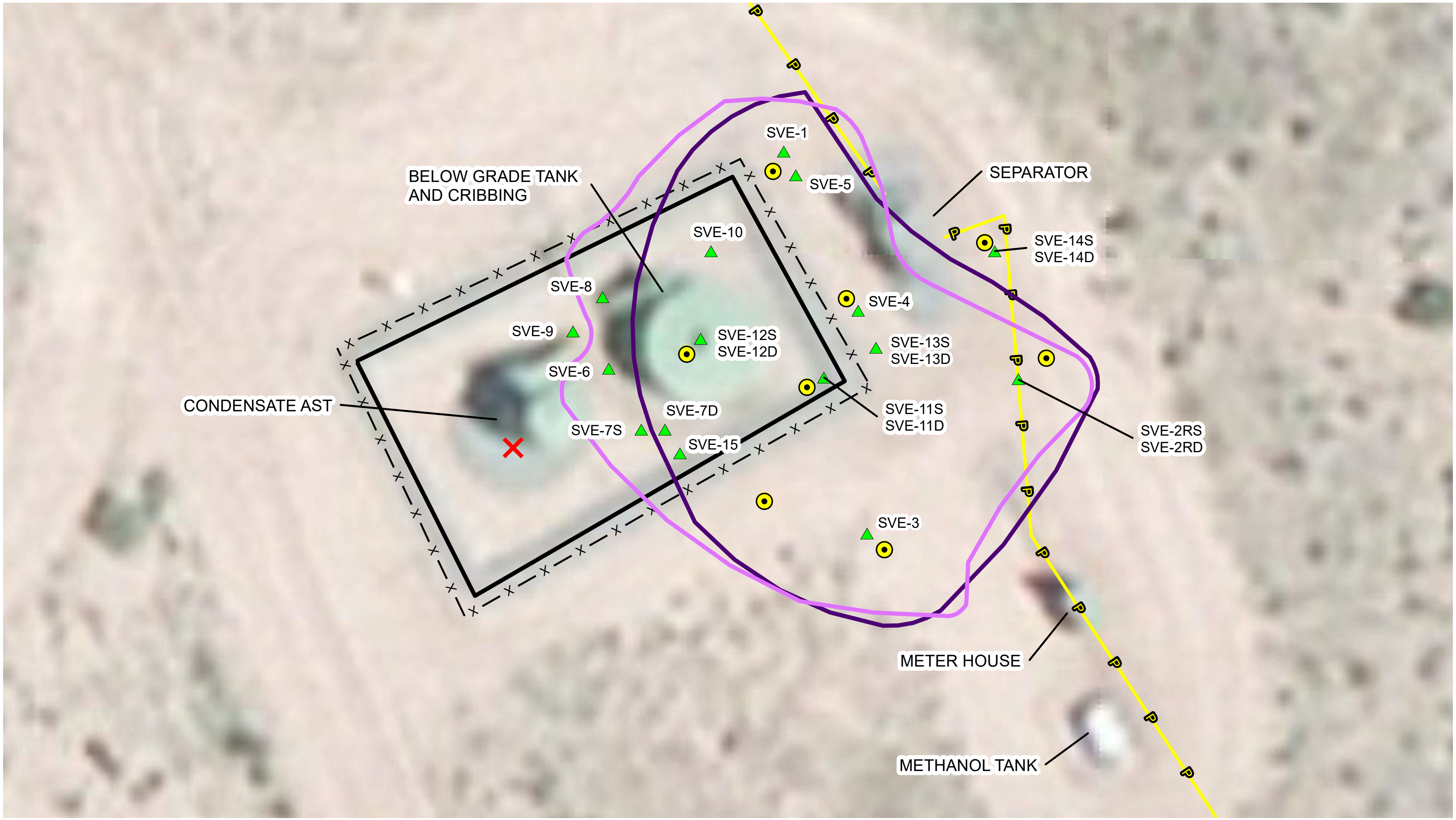

IMAGE COURTESY OF ESRI

LEGEND

- ✕ RELEASE LOCATION
- ● PROPOSED CONFIRMATION SOIL BORING
- ▲ SVE WELL
- P — APPROXIMATE LOCATION OF PIPELINE
- — SECONDARY CONTAINMENT BERM
- X — X FENCE
- ☐ INTERPRETED EXTENT OF SOIL IMPACTS BETWEEN 0 AND 15 FEET BGS
- ☐ INTERPRETED EXTENT OF SOIL IMPACTS BETWEEN 15 AND 30 FEET BGS

AST: ABOVEGROUND STORAGE TANK
BGS: BELOW GROUND SURFACE
SVE: SOIL VAPOR EXTRACTION

0 20 40
Feet

N

FIGURE 7
PROPOSED CONFIRMATION SOIL SAMPLE LOCATIONS
SAN JUAN 28-6 UNIT #31
SWSW SEC 28-T28N-R6W
RIO ARRIBA COUNTY, NEW MEXICO
HILCORP ENERGY COMPANY

wsp

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TABLES

TABLE 1
SOIL ANALYTICAL RESULTS - SOIL DELINEATION

SAN JUAN 28-6 UNIT #31
RIO ARRIBA COUNTY, NEW MEXICO
HILCORP ENERGY COMPANY

Sample ID	Date	Sample Depth (feet)	PID	Benzene (mg/kg)	Total BTEX (mg/kg)	TPH-GRO (mg/kg)	TPH-DRO (mg/kg)	TPH-MRO (mg/kg)	TPH GRO + DRO (mg/kg)	Total TPH (mg/kg)
NMOCD Table 1 Closure Criteria				**10**	**50**	NE	NE	NE	**1,000**	**2,500**
SB-1	5/31/2018	3	5.4	0.000844	0.00421	<0.112	<4.47	<4.47	<4.47	<4.47
		7	0.0	0.00145	0.0200	<0.114	<4.58	<4.58	<4.58	<4.58
SB-2	5/31/2018	7	0.0	0.000724	0.000724	<0.115	<4.59	<4.59	<4.59	<4.59
SB-3	5/31/2018	1	30.5	0.00115	0.00719	<0.114	<4.55	<4.55	<4.55	<4.55
		7.5	0.0	0.00795	0.0646	<0.116	<4.64	<4.64	<4.64	<4.64
SB-4	5/31/2018	8.5	2,508	2.26	**51.3**	626	60.9	<4.70	687	687
SB-4R/ SVE-6	12/5/2018	8	3,232	0.268	2.32	11.2	46.1		57.3	57.3
		12	3,044	5.45	**207**	3,940	251		**4,190**	**4,190**
SB-5	5/31/2018	11.75	2,745	3.02	**72.7**	1,050	132	<4.36	**1,180**	1,180
SB-5R/ SVE-7S/ SVE-7D	12/5/2018	8.5	4.4	0.00427	0.0166	0.180	<4.00		0.180	0.180
		13	2,799	**10.8**	**382**	6,020	423		**6,440**	**6,440**
SB-6	5/31/2018	11	2,440	5.84	**184**	2,120	331	<4.37	**2,450**	2,450
SB-6R/ SVE-8	12/5/2018	8	188.0	0.0151	0.480	23.8	9.93		33.7	33.7
		12	4,247	8.70	**382**	6,970	385		**7,360**	**7,360**
SB-7	6/27/2018	25	202.6	0.00101	0.0476	0.247	14.2	<4.00	14.4	14.4
SB-7R/ SVE-9	12/5/2018	8	1.3	<0.000500	<0.0075	<0.100	<4.00		<4.00	<4.00
		12	282.1	0.00593	0.0696	3.41	<4.00		3.41	3.41
SB-8	6/27/2018	15	2,196	0.417	0.495	362	82.6	<4.00	445	445
SB-8R/ SVE-10	12/5/2018	4	509.0	0.052	1.55	65.7	9.84		75.5	75.5
		12	2,969	6.09	**243**	4,250	277		**4,530**	**4,530**
SB-9	6/27/2018	10	629.4	<0.0005000	0.0141	0.700	<4.00	<4.00	0.700	0.700
SB-10	6/27/2018	10	1,938	**19.6**	**631**	10,800	1,330	6.67	**12,100**	**12,100**
		25	615.1	<0.500	**144**	1,860	15.7	<4.00	**1,880**	1,880
SB-11	6/27/2018	10	35.2	0.000664	0.0141	0.119	<4.00	<4.00	0.119	0.119
SB-12	6/27/2018	10	2,482	4.12	**233**	4,970	372	<4.00	**5,340**	**5,340**
		25	31.5	0.519	23.9	625	11.4	<4.00	636	636
SB-13	6/27/2018	10	2,157	1.65	**154**	3,270	813	<1.00	**4,080**	**4,080**
		25	360.9	<0.500	46.2	1,020	6.49	<4.00	**1,030**	1,030
SB-14	6/27/2018	10	2,173	5.82	**342**	5,810	932	<4.00	**6,740**	**6,740**
		25	51.0	<0.500	**77.4**	1,240	10.4	<4.00	**1,250**	1,250
SB-15	6/27/2018	10	1,550	4.05	**365**	6,130	877	<4.00	**7,010**	**7,010**
		25	205.6	<0.500	**109**	1,800	4.19	<4.00	**1,800**	1,800
SB-16	8/22/2018	12	60.8	<0.00500	0.00176	0.325	6.00	<4.00	6.33	6.33
		20	33.9	0.000586	0.000586	<0.100	10.0	<4.00	10.0	10.0
SB-17	8/22/2018	15	0.7	<0.000500	<0.0075000	<0.100	<4.00	<4.00	<4.00	<4.00
		25	NR	<0.000500	<0.0075000	<0.100	10.4	<4.00	10.4	10.4
SB-18	8/22/2018	15	14.0	<0.000500	0.00321	0.182	10.7	<4.00	10.8	10.8
		25	9.3	<0.000500	<0.007500	<0.100	5.47	<4.00	5.47	5.47
SB-19/ SVE-3	10/2/2018	30	43.7	0.00067	0.000670	<0.100	50.5	10.3	50.5	60.8
SB-20/ SVE-2	10/8/2018	30	135.0	0.000841	0.00805	0.278	32.5	5.95	32.8	38.7
SB-21/ SVE-1	10/8/2018	30	505.0	0.00102	0.0287	1.42	15.4	<4.00	16.8	16.8
SB-22	10/2/2018	10	0.0	0.000591	0.00111	<0.100	<4.00	<4.00	<4.00	<4.00
		25	25.9	0.000842	0.00257	<0.100	120	26.5	120	147
SB-23	8/22/2018	15	1,100	0.562	3.16	825	81.1	<4.00	906	906
		30	325.5	0.000883	0.0276	0.988	15.8	<4.00	16.8	16.8
SB-24/ SVE-4	12/5/2018	8	4,750	**30.3**	**1,230**	20,200	41.6		**20,200**	**20,200**
	12/5/2018	12	NR	**29.8**	**1,090**	15,500	1,710		**17,200**	**17,200**
SB-25/ SVE-11S/ SVE-11D	5/1/2019	10	2,703	**19.2**	**402**	6,970	324	<4.00	**7,290**	**7,290**
		20	3,127	2.43	**151**	2,550	293	<4.00	**2,840**	**2,840**
		30	3,326	<0.0125	0.238	8.75	28.4	<4.00	37.2	37.2
		35	212.2	0.000928	0.0308	1.49	<4.00	<4.00	1.49	1.49

TABLE 1
SOIL ANALYTICAL RESULTS - SOIL DELINEATION

SAN JUAN 28-6 UNIT #31
RIO ARRIBA COUNTY, NEW MEXICO
HILCORP ENERGY COMPANY

Sample ID	**Date**	**Sample Depth (feet)**	**PID**	**Benzene (mg/kg)**	**Total BTEX (mg/kg)**	**TPH-GRO (mg/kg)**	**TPH-DRO (mg/kg)**	**TPH-MRO (mg/kg)**	**TPH GRO + DRO (mg/kg)**	**Total TPH (mg/kg)**
NMOCD Table 1 Closure Criteria				**10**	**50**	NE	NE	NE	**1,000**	**2,500**
SB-26/ SVE-12S/ SVE-12D	4/30/2019	10	2,042	**79.1**	**1,580**	19,900	1,710	9.82	**21,600**	**21,600**
		20	2,585	**48.1**	**761**	8,750	421	4.08	**9,170**	**9,180**
		35	272.0	0.000725	0.0301	1.83	<4.00	<4.00	1.83	1.83
SB-27/ SVE-13S/ SVE-13D	5/1/2019	15	3,061	0.467	**58.2**	1,250	249	<4.00	**1,500**	1,500
		30	2,382	<0.0125	1.07	71.6	23.9	<4.00	95.5	95.5
SB-28/ SVE-14S/ SVE-14D	5/1/2019	10	683.9	0.905	17.7	591	61.1	<4.00	652	652
		30	25.6	0.000577	0.0100	0.437	<4.00	<4.00	0.437	0.437
SB-29/ SVE-15	5/1/2019	10	2,967	3.25	45.6	1,130	17.4	<4.00	**1,150**	1,150
		20	2,776	0.623	35.4	601	271	<4.00	872	872
		35	47.4	0.000700	0.00846	0.209	<4.00	<4.00	0.209	0.209

Notes:

< - indicates result is less than the stated laboratory reporting limit

BOLD - and highlighted indicates sample concentration exceeding NMOCD Table 1 Closure Criteria

bgs - below ground surface

BTEX - benzene, toluene, ehtylbenzene, and total xylenes

mg/kg -milligrams per kilogram

NMOCD - New Mexico Oil Conservation Division

PID - photoionization detector

ppm - parts per million

TPH-DRO - total petroleum hydrocarbons diesel range organics

TPH-GRO - total petroleum hydrocarbons gasoline range organics

TPH-MRO - total petroleum hydrocarbons motor oil range organics

TABLE 2
SVE WELL CONSTRUCTION INFORMATION

SAN JUAN 28-6 UNIT #31
RIO ARRIBA COUNTY, NEW MEXICO
HILCORP ENERGY COMPANY

Well Name	Treatment Zone	Impacted Depth (bgs)	SVE Well Screened Interval (bgs)	Total Depth (feet)
SVE-1	Shallow and Deep	7' - 26'	10' - 25'	30.0
SVE-2RS	Shallow	10' - 20'	No Information	30.0
SVE-2RD	Deep	10' - 20'	No Information	30.0
SVE-3	Shallow and Deep	8' - 18'	10' - 25'	30.0
SVE-4	Shallow	7' - 12'	7' - 12'	12.0
SVE-5	Shallow	7' - 12'+	7' - 12'	12.0
SVE-6	Shallow	7' - 12'+	7' - 12'	12.0
SVE-7S	Shallow	8' - 10'+	5' - 10'	10.0
SVE-7D	Shallow	8' - 13'+	8' - 13'	13.0
SVE-8	Shallow	11' - 12'+	7' - 12'	12.0
SVE-9	Shallow	11' - 12'+	7' - 12'	12.0
SVE-10	Shallow	4' - 12'+	7' - 12'	12.0
SVE-11S	Shallow	8' - 30'	10' - 15'	Nested Well
SVE-11D	Deep	8' - 30'	25' - 30'	35.0
SVE-12S	Shallow	8' - 30'	9' - 14'	Nested Well
SVE-12D	Deep	8' - 30'	20' - 25'	35.0
SVE-13S	Deep	8' - 28'	17' - 22'	Nested Well
SVE-13D	Deep	8' - 28'	25' - 30'	35.0
SVE-14S	Shallow	---	9' - 14'	Nested Well
SVE-14D	Deep	---	20' - 25'	30.0
SVE-15	Deep	8' - 18'	15' - 20'	35.0

NOTES:

bgs - below ground surface

' - feet

--- - no impacts above NMOCD Table 1 Closure Criteria in soil analytical results

+ - indicates that soil impacts are greater than the total depth of the borings/SVE well

TABLE 3
SOIL VAPOR EXTRACTION SYSTEM ANALYTICAL RESULTS

SAN JUAN 28-6 UNIT #31
RIO ARRIBA COUNTY, NEW MEXICO
HILCORP ENERGY COMPANY

Date	Event	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Xylenes (µg/L)	TVPH (µg/L)	PID (ppm)
9/20/2021	Pilot Test	720	1,600	15	320	250,000	1,287
9/28/2021	System Startup	240	720	27	350	53,000	736

Notes:

µg/L - micrograms per Liter
PID - photoionization detector
ppm - parts per million
TVPH - total volatile petroleum hydrocarbons

TABLE 4
SOIL VAPOR EXTRACTION SYSTEM RECOVERY & EMISSIONS SUMMARY

SAN JUAN 28-6 UNIT #31
RIO ARRIBA COUNTY, NEW MEXICO
HILCORP ENERGY COMPANY

Sample Information and Lab Analysis

Date	Total Flow (cf)	Delta Flow (cf)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Xylenes (µg/L)	TVPH (µg/L)	PID (ppm)
9/28/2021	17,280	17,280	240	720	27	350	53,000	736
		Average	240	720	27	350	53,000	736

Vapor Extraction Calculations

Date	Flow Rate (cfm)	Benzene (lb/hr)	Toluene (lb/hr)	Ethylbenzene (lb/hr)	Xylenes (lb/hr)	TVPH (lb/hr)
9/28/2021	60	0.1	0.2	0.0	0.1	11.9
Average	60					

Pounds Extracted Over Operating Time

Date	Total Operational Hours	Delta Hours	Benzene (lbs)	Toluene (lbs)	Ethylbenzene (lbs)	Xylenes (lbs)	TVPH (lbs)	TVPH (tons)
9/28/2021	5	5	0.3	0.8	0.0	0.4	57.1	0.0
		Total Extracted to Date	0	1	0	0	57	0

NOTES:

(1) - data extrapolated from PID measurements
(2) - blower not operational for sampling in May and June 2020
cf - cubic feet
cfm - cubic feet per minute
µg/l - micrograms per liter

lbs - pounds
lb/hr - pounds per hour
PID - photo-ionization detector
ppm - part per million
TVPH - total volatile petroleum hydrocarbons

ENCLOSURE A – ANIMAS ENVIRONMENTAL SERVICES *REVISED SITE REMEDIATION PLAN*

animas environmental services

December 28, 2018

Lindsay Dumas
Hilcorp Energy Company
9 Road 5793, Ste A
Farmington, New Mexico 87401
Electronic Mail: ldumas@hilcorp.com

RE: Revised Site Remediation Plan
San Juan 28-6 #31
API# 30-039-07290
Incident No. NVF 1816655680
SW¼ SW¼, Section 28, T28N, R6W
Rio Arriba County, New Mexico

Dear Ms. Dumas:

Animas Environmental Services, LLC (AES) has prepared this Revised Remediation Plan for a release which occurred May 25, 2018, at the Hilcorp Energy Company (Hilcorp) San Juan 28-6 #31, located in Rio Arriba County, New Mexico. The release consisted of approximately 11.8 barrels (bbls) of condensate and 2.1 bbls of produced water and was the result of corrosion on the bottom of the production tank.

On May 31, June 27, August 22, October 2, and October 8, 2018, AES completed a release assessment and site delineation at the Hilcorp San Juan 28-6 #31. Petroleum hydrocarbon impacted soils were found to be present near the condensate tank, which was the source of the release, but also extended east and south of the containment berm. While concentrations near the condensate tank reflect the recent release, petroleum hydrocarbon concentrations to the east and south appear to be associated with historic contamination at the site. Remediation of petroleum contaminated soils via soil vapor extraction is proposed for the site. No groundwater was encountered during any of the site work; the maximum vertical extent of soil impacts is approximately about 25 ft bgs (in sandstone) in an area east and south of the secondary containment berm.

A Remediation Plan dated November 6, 2018, was submitted to New Mexico Oil Conservation Division (NMOCD) for review, and a project meeting was held with NMOCD, Hilcorp and AES on November 14, 2018, to discuss site conditions and the remedial strategy. Based on those discussions, Hilcorp submitted an

604 W. Piñon St.
Farmington, NM 87401
505-564-2281

1911 Main, Ste 206
Durango, CO 81301
970-403-3084

www.animasenvironmental.com

Additional Site Delineation Workplan to NMOCD on November 29, 2018. AES completed additional site work on December 5, 2018, and the results of the field work have been incorporated into this Revised Remediation Plan.

1.0 Site Information

1.1 Location

Site Name – San Juan 28-6 #31
API# – 30-039-07290
Legal Description – SW¼ SW¼, Section 28, T28N, R6W, Rio Arriba County, New Mexico
Release Latitude/Longitude – N36.62757 and W107.47815, respectively
Land Jurisdiction – Bureau of Land Management (BLM)
Figure 1. Topographic Site Location Map
Figure 2. Aerial Site Location Map, May 2018

1.2 NMOCD Ranking

The subject release occurred in May 2018; however, Hilcorp is complying with NMOCD's request to conform to release regulations that were adopted on August 14, 2018. In accordance with NMAC 19.15.29.12 Table I (August 2018), release closure criteria for this location are based on the minimum depth to groundwater within the horizontal extent of the release area and proximity to sensitive receptors:

- **Depth to Groundwater:** A cathodic report dated May 1991 reported groundwater at 250 ft below ground surface (bgs).
- **Sensitive Receptor Determination:** The site does not occur within any of the areas listed within NMAC 19.15.29.12C.4, where releases must be treated as if they occur less than 50 feet bgs to groundwater.

New Action levels are:

- 10 mg/kg benzene and 50 mg/kg total benzene, toluene, ethylbenzene, and xylene (BTEX);
- 1,000 mg/kg total petroleum hydrocarbons (TPH) as gasoline range organics (GRO) and diesel range organics (DRO);
- 2,500 mg/kg TPH as GRO/DRO and motor oil range organics (MRO); and
- 20,000 mg/kg chloride.

2.0 Site Assessment and Delineation

AES was initially contacted by Lindsay Dumas of Hilcorp on May 29, 2018. Subsequent field work is summarized as follows:

- May 31 and June 27, 2018 - AES completed the initial release assessment and delineation field work via hand auger.
- August 22, 2018 - AES and GeoMat, Inc. (GeoMat) completed four soil borings (SB-16, SB-17, SB-18, and SB-23).
- October 2, 2018 – AES and GeoMat completed two borings (SB-19 and SB-22).
- October 8, 2018 – AES and GeoMat completed two borings (SB-20 and SB-21).
- December 5, 2018 – AES and EarthWorx installed seven additional borings (SB-4R through SB-8R, SB-24/SVE-4, and SVE-5).

Soil borings installed by GeoMat were completed with a hollow stem auger drilling rig and were terminated between 20 and 30 ft; however, note that dense weathered sandstone was encountered between about 12 to 15 feet below grade, with hard, dense sandstone below. Borings were advanced into sandstone to define the vertical extent of contaminant impact, and three soil vapor extraction wells were installed, including SVE-1 (SB-21), SVE-2 (SB-20), and SVE-3 (SB-19).

Borings installed by EarthWorx in December 2018 were advanced with a track-mounted direct push GeoProbe rig to the top of dense weathered sandstone at about 12 feet below grade, where the direct push rods encountered refusal. Five SVE wells (SB-4R through SB-8R) were installed within the earthen berm containment area, each completed with 5-feet of screen, between 7 and 12 feet below grade. Two additional SVE wells were installed between the berm and the separator, SVE-4 and SVE-5.

Groundwater was not encountered during any site assessment or delineation field work. Soil boring locations are presented on Figure 3.

2.1 Subsurface Lithology

Geologic subsurface lithology encountered included poorly graded fine-grained sand from 0 to approximately 7 ft bgs, transitioning to a sand and clayey sand between 7 and 12 ft bgs, weathered sandstone from about 12 to 15 bgs, and dense sandstone extending to the terminal depths of the borings, between 23 and 35 ft bgs. Geological cross sections of the site are included as Figures 4A and 4B.

2.2 Soil Sampling

For field work through October 2018, 50 soil samples from 23 borings (SB-1 through SB-23) were collected during the assessment and delineation field work. All soil samples were field screened for volatile organic compounds (VOCs), and selected samples were also analyzed for TPH. A total of 35 samples were also submitted for confirmation laboratory analysis.

All soil samples collected during the additional delineation work in December 2018 were field screened for VOCs, and 12 soil samples were submitted for laboratory analysis.

2.2.1 Field Screening

Volatile Organic Compounds

Field screening for VOC vapors was conducted with a photo-ionization detector (PID) organic vapor meter (OVM). Before beginning field screening, the PID-OVM was first calibrated with 100 parts per million (ppm) isobutylene gas in accordance with U.S. Environmental Protection Agency (USEPA) Method 3815.

Total Petroleum Hydrocarbons

Select soil samples were also analyzed in the field for TPH per USEPA Method 418.1 using a Buck Scientific Model HC-404 Total Hydrocarbon Analyzer Infrared Spectrometer (Buck). A 3-point calibration was completed prior to conducting soil analyses. Field analytical protocol followed AES' *Standard Operating Procedure: Field Analysis Total Petroleum Hydrocarbons per USEPA Method 418.1*.

2.2.2 Soil Samples for Laboratory Analyses

The samples collected for laboratory analysis were placed into new, clean, laboratory-supplied containers, which were then labeled, placed on ice, and logged onto sample chain of custody records. The samples were maintained on ice until delivery to the analytical laboratory, Pace Analytical Laboratories (Pace).

Laboratory Analyses

The samples were laboratory analyzed for:

- Benzene, toluene, ethylbenzene, and xylene (BTEX) per USEPA Method 8021B; and
- TPH as gasoline range organics (GRO), diesel range organics (DRO), and motor oil range organics (MRO) per USEPA Method 8015M/D.

2.3 Field Screening and Laboratory Analytical Results

2.3.1 Field Screening Results

May and June 2018 release assessment field screening followed standards found in NMOCD *Guidelines for Remediation of Leaks, Spills, and Releases* (August 1993). Field screening results above the NMOCD action level of 100 ppm VOCs and 5,000 mg/kg TPH were reported in SB-4 through SB-10, SB-12 through SB-15, SB-19 through SB-21, and SB-23. The highest VOC concentration was reported in SB-7 at 20 ft with 31,824 ppm, and the highest TPH concentration was reported in SB-12 at 10 ft with 2,000 mg/kg.

2.3.2 Laboratory Analytical Results

Laboratory analyses were used to confirm field screening results.

- Benzene concentrations were reported below the NMOCD action levels of 10 mg/kg in all samples except SB-10 at 10 ft (19.6 mg/kg); SB-5R at 13 ft (10.8 mg/kg); and SB-24 at 8 ft (30.3 mg/kg) and 12 ft (29.8 mg/kg).

- Total BTEX concentrations exceeded the NMOCD action level of 50 mg/kg in SB-4/4R through SB-6/6R, SB-8R, SB-10, SB-12 through SB-15, with the highest BTEX concentration reported in SB-24 at 8 ft (1226 mg/kg).

- TPH concentrations as GRO/DRO were reported above the NMOCD action level of 1,000 mg/kg in SB-4R, SB-5/5R, SB-6/6R, SB-8R, SB-10, SB-12 through SB-15 and SB-24, with the highest concentration reported in SB-24 at 8 ft bgs with 20,242 mg/kg.

- TPH concentrations as GRO/DRO/MRO were reported above the NMOCD action level of 2,500 mg/kg in SB-4R, SB-5R, SB-6R, SB-8R, SB-10 and SB-12 through SB-15, with the highest concentration reported in SB-10 at 10 ft bgs with 20,242 mg/kg.

Field screening results are summarized on the attached AES Field Screening Reports. Laboratory analytical results are included on Figures 3, 4A and 4B, and laboratory analytical reports are attached.

2.4 Vertical and Lateral Extent of Petroleum Hydrocarbon Impacts

The lateral extents of petroleum hydrocarbon impacts (including historic contamination) extend from the condensate tank to the BGT area as well as outside the berm to the east, including between the separator and meter house. Note that contaminant concentrations outside the berm had higher concentrations of DRO at deeper intervals, indicating heavier and possibly older, historic impacts from petroleum hydrocarbons.

The estimated lateral extent of subsurface petroleum hydrocarbon impacts is included on Figure 3.

Vertically, petroleum hydrocarbon contaminant concentrations in excess of the NMOCD action levels were found at about 10 ft bgs within the clayey sand layer but appear to extend to approximately 25 ft bgs (weathered sandstone and dense sandstone) in the area of SB-10, SB-14, and SB-15. The presence of higher BTEX concentrations near the condensate tank (release location) are indicative of impacts from the recent release.

The additional borings advanced inside the berm in December 2018 allowed for collection and laboratory confirmation of the highest VOC concentrations measured during May and June 2018 field work (in the interval just above weathered sandstone at about 10 to 12 ft). However, the use of the direct push GeoProbe rig did not allow for extending boring depths beyond 12 feet, so vertical extent could not be confirmed in these borings (SB-4R through SB-8R). Note that borings SB-7 and SB-8 (installed in June 2018 and which are 25 ft apart), were advanced to between 25 and 35 ft below grade, and vertical extent was confirmed via laboratory analyses in these borings.

No groundwater was encountered during any of the site work, and based on available information, depth to groundwater is anticipated to be at least 100 ft bgs. The estimated vertical extents of petroleum hydrocarbon impacts in soil are found on Figures 4A and 4B.

3.0 Remediation Plan

In October 2018, AES installed three soil vapor extraction (SVE) wells, SVE-1, SVE-2, and SVE-3, as a preliminary mitigation measure. In December 2018, five additional SVE wells were installed inside the secondary containment berm (SB-4R through SB-8R), and two additional SVE wells, SVE-4 and SVE-5, were installed between the berm and the separator. The SVE wells will serve to volatilize and remove contaminants through desorption of contaminants from the surface of soil particles, and through biodegradation of contaminants by moving air through subsurface soil pore spaces.

3.1 Soil Vapor Extraction Well Installation, October 2018

On October 2 and 8, 2018, a CME-75 drill rig was utilized to install three 2-inch diameter PVC SVE wells to a depth of approximately 25 ft bgs in borings SB-19, SB-20 and SB-21. The SVE wells were screened between 10 ft and 25 ft bgs, and the annular space was filled with 10-20 silica sand from the base of the SVE well up to a depth of 8 ft bgs (2 ft above the top of the screened interval). A hydrated bentonite seal was placed from 8 ft bgs to surface grade. Each SVE was completed with a 3-ft stick up completion with a protective metal shroud.

On December 5, 2018, seven additional SVE wells were installed with a direct push GeoProbe, and each consisted of 2-inch diameter PVC wells screened between 7 and 12 ft bgs (terminal depths of borings, with refusal at top of dense sandstone). SVE well locations are presented on Figure 3, and soil boring logs with SVE well construction details are included as an attachment.

3.2 Soil Vapor Extraction System

Soil vapor extraction (SVE) is proposed to be conducted with an integrated unit which includes the following:

- Ametek Rotron model EN656M5XL (*or equivalent*), rated for Hazardous Location Class I, Group D, Class II Group F&G; aluminum fan regenerative blower capable of approx 100 CFM (+/- 10%), -50 inches W.C.; blower motor will be XP, 230 volt, 3HP, single phase with thermal overload protection;
- Explosion proof power disconnect on/off switch (NEMA 7 Enclosure);
- Manual dilution air valve;
- Two vacuum gauges;
- Duotec model H3A-1SL vacuum switch to protect the blower from overheating (by detecting a blockage in the line); Rated for Hazardous locations, Class I Group B,C & D and Class II Group E,F& G;
- Moisture separator capable of removing vapor from an air flow of up to 350 SCFM with the following features:
  - Integral Mist Eliminator/Particulate Filter
  - 37 gallon capacity, steel canister with epoxy coated interior.
  - High efficiency cyclonic separation.
  - Inherent safe collection design.
  - Outfitted with drain for convenient removal of fluids.
  - W.E. Anderson, Flotect model L-6, high liquid level switch system (will shut down the blower to protect the blower from flooding when the moisture separator is full); rated for Hazardous location, Class I Group A, B, C & D, Class II Group E, F & G.
- Mounted and wired in a metal HazMat Station, with lockable, hinged lid & doors; welded steel construction; 66 gallon sump meets USEPA & NUFC requirements; side vents and added roof vent for passive ventilation; coated with a durable, corrosion and weather resistant finish; four way “forklift-able”.

A natural gas generator will be utilized to supply electric power to the SVE System. The anticipated generator will consist of:

- Generac LP/NG generator (*or equivalent*), 3 HP, single phase, 120VAC/240VAC, 3600 RPM, 8kW, 8 NG kVA.

Vapor emission control will be provided by two granulated activated carbon (GAC) drums, connected in series.

3.4 SVE Monitoring and Sampling

AES proposes the following SVE monitoring and sampling plan:

1. **Baseline Soil Vapor Sampling**: AES will conduct initial SVE vapor sampling of each well (SVE-1 through SVE-5 and SB-4R through SB-8R) for field measurement of VOCs using and PID-OVM and for laboratory analysis of BTEX and TPH-GRO. Results will be utilized as baseline readings and help determine remedial progress during SVE operations. Analytical parameters are detailed below.

2. **Vapor Sampling during SVE Operations**: After the initial sampling, AES will measure VOCs from each SVE well twice per month by field screening for VOC concentrations (ppm) using a PID-OVM. VOC readings and total air flow will be also be measured and air samples collected (for total VOCs) pre- and post-GAC.

   Samples for laboratory analysis will be collected with Tedlar bags and a vacuum pump and submitted to either Pace Analytical or to Hall Environmental Analysis Laboratory (Hall), Albuquerque, New Mexico, for analysis. Samples will be laboratory analyzed for the following:

Vapor Sampling Laboratory Parameters		
Laboratory Analytical Parameters and Methods	***Laboratory Detection Limit***	***Units***
BTEX - USEPA METHOD 8021B		
Benzene, Toluene, Ethylbenzene &	0.10	µg/L
Xylenes, Total	0.30	µg/L
TPH - Gasoline Range Organics (GRO) – USEPA METHOD 8015B	5	µg/L

3.5 Site Re-Evaluation

After approximately seven months of SVE operations, AES and Hilcorp will evaluate site remedial progress in consultation with NMOCD. If supplemental or alternative remedial measures are warranted, AES will prepare and submit a Supplemental Remedial Plan to NMOCD for review and approval.

4.0 Deliverables

Reports detailing remedial activities will be submitted on a quarterly basis to NMOCD and will include the following information:

- SVE system installation and operations records;
- Updated site maps and figures;
- Tabulated field screening and laboratory analytical results for soil and vapors;
- Laboratory analytical reports; and
- Site photographs.

5.0 Proposed Schedule

SVE is proposed as the remedial method for the site; however, in order to mitigate the potential for freezing lines, it is proposed to run the system during non-freezing months (i.e. April through October). The following schedule is anticipated upon approval of the Revised Remediation Plan:

Month:	***Task:***
February and March 2019	Order and obtain SVE Unit, NG generator, and GAC drums;
April 2019	Installation of SVE System; Completion of baseline vapor sampling;
May 2019	Monthly O&M and vapor sampling;
June 2019	Monthly O&M and vapor sampling;
July 2019	Submit Quarterly Remedial Progress Report; Monthly O&M and vapor sampling;
August 2019	Monthly O&M and vapor sampling;

September 2019	Monthly O&M and vapor sampling;
October 2019	Submit Quarterly Remedial Progress Report, with Site Re-Evaluation and possible Supplemental Remediation Plan; and Monthly O&M and vapor sampling.

If you have any questions about site conditions or this Revised Remediation Plan, please do not hesitate to contact me at (505) 564-2281.

Sincerely,

Elizabeth V McNally

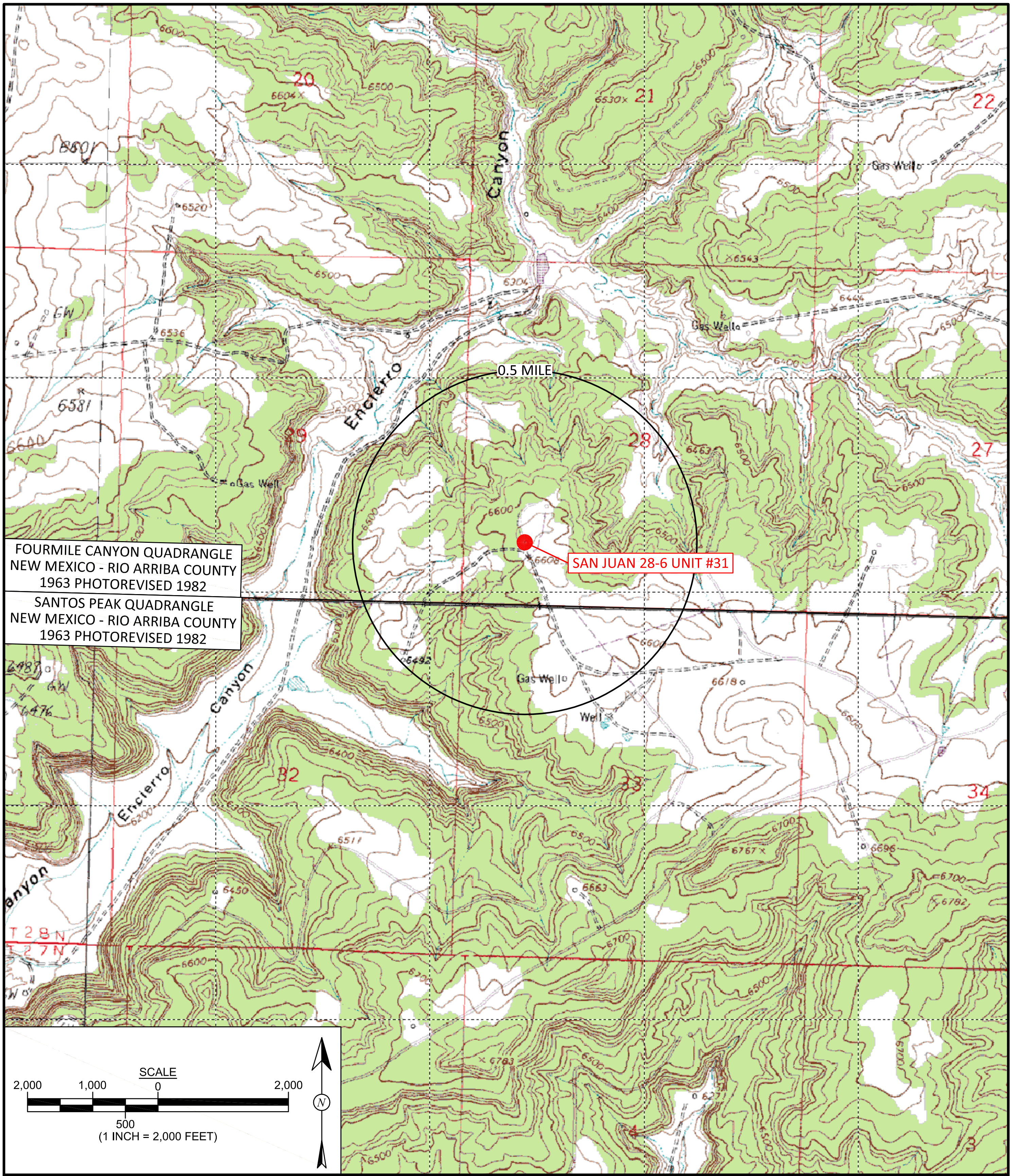
Elizabeth McNally, P.E.

Attachments:

Figure 1.	Topographic Site Location Map
Figure 2.	Aerial Site Location Map, May 2018
Figure 3.	Release Assessment and Site Delineation Sample Locations and Results—May, June, August, October and December 2018
Figure 4A.	Geological Cross Section, A to A’
Figure 4B.	Geological Cross Section, B to B’

AES Field Screening Reports 053118 and 062718
Field Notes and Soil Boring Logs, August 2018
Boring Logs with SVE Well Construction Schematics (SVE-1 - SVE-3), October 2018
Field Notes and Soil Boring Logs, December 2018
Pace Analytical Reports L998202, L1006375, L1008712, L1020740, L1033649, L1040751
SVE System Specifications

C:\Users\emcnally\Dropbox (Animas Environmental)\0000 aes server client projects dropbox\2018 Client Projects\Hilcorp\East Area\SJ 28-6 31\Reports and Workplans\San Juan 28-6 #31 Revised Remediation Plan 122818.docx



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APPROVED BY: E. McNally	**DATE APPROVED:** December 14, 2018

FIGURE 1

TOPOGRAPHIC SITE LOCATION MAP
HILCORP ENERGY
SAN JUAN 28-6 UNIT #31
API:30-039-07290
INCIDENT NO. NVF 1816655680
SW¼ SW¼, SECTION 28, T28N, R6W
RIO ARRIBA COUNTY, NEW MEXICO
N36.62780, W107.47811

AERIAL SOURCE: © 2018 GOOGLE EARTH PRO, AERIAL DATE: OCTOBER 5, 2016.

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CHECKED BY:	**DATE CHECKED:**
E. McNally	November 7, 2018
APPROVED BY:	**DATE APPROVED:**
E. McNally	November 7, 2018

FIGURE 2

AERIAL SITE LOCATION MAP

HILCORP ENERGY
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API:30-039-07290
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SW¼ SW¼, SECTION 28, T28N, R6W
RIO ARRIBA COUNTY, NEW MEXICO
N36.62780, W107.47811

Laboratory Analytical Results								
Sample ID	*Date*	*Depth (ft)*	*PID - OVM*	*Benzene (mg/kg)*	*Total BTEX (mg/kg)*	*TPH-GRO (mg/kg)*	*TPH-DRO (mg/kg)*	*TPH-MRO (mg/kg)*
NMOCD ACTION LEVEL			--	*10*	*50*	*1,000*		--
						2,500		
SB-1	5/31/18	3	5.4	0.000844	0.004214	<0.112	<4.47	<4.47
		7	0.0	0.00145	0.020007	<0.114	<4.58	<4.58
SB-2	5/31/18	7	0.0	0.000724	0.000724	<0.115	<4.59	<4.59
SB-3	5/31/18	1	30.5	0.00115	0.00719	<0.114	<4.55	<4.55
		7.5	0.0	0.00795	0.06461	<0.116	<4.64	<4.64
SB-4	5/31/18	8.5	2,508	2.26	**51.25**	626	60.9	<4.70
SB-4R	12/5/18	8	3,232	0.268	2.3183	11.2	46.1	
		12	3,044	5.45	**207.15**	**3,940**	**251**	
SB-5	5/31/18	11.75	2,745	3.02	**72.68**	**1,050**	**132**	<4.36
SB-5R	12/5/18	8.5	4.4	0.00427	0.01657	0.180	<4.00	
		13	2,799	**10.8**	**381.9**	**6,020**	**423**	
SB-6	5/31/18	11	2,440	5.84	**183.94**	**2,120**	**331**	<4.37
SB-6R	12/5/18	8	188	0.0151	0.4797	23.8	9.93	
		12	4,247	8.70	**381.5**	**6,970**	**385**	
SB-7	6/27/18	25	202.6	0.00101	0.004759	0.247	14.2	<4.00
SB-7R	12/5/18	8	1.3	<0.000500	<0.0075	<0.100	<4.00	
		12	282.1	0.00593	0.0696	3.41	<4.00	
SB-8	6/27/18	15	2,196	0.417	4.946	362	82.6	<4.00
SB-8R	12/5/18	4	509	0.0520	1.546	65.7	9.84	
		12	2,969	6.09	**242.89**	**4,250**	**277**	
SB-9	6/27/18	10	629.4	<0.000500	0.008139	0.700	<4.00	<4.00
SB-10	6/27/18	10	1,938	**19.6**	**630.6**	**10,800**	**1,330**	**6.67**
		25	615.1	<0.500	**143.5**	**1,860**	**15.7**	<4.00
SB-11	6/27/18	10	35.2	0.000664	0.014115	0.119	<4.00	<4.00
SB-12	6/27/18	10	2,482	4.12	**232.92**	**4,970**	**372**	**<4.00**
		25	31.5	0.519	23.949	625	11.4	<4.00
SB-13	6/27/18	10	2,157	1.65	**154.24**	**3,270**	**813**	**<1.00**
		25	360.9	<0.500	46.16	**1,020**	**6.49**	<4.00
SB-14	6/27/18	10	2,173	5.82	**342.12**	**5,810**	**932**	**<4.00**
		25	51.0	<0.500	**77.38**	**1,240**	**10.4**	<4.00
SB-15	6/27/18	10	1,550	4.05	**364.75**	**6,130**	**877**	**<4.00**
		25	205.6	<0.500	**109.26**	**1,800**	**4.19**	<4.00
SB-16	8/22/18	12	60.8	<0.000500	0.00176	0.325	6.00	<4.00
		20	33.9	0.000586	0.000586	<0.100	10.0	<4.00
SB-17	8/22/18	15	0.7	<0.000500	<0.007500	<0.100	<4.00	<4.00
		25	NR	<0.000500	<0.007500	<0.100	10.4	<4.00
SB-18	8/22/18	15	14.0	<0.000500	0.003209	0.182	10.7	<4.00
		25	9.3	<0.000500	<0.007500	<0.100	5.47	<4.00
SB-19	10/2/18	30	43.7	0.000670	0.000670	<0.100	50.5	10.3
SB-20	10/8/18	30	135	0.000841	0.008052	0.278	32.5	5.95
SB-21	10/8/18	30	505	0.00102	0.02874	1.42	15.4	<4.00
SB-22	10/2/18	10	0.0	0.000591	0.001105	<0.100	<4.00	<4.00
		25	25.9	0.000842	0.002572	<0.100	120	26.5
SB-23	8/22/18	15	1,100	0.562	3.162	825	81.1	<4.00
		30	325.5	0.000883	0.027552	0.988	15.8	<4.00
SB-24	12/5/18	8	4,750	**30.3**	**1,226.3**	**20,200**	**41.6**	
		12	4,594	**29.8**	**1,091.1**	**15,500**	**1,710**	

Samples were analyzed per USEPA Method 8021 and 8015.

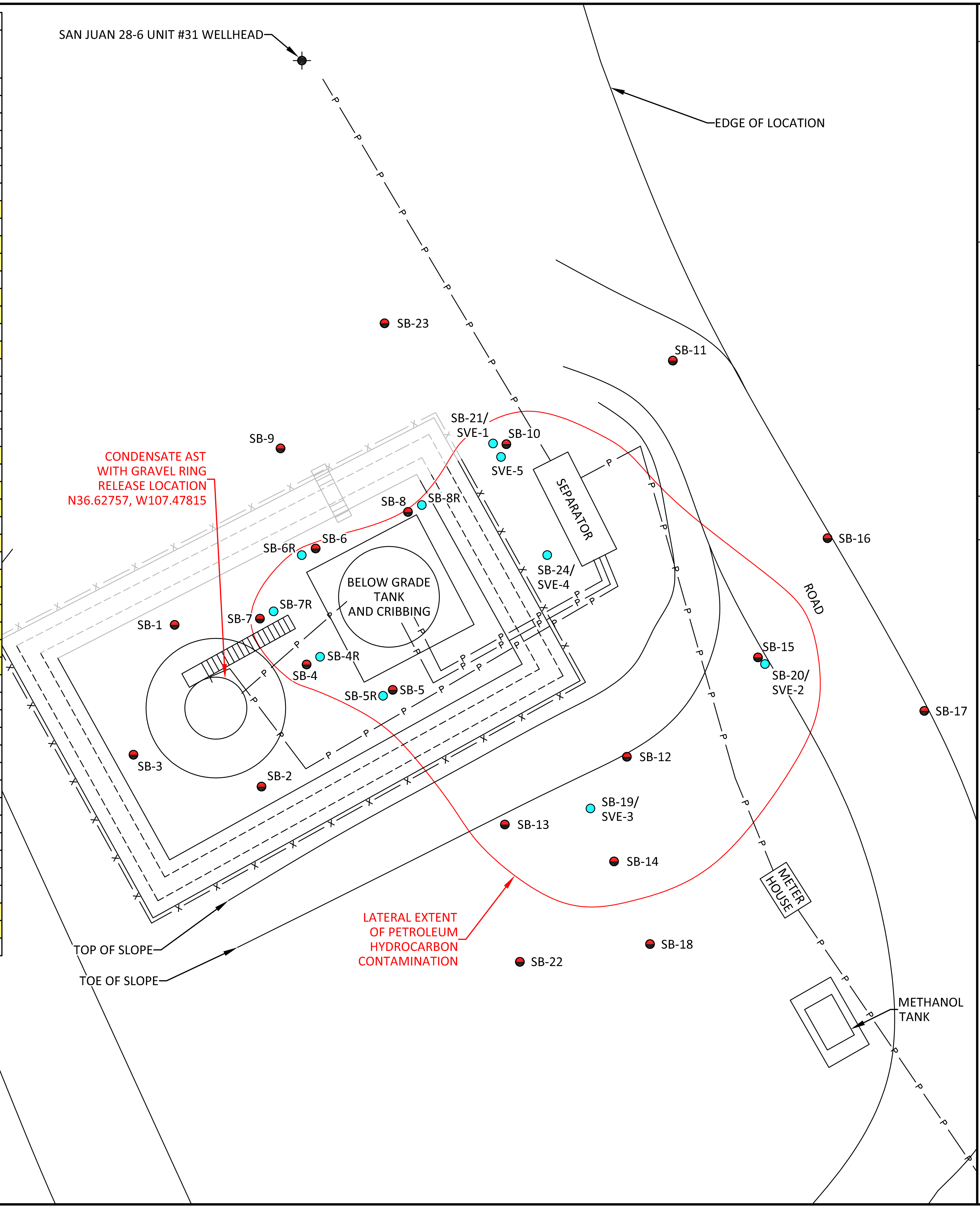

FIGURE 3

RELEASE ASSESSMENT AND SITE DELINEATION SAMPLE LOCATIONS AND RESULTS MAY, JUNE, AUGUST, OCTOBER, AND DECEMBER 2018

HILCORP ENERGY
SAN JUAN 28-6 UNIT #31
API:30-039-07290
INCIDENT NO. NVF 1816655680
SW¼ SW¼, SECTION 28, T28N, R6W
RIO ARRIBA COUNTY, NEW MEXICO
N36.62780, W107.47811

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APPROVED BY: E. McNally	**DATE APPROVED:** December 10, 2018

LEGEND

●	SOIL BORING SAMPLE LOCATION
●	SVE WELL AND SOIL BORING SAMPLE LOCATION
- - - -	SECONDARY CONTAINMENT BERM
—x—	FENCE
—P—	APPROXIMATE PIPELINE

NOTE:

DEPTH LAYERS ARE AVERAGED AND APPROXIMATE.
SAND LAYER FROM SURFACE TO 10 FEET;
CLAYEY SAND FROM 10 TO 15 FEET;
WEATHERED SANDSTONE FROM 15 TO 25 FEET.
NO GROUNDWATER WAS ENCOUNTERED.

FIGURE 4A

GEOLOGICAL CROSS SECTION
A - A'

HILCORP ENERGY
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API:30-039-07290
INCIDENT NO. NVF 1816655680
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RIO ARRIBA COUNTY, NEW MEXICO
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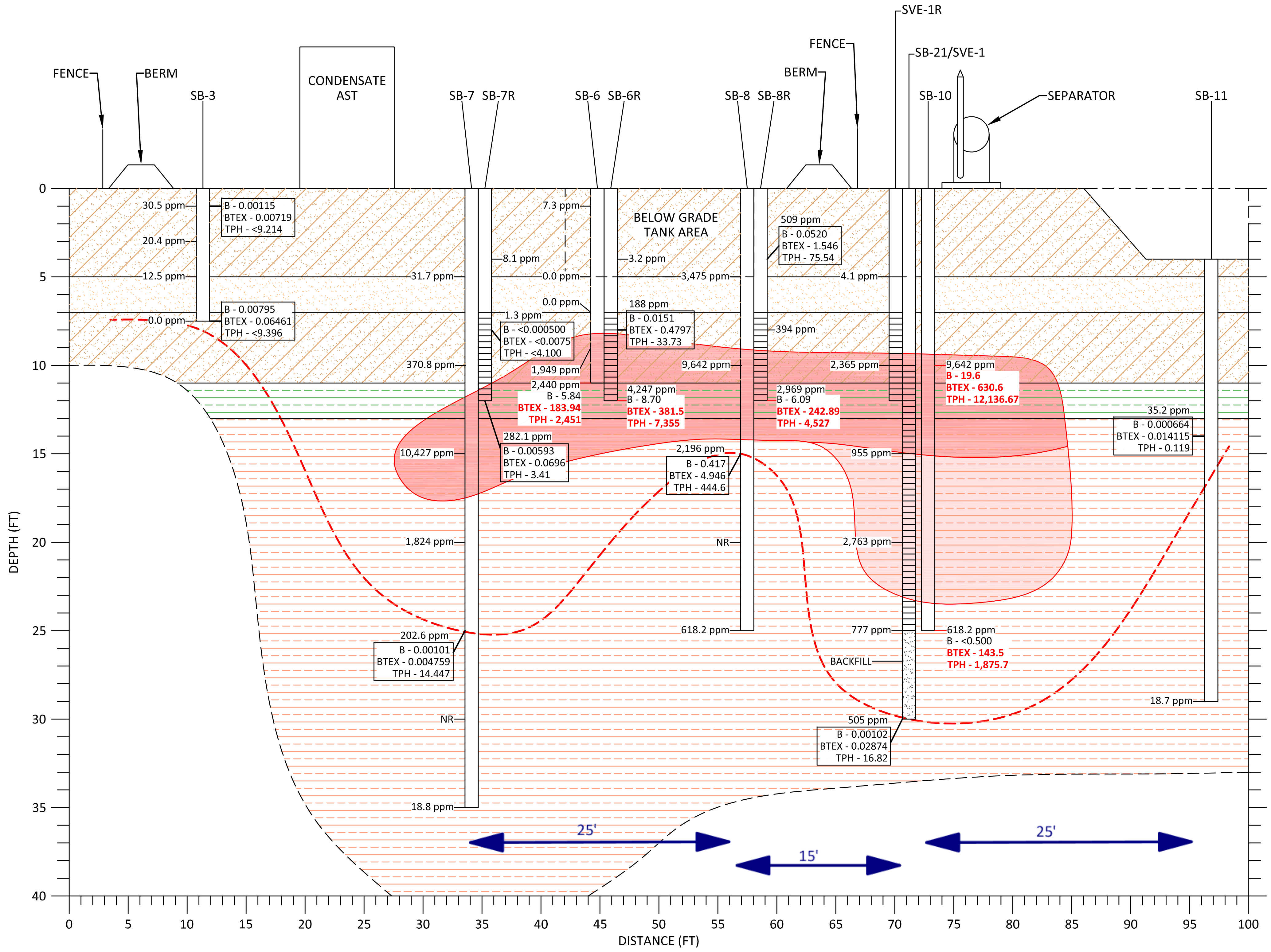
APPROVED BY:	**DATE APPROVED:**
E. McNally	December 18, 2018

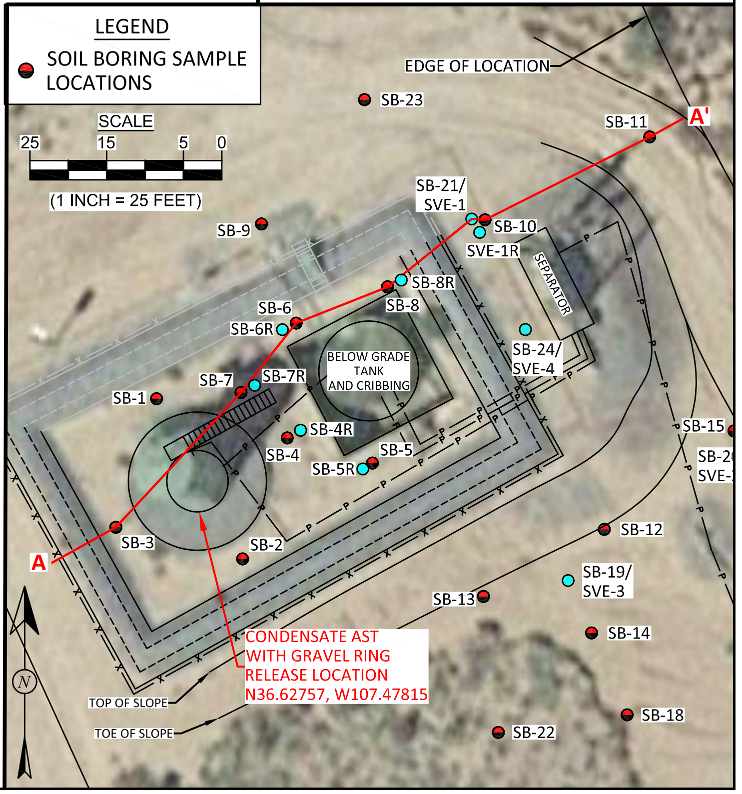


LEGEND

- ▨ SAND
- ▨ CLAYEY SAND
- 🟩 SANDSTONE (WEATHERED)
- ▨ SANDSTONE (HARD)
- 🟥 INTERPOLATED AREA OF PETROLEUM HYDROCARBON IMPACTS
- - - - VERTICAL DELINEATION - LABORATORY CONCENTRATIONS BELOW ACTION LEVELS

NOTE: FOR VISUAL CLARITY SVE WELLS ARE SHOWN ADJACENT TO ORIGINAL BORINGS IN CROSS-SECTION ONLY.

NOTE: ALL LABORATORY ANALYTICAL RESULTS REPORTED IN mg/kg.



NOT TO SCALE

FIGURE 4B

GEOLOGICAL CROSS SECTION
B - B'

HILCORP ENERGY
SAN JUAN 28-6 UNIT #31
API:30-039-07290
INCIDENT NO. NVF 1816655680
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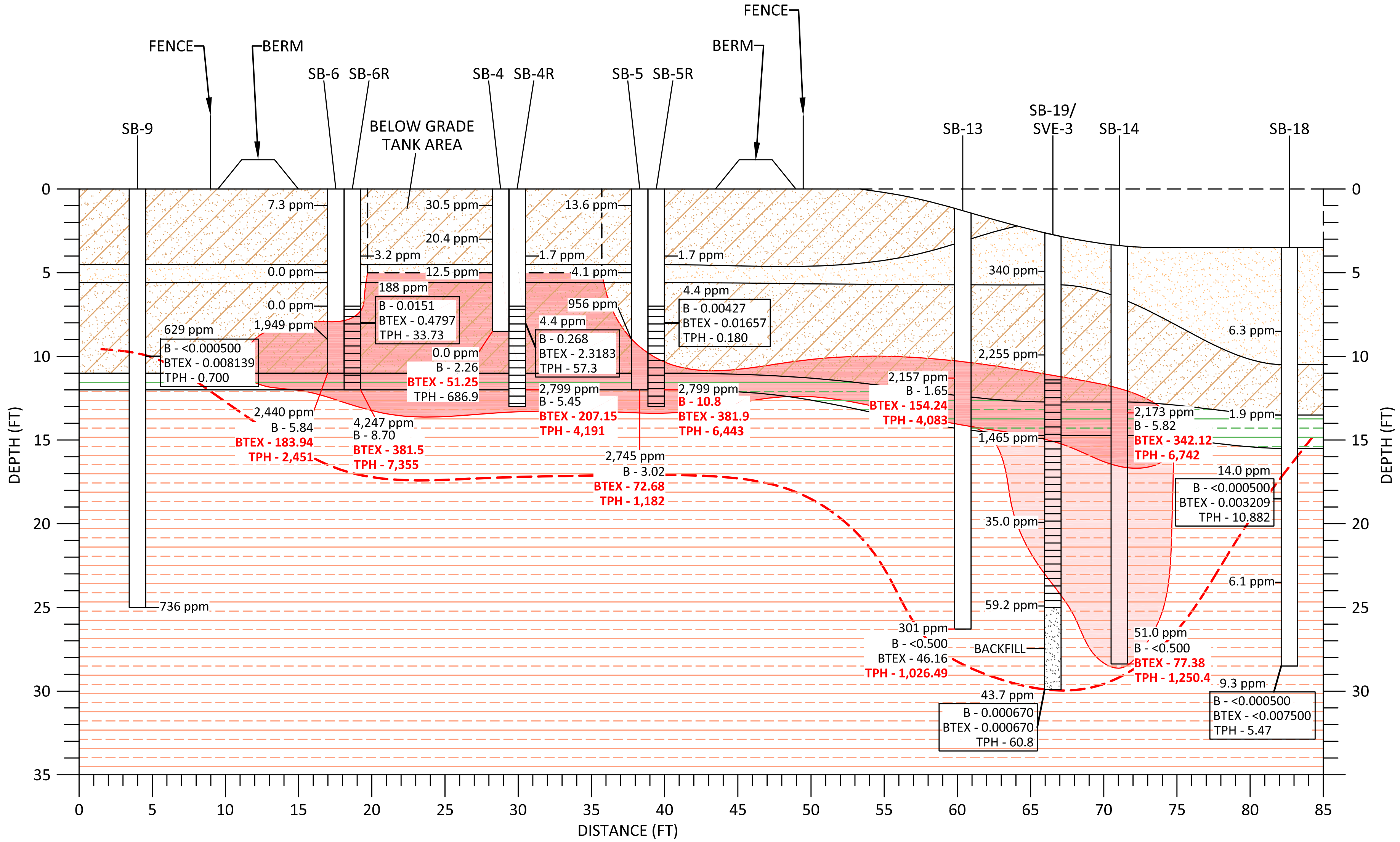
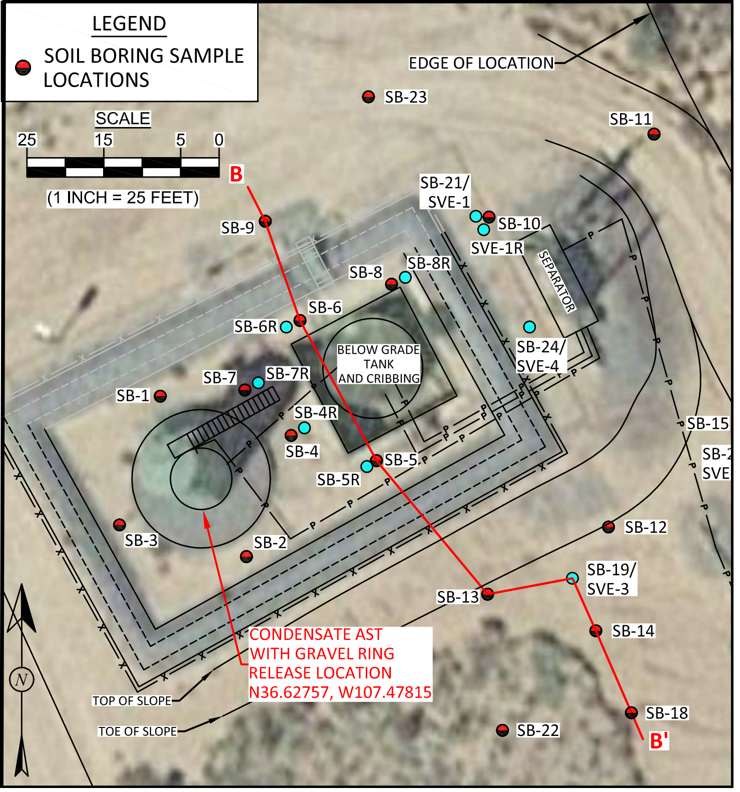


LEGEND

▨	SAND
▨	CLAYEY SAND
🟩	SANDSTONE (WEATHERED)
▨	SANDSTONE (HARD)
🟥	INTERPOLATED AREA OF PETROLEUM HYDROCARBON IMPACTS
- - -	VERTICAL DELINEATION - LABORATORY CONCENTRATIONS BELOW ACTION LEVELS

NOTE: FOR VISUAL CLARITY SVE WELLS ARE SHOWN ADJACENT TO ORIGINAL BORINGS IN CROSS-SECTION ONLY.

NOTE: ALL LABORATORY ANALYTICAL RESULTS REPORTED IN mg/kg.



NOT TO SCALE

Oil and Gas Release Assessment Field Form

Name of Operator: Hilcorp
Facility or Pipeline Name: San Juan 28-6 #31
Onsite Contact Person: Kurt Hoekstra
Release Source: Condensate tank

Release Lat/Long: 36.62757, -107.47815
Wellhead Lat/Long: 36.62780, -107.47811
Groundwater Present? ☐ Yes ☒ No
Surface Water present? ☐ Yes ☒ No
Excavation prior to arrival? ☐ Yes ☒ No
Areas affected by release: Inside the containment berm

County and State: Rio Arriba
Land Jurisdiction: BLM
Site Rank: 0

Date: 5-31-18
AES Personnel: C. Lameman
S. Glasses
Arrival Time: 8:45
Depart Time: 14:45
Begin Miles: 56775
End Miles:

Regulatory Representatives: None

Has the release been removed prior to arrival?: ☐ Yes ☒ No

Project Details: 13.9 BBLs released from condensate tank.

Site Limitations: Auger refusal ranging from 7 - 11.75'.

Photos taken: ☒ Yes ☐ No

Facility or Pipeline Name: San Juan 28-6 #31

Date: 5-31-18

AES personnel: C. Lameman, S. Glasses

Buck Machine #_____			
Concentration	50 mg/kg	100 mg/kg	500 mg/kg
Calibration ABS Values			

* was in process of prepping a TPH sample when Kurt said that Lindsay said no TPH field, only OVM-PID. Confirmed looking @ email.

Sample ID	Collection Date	Time of Sample Collection	Sample Location	Sample Depth (ft)	Composite	PID-OVM (ppm)	PID-OVM Time	Field TPH (mg/kg)	Field TPH Analysis Time	ABS	NOTES (i.e. Soil Type, Color, Odor, Staining)
SB-1	5-31-18	9:30	N. of Prod. tank	1'	N	0.0	9:56	234 *	10:12		No Staining Sand w/Clay, Brown, No Odor
		9:36		3'	N	5.4	9:57	–	–	–	S.A.A.
		9:41		5'	N	2.9	9:58	–	–	–	S.A.A.
		9:55		7'	N	0.0	10:16	–	–	–	Auger refusal. Clayey Sand DK Brown, No Odor No Staining
SB-2		9:59	S. of Prod. tank.	1'	N	0.0	10:17	–	–	–	Sand, Brown, No Staining, No Odor Coarse-Med., Moist
		10:05		3'	N	0.0	10:33	–	–	–	S.A.A.
		10:11		5'	N	0.0	10:49	–	–	–	S.A.A
		10:25		7'	N	0.0	10:50	–	–	–	Auger Refusal. Clayey Sand Dk. Brown, No Staining, No Odor
SB-3		10:30	W of Prod. tank	1'	N	30.5	11:03	–	–	–	Sand, Brown, No Staining, Sl. Odor Coarse-Med, Moist
		10:36		3'	N	20.4	11:04	–	–	–	S.AA.
		10:38		5'	N	12.5	11:05	–	–	–	Sand, Red-Brown, No Staining, Sl. Odor Fine-Med, Moist
		10:46		7.5'	N	0.0	11:06	–	–	–	Clayey Sand, Dk. Brown, No Staining No Odor, Auger Refusal, Moist
SB-4		10:58	E. of Prod. tank	1'	N	2385	11:22	–	–	–	Sand, Brown, No Staining, V. Strong Odor, Coarse-Med, Moist
		11:01		3'	N	2009	11:23	–	–	–	S.A.A.
		11:08		5'	N	1996	11:24	–	–	–	Sand, Red-Brown, No Staining, V. Strong Odor, Fine-Md, Moist
		11:15		8.5'	N	2508	11:34	–	–	–	Clayey Sand, Dk. Brown, V. Strong Odor No Staining, Auger Refusal, Moist
SB-5		11:41	S of BGT	1'	N	13.6	11:55				Sand w/ some clay, Brown, No Odor No Staining, Md, Moist
		11:50		5'	N	4.1	12:09				Sand, Tan-Brown, No Odor, No Stain Md, Moist
		12:08		9'	N	956	12:24				Historic Contam. @ 8'. Brown, Clayey Sand, Sl. Odor, Some Staining

Type of Sample collection?:

~~Depends~~ run from 0.0 from
Step out. N, W, S

Facility or Pipeline Name: Historic pull sample. for them to know. Characterize.

Date:

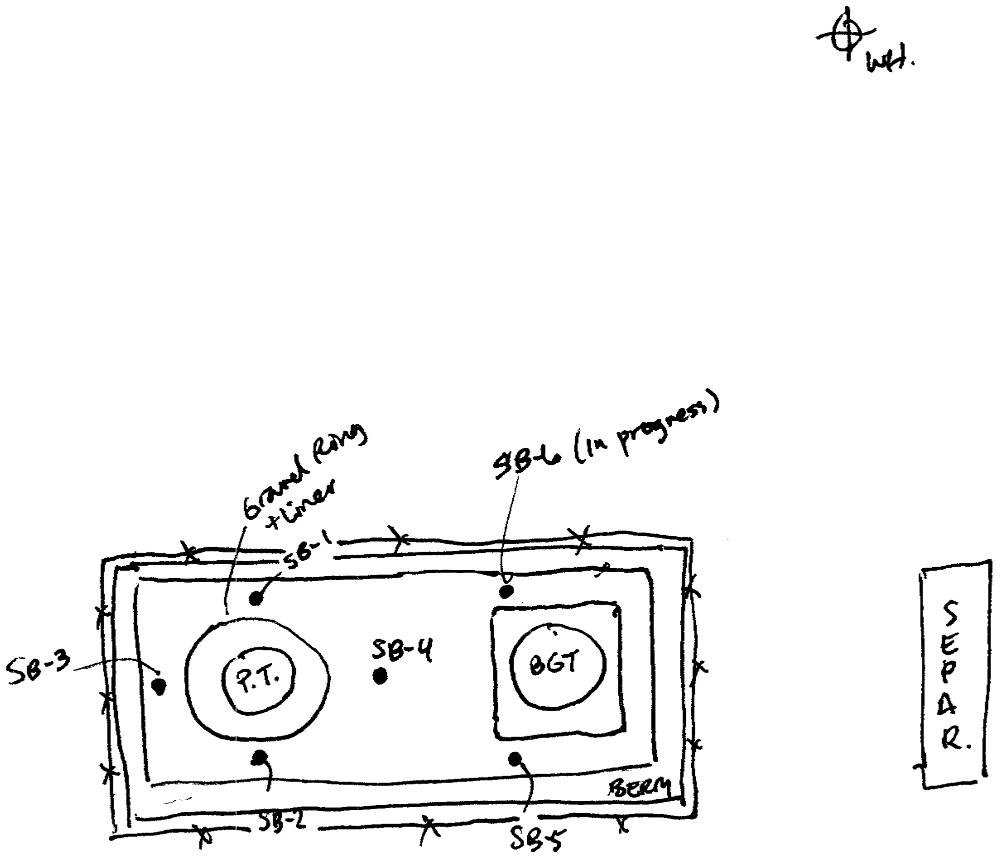
AES personnel:

Delineate old? let OCD know to be addressed.
Hilcorp to address the old.

Buck Machine #_____			
Concentration	50 mg/kg	100 mg/kg	500 mg/kg
Calibration ABS Values			

Sample ID	Collection Date	Time of Sample Collection	Sample Location	Sample Depth (ft)	Composite	PID-OVM (ppm)	PID-OVM Time	Field TPH (mg/kg)	Field TPH Analysis Time	ABS	NOTES (i.e. Soil Type, Color, Odor, Staining) Auger Refusal/ Degraded SS
SB-5	5-31-18	12:21	S of BGT	11.75'	N	2745	12:53	—	—	—	Light Brown, Discoloration, Strong Odor, No Staining, Moist, Historic
~~SB-6~~		12:00	~~N-G BGT~~	7	N	0.0	12:52	—	—	-	
SB-6		13:02	N of BGT	1'	N	7.3	13:36	—	—	—	Sand, Brown, No Odor, No Staining Nd, Moist
		13:16		5'	N	0.0	13:37	—	-	—	S.A.A.
		13:22		7'	N	0.0	13:38	—	-	—	Clayey Sand, Dk. Brown, No Odor No Staining, Moist.
		13:34		9'	N	1,949	13:42	—	-	—	Brown, Sand, V. Strong odor, No Stain Moist, Historic
		13:46		11'	N	2,440	14:00	—	—	—	

Type of Sample collection?:



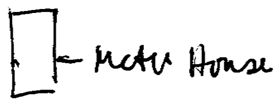
SB-1 1' - 0.0
3 - 5.4
5 - 2.9
7 - 0.0

SB-2 1 - 0.0
3 - 0.0
5 - 0.0
7 - 0.0

SB-3 1 - 30.5
3 - 20.4
5 - 12.5
7.5 - 0.0

SB-4 1 - 2,385
3 - 2,009
5 - 1,996
8.5 - 2,518

SB-5. 1 - 13.6
5 - 4.1
7 - 0.0
9 - 956
11.75 - 2,745



Oil and Gas Release Assessment Field Form

Name of Operator: Hilcorp
Facility or Pipeline Name: San Juan 28-6 31
Onsite Contact Person: Lindsay Dumas
Release Source: Condensate Tank
+ Historic Release
Release Lat/Long: 36.62757, -107.47815
Wellhead Lat/Long: 36.62780, -107.47811
Groundwater Present? ☐ Yes ☒ No
Surface Water present? ☐ Yes ☒ No
Excavation prior to arrival? ☐ Yes ☒ No
Areas affected by release: Inside the containment Berm
& HISTORIC
Has the release been removed prior to arrival?: ☐ Yes ☒ No

County and State: Rio Arriba
Land Jurisdiction: BLM
Site Rank: 0

Regulatory Representatives: none

Date: 6-27-18
AES Personnel: C.Lameman
Arrival Time: 900
Depart Time: 1815
Begin Miles: 57091
End Miles: 57197

Project Details: OCD requested that Hilcorp find the extent of Historic Contamination. GeoMat onsite to Soil drig and collect w/ Hollow Stem Auger and split spoon.

Site Limitations: Edge of location, piping and equipment

Photos taken: ☒ Yes ☐ No

Alexandra 505-608-6061

Facility or Pipeline Name: San Juan 28-6 #31

Date: 6-27-18

AES personnel: C. Lameman

Buck Machine # 2			
Concentration	50 mg/kg	100 mg/kg	500 mg/kg
Calibration ABS Values	0.091	0.141	0.725

Sample ID	Collection Date	Time of Sample Collection	Sample Location	Sample Depth (ft)	Composite	PID-OVM (ppm)	PID-OVM Time	Field TPH (mg/kg)	Field TPH Analysis Time	ABS	NOTES (i.e. Soil Type, Color, Odor, Staining)
SB-7	6-27-18	9:45	N of SB-4	5'	N	31.7	10:16	—	—	—	Red, Sand, No Odor, N. Stain, Dry
		9:51		10'	N	370.8	10:17	—	—	—	Sl. Gray, Sl. Odor, Shale or Clay
		9:59		15'	N	10,427	10:20	—	—	—	SS, Gray, Odor
		10:07		20'	N	1,824	10:25	—	—	—	SS, Gray, Odor
		10:19		25'	N	202.6	10:39	—	—	—	SS, Lt tan Gray, Odor (Lab)
		10:28		30'	N	—	—	—	—	—	No Recovery
		10:41		35	N	18.8	10:52	221	10:56	.167	SS, Lt. Gray, Sl. Odor, Dry (Lab Hold)
SB-8		1127	N of BGT	5'	N	3475	11:53	—	—	—	Red, Sand, Strg Odor, N. Staining
		1135		10'	N	9642	11:59	—	—	—	Clayey Sand, Gray, Strong Odor
		12:13		15'	N	2196	12:22	—	—	—	SS, Weathered, Strg. Odor, SL Stain (Lab)
		12:24		25'	N	618.2	12:32	168.	12:40	0.128	SS, tan, Odor, No Staining (Lab Hold)
SB-9		13:09	N of BGT outside fence	10'	N	629.4	13:22	—	—	—	Clayey Sand, Odor, Sl. Gray (Lab)
		13:15		25	N	735.5	13:29	145	14:41	0.113	SS, tan, Odor, No Staining, Dry (Lab Hold)
SB-10		13:55	NE corner outside fence	10'	N	1938	14:13	—	—	—	Clayey Sand, Strg. Odor, Gray, Moist (Lab)
		14:11		25	N	615.1	14:14	—	—	—	Sl, tan, Odor, No Staining, Dry (Lab Hold)
SB-11		14:34	E of sep e edge of location	10'	N	35.2	14:55	—	—	—	Red Sand to Gray Clay Sand, Odor (Lab)
		14:51		25'	N	18.7	15:19	—	—	—	Lt tan, Sl Odor, No Stain, Dry (Lab Hold)
SB-12		15:17	S of Berm SE corner	10'	N	2482	15:34	2,000	15:45	1.444	Clay, Grey, Odor, Staining (Lab)
		15:30		25'	N	31.5	15:38	—	—	—	Lt tan, SS, Sl. Odor, No Stain, Dry (Lab Hold)

Type of Sample collection?:

Well or Lease Name: San Juan 28-6 #31

Date: 6-27-18

AES personnel: C. Lameman

Sample ID	Collection Date	Time of Sample Collection	Sample Location	OVM (ppm)	OVM Time	Field TPH (mg/kg)	Field TPH Analysis Time	ABS	NOTES
SB-13@10	6-27-18	16:02	S of BGT outside fence	2157	1620	—	—	—	Gray, Sand w/Clay, Odor, Moist (Lab)
.25'		16:17	⊥	360.9	16:22	—	—	—	SS, Tan-White, Dry, Sl. Odor, No Stain (Lab Hold)
SB-14@10'		16:41	Midway of SB-13 & 12	2173	16:59	—	—	—	
		17:15	⊥	51.0	17:23	—	—	—	
SB-15@10'		17:28'	E of Berm SE corner	1550	17:35	—	—	—	
		17:42'	⊥	205.6	17:49	—	—	—	

*Include Benzene readings in the notes section initially and transfer to Limitations if Benzene is a problem on the location.

SOIL BORING LOG

Animas Environmental Services
604 W. Piñon St., Farmington, NM 87401
Tel. (505) 564-2281 animasenvironmental.com

Soil Boring No: 16
Monitor Well No: —

Project:
Date: 8-22-18
Client: Hilcorp
Latitude/Longitude: 36.62762, -107.47788
Location: San Juan 28-6 Unit 31
Datum:
Driller: GeoMat - Kelley Padilla / Fernando Enriquez
Elevation:
Drilling Method: Continous Boring to Split Spoon - HSA
Logged by: C. Lameman
Depth to Water (ft): —
Time Recorded: 905
Total Depth (ft): 25

Depth (ft)	Sample Interval	Sample Type (SPT, Grab, etc)	Sample Time	Blow Count (per 3x6" intervals)	Soil Description TYPE, density/consistency, color, grain size, moisture, other (i.e. odor, staining)	USCS Symbol	OVM (ppm)	OVM Time	MW Schematic and Description
0					Very ~~Soft~~ Loose, Red-Tan, ~~Poorly~~ ~~Well~~ ok Graded Sand, Dry	SP			
					Non plastic, noncohesive (0-4')				
					Very Loose, Tan, ~~Poorly~~ Well Graded Sand, Dry	SW			
5					non plastic, noncohesive (4-5')		7.3	9:55	
5			9:05		Loose, Tan, Well Graded Sand, Dry	SW			
					non plastic, non cohesive (5 - 7.5')				
					Stiff, Brown, lean Clay with Sand, Moist	CL			
10			9:15		Medium plasticity, cohesive (7.5 - 10')		8.7	9:56	
10					Medium Dense, Red-Tan, well Graded Sand, Dry	SW			
					non plastic, non cohesive (10-11')				
					Dense, Tan, well Graded Sand, Dry, noplast., nonco.	SW			
					(11-12')				
12			9:30		Very Dense, Tan-Light Gray, SS, Strong odor	SS	60.8	9:57	
					UNABLE TO CONTINUE WITH CONTINOUS				
					BORINGS. SWITCHING TO SPLIT SPOON				
15			9:34		Very Dense, Tan, Sandstone, No Odor, Small Recov.	SS	5.7	10:02	
20			9:51		S.A.A.	SS	33.9	10:03	
25			NR		No Recovery, Sandstone,	SS	NR	NR	
					Total Depth 25'				

SOIL BORING LOG

Animas Environmental Services
604 W. Piñon St., Farmington, NM 87401
Tel. (505) 564-2281 animasenvironmental.com

Soil Boring No: 17
Monitor Well No: -

Project:
Client: Hilcorp
Location: San Juan 28-6 Unit #31
Driller: GeoMat - KP & FE
Drilling Method: Continuous to split Spoon - HSA
Depth to Water (ft): -
Time Recorded: 1040

Date: 8-22-18
Latitude/Longitude: 36.62757, -107.47784
Datum:
Elevation:
Logged by: C. Lameman
Total Depth (ft): 25

Depth (ft)	Sample Interval	Sample Type (SPT, Grab, etc)	Sample Time	Blow Count (per 3x6" intervals)	Soil Description TYPE, density/consistency, color, grain size, moisture, other (i.e. odor, staining)	USCS Symbol	OVM (ppm)	OVM Time	MW Schematic and Description
0					Loose, Brown, Poorly Graded Sand, Dry, nonplastic noncohesive (0-4')	SP			
5			10:47		Very Loose, Tan, Poorly Graded Sand, Dry, nonplastic noncohesive (4-5')	SP	1.7	11:38	
5					Loose, Tan-Red, Poorly Graded Sand, Dry, nonplast. noncohesive (5-8')	SP			
10			10:55		Stiff, Brown, Lean Clay with Sand, Moist Med. Plast., cohesive (8-10')	CL	4.5	11:39	
10					Very Dense, Tan, Well Graded Sand, Dry, nonplast. noncohesive. ~~Weathered SS~~	SW			
12			11:01		Very Dense, Tan, SS	SS	5.2	11:40	
					unable to continue CONTINOUS, SWITCH to SPLIT SPOON				
15			11:07		Weathered SS, Dry, Tan-White, Small Recov.	SS	0.7	11:41	
					[Rig Broken down @ 11:13]				
20			13:20		Very Dense, Tan-White, Sandstone, Dry	SS	18.0	13:34	
25			13:30		S.A.A., Very Small Recovery	SS	NR	NR	
					Total Depth - 25'				

SOIL BORING LOG

Animas Environmental Services
604 W. Piñon St., Farmington, NM 87401
Tel. (505) 564-2281 animasenvironmental.com

Soil Boring No: 18
Monitor Well No: —
Project:
Client: Hilcorp
Location: San Juan 28-6 Unit #31
Driller: GeoMat: KP & FE
Drilling Method: Continuous to Split Spoon
Depth to Water (ft): —
Time Recorded: 13:49
Date: 8-22-18
Latitude/Longitude: 36.62748, -107.47796
Datum:
Elevation:
Logged by: C. Lameman
Total Depth (ft): 25'

Depth (ft)	**Sample Interval**	**Sample Type** (SPT, Grab, etc)	**Sample Time**	**Blow Count** (per 3x6" intervals)	**Soil Description** TYPE, density/consistency, color, grain size, moisture, other (i.e. odor, staining)	**USCS Symbol**	**OVM (ppm)**	**OVM Time**	**MW Schematic and Description**
0					Loose, Brown, Poorly graded Sand, Dry, nonplast.	SP			
					non cohesive (0-5')				
5			13:58				6.3	14:39	
5					Loose, Brown, Poorly graded sand, Dry, nonplast.	SP			
					non cohesive (5-7')				
					Stiff, Brown, Lean clay w/ Sand, Moist, Med. Plast.	CL			
10			14:04		Cohesive (8-10')		~~4.5~~ 1.9	14:40	
10					Stiff, Brown, Lean clay w/ Sand, Moist, Med. Plast	CL			
					cohesive (10-10.5)				
					Very Dense, Tan, Well Graded Sand, Dry, nonplast.	SW			
					noncohesive (10-12')				
12'					Very Dense, SS, Tan	SS			
					Unable to continue CONTINUOUS, Switch to				
					SPLIT SPOON				
15'			14:12		Weathered SS, Dry, Tan, Very Dense, odor	SS	14.0	14:41	
20'			14:27		Very Dense, Tan-White, Sandstone, Dry, odor	SS	6.1	14:42	
25'			14:36		Very Dense, Tan-White, Sandstone, Dry, No Odor	SS	9.3	14:50	
					Total Depth - 25'				

SOIL BORING LOG

Animas Environmental Services

604 W. Piñon St., Farmington, NM 87401
Tel. (505) 564-2281 animasenvironmental.com

Soil Boring No: SB-19
Monitor Well No: BV-3
Project:
Date: 10-2-18
Client: Hilcorp
Latitude/Longitude: 36.62755, -107.47797
Location: San Juan 28-6 Unit #31
Datum:
Driller: GeoMat - Kelley Padilla & Fernando Enriquez
Elevation:
Drilling Method: Continous to split spoon - HSA
Logged by: C. Lameman
Depth to Water (ft): —
Time Recorded: 10:58
Total Depth (ft): 30' Backfill to 25'

Depth (ft)	**Sample Interval**	**Sample Type** (SPT, Grab, etc)	**Sample Time**	**Blow Count** (per 3x6" intervals)	**Soil Description** TYPE, density/consistency, color, grain size, moisture, other (i.e. odor, staining)	**USCS Symbol**	**OVM (ppm)**	**OVM Time**	**MW Schematic and Description**
0					Very Loose, Brown, Poorly Graded Sand, Dry	SP			← 10' PVC Well + 3' Stick up → 
					Nonplasticity, non cohesive (1-3')				
			11:06		Stiff, Brown, Lean clay with Sand, Moist, odor	CL	340	11:36	
5					High Plasticity, cohesive (3-5')				
5					Stiff, Brown, Lean clay with Sand, Moist,	CL			
					High Plasticity, cohesive, odor (5-8')				
			11:13		Soft, Gray, Lean clay with Sand, Moist	CL	2,255	11:37	
10					High Plasticity, cohesive, Strong odor (8-10')	"			
10					~~10~~ S.A.A (10-10.25')	CL			← 15' Screen →
			11:20		Loose, Tan, Poorly Graded Sand, Dry,	SP	1,465	11:38	
					Non-Plast, non-cohesive, Strong odor, Light Gray ~~10.25~~				
					(10.25 - 15')				
15									
					UNABLE TO CONTINUE WITH CONTINOUS				
					BORING. SWITCHED TO SPLIT SPOON-1				
20			11:31		Dense, Tan, Sandstone, Dry, Slight odor	SS	35.0	11:48	
					Small Recovery				
25			11:47		Very Dense, Tan-White, Dry, No Odor	SS	59.2	11:53	
					No Staining				
30'			11:59		S.A.A.	SS	43.7	12:05	
					Total Depth @ 30'. Backfilled to 25'				
					to set Bottom of well @ 25'.				
					17' Sand Pack, 8' Bentonite				

SOIL BORING LOG

Animas Environmental Services
604 W. Piñon St., Farmington, NM 87401
Tel. (505) 564-2281 animasenvironmental.com

Soil Boring No: SB-20

Monitor Well No: BV-2

Project:

Date: 10-8-18

Client: Hilcorp

Latitude/Longitude: 36.62760, -107.47790

Location: San Juan 28-6 Unit #31

Datum:

Driller: Geo Mat - Kelley Padilla & Fernando Enriquez

Elevation:

Drilling Method: Continuous to Split Spoon - HSA

Logged by: C.Lameman

Depth to Water (ft): —

Time Recorded: 11:44

Total Depth (ft): 30' Backfilled to 25'

Depth (ft)	**Sample Interval**	**Sample Type** (SPT, Grab, etc)	**Sample Time**	**Blow Count** (per 3x6" intervals)	**Soil Description** TYPE, density/consistency, color, grain size, moisture, other (i.e. odor, staining)	**USCS Symbol**	**OVM (ppm)**	**OVM Time**	**MW Schematic and Description**
0					Very Loose, ~~Red~~-Tan, Poorly Graded Sand, Moist,	SP			
					Nonplastic, noncohesive (0-5')				+3' Stick Up →
5			11:55		S.A.A	SP	5.6	12:36	
5					S.A.A (5-6.5')	SP			
					Stiff, Brown, Lean Clay w/ Sand, Moist, Med-Plast,	CL			← 10' Blank PVC →
					Cohesive (6.5-10')		3,050	12:37	
			11:59		Dense, Tan-Gray, Weathered Sandstone, Strong	SS	~~3,460~~	~~12:38~~	
10					odor, Dry (10-11.5')				
					UNABLE TO CONTINUE W/ CONTINOUS				
					BORING. SWITCHED TO SPLIT SPOON				
15'			12:06		Very Dense, Tan, Sandstone, Dry, Strong odor Small Recovery	SS	3,460	12:38	← 15' Screen →
20			12:15		Very Dense, Tan, Sandstone, Dry, odor, small Recovery	SS	312	12:39	
25			12:24		S.A.A.	SS	186	12:41	
30			12:33		S.A.A.	SS	135	12:43	
					Total Depth @ 30'. Backfilled to 25'				
					to set bottom of well @ 25'				
					17' Sand Pack, 8' Bentonite				

SOIL BORING LOG

Animas Environmental Services
604 W. Piñon St., Farmington, NM 87401
Tel. (505) 564-2281 animasenvironmental.com

Soil Boring No: SB-21
Monitor Well No: BV-1
Project:
Date: 10-8-18
Client: Hilcorp
Latitude/Longitude: 36.62768, -107.47802
Location: San Juan 28-6 Unit #31
Datum:
Driller: GeoMat - Kelley Padilla & Fernando Enriquez
Elevation:
Drilling Method: Continons to Split Spoon - HSA
Logged by: C. Lameman
Depth to Water (ft): –
Time Recorded: 10:00
Total Depth (ft): 30' Backfilled to 25'

Depth (ft)	Sample Interval	Sample Type (SPT, Grab, etc)	Sample Time	Blow Count (per 3x6" intervals)	Soil Description TYPE, density/consistency, color, grain size, moisture, other (i.e. odor, staining)	USCS Symbol	OVM (ppm)	OVM Time	MW Schematic and Description
0					Very Loose, Red-Brown, Poorly Graded Sand, Moist Non-plastic, non-cohesive, (0-0.5')	SP			←10' Blank PVC + 3' Stick up →
5			10:18		Stiff, Brown, Lean Clay w/ Sand, Moist, High Plast, Cohesive, (0.5 to 5')	CL	4.1	10:48	
5					Loose, Brown, Poorly Graded Sand, Moist Non-plast non-cohesive, Strong odor (5-7.5')	SP			
10			10:23		Dense, Brown, Poorly Graded Sand w/ Clay, Moist, Med-Plast, noncohesive, V. Strong Odor, Gray (7.5-10')	SP-SC	2,365	10:49	
10					S.A.A. (10-14')	SP-SC			← 15' Screen →
15			10:28		Dense, Tan, Weathered Sandstone, V. Strong, Dry Odor (14-15')	SS	955	10:50	
					UNABLE TO CONTINUE WITH CONTINOUS BORING. SWITCHED TO SPLIT SPOON				
20			10:36		Dense, Tan, Weathered Sandstone, Strong odor, Dry	SS	2,763	10:51	
25			10:47		S.A.A.	SS	777	10:52	
30			11:07		Very Dense, Tan, Sandstone, Dry, Strong odor	SS	505	11:15	
					Total Depth @ 30'. Backfilled to 25' to set Bottom of Well @ 25'.				
					17' Sand Pack; 8' Bentonite				

SOIL BORING LOG

Animas Environmental Services
604 W. Piñon St., Farmington, NM 87401
Tel. (505) 564-2281 animasenvironmental.com

Soil Boring No: SB-22
Monitor Well No: ~~BV~~ —
Project:
Date: 10-2-18
Client: Hilcorp
Latitude/Longitude: 36.67749, -107.47801
Location: San Juan 28-6 Unit #31
Datum:
Driller: GeoMat -Kelley Padilla and Frenando Enriquez
Elevation:
Drilling Method: Continous Boring to Split spoon -HSA
Logged by: C. Lameman
Depth to Water (ft): —
Time Recorded: 9:20
Total Depth (ft): 30 ft

Depth (ft)	Sample Interval	Sample Type (SPT, Grab, etc)	Sample Time	Blow Count (per 3x6" intervals)	Soil Description TYPE, density/consistency, color, grain size, moisture, other (i.e. odor, staining)	USCS Symbol	OVM (ppm)	OVM Time	MW Schematic and Description
0					Very Loose, Brown, Poorly Graded Sand, Dry	SP			
					Non plastic, non cohesive (1-5')				
5			9:35				0.0	10:34	
5					Very Loose, Brown, Poorly Graded Sand, Dry	SP			
					Non plastic, non cohesive (5-6')				
					Stiff, Brown, lean Clay with Sand, Dry	CL			
10			9:41		High Plasticity, cohesive (6-10')		0.0	10:35	
10					Dense, Tan-Gray, Well Graded Sand, Dry	SW			
					non-plasticity, non-cohesive (10-11.0')				
			9:48		Very Dense, Tan, Sandstone, Strong odor	SS	17.2	10:35	
11.5					(11-11.5')				
					UNABLE TO CONTINUE WITH CONTINOUS				
					BORINGS. SWITCHED TO SPLIT SPOON				
15			9:56		Very Dense, Tan, Sandstone, Dry, Slight odor	SS	9.2	10:36	
20			10:10		~~Ver~~ S.A.A.	SS	1.4	10:36	
25			10:27		Very Dense, tan-Pink, Sandstone, Dry, No Odor	SS	25.9	10:37	
					Total Depth @ 25'				

SOIL BORING LOG

Soil Boring No: 23

Monitor Well No: –

Animas Environmental Services

604 W. Piñon St., Farmington, NM 87401

Tel. (505) 564-2281 animasenvironmental.com

Project:

Date: 8-22-18

Client: Hilcorp

Latitude/Longitude: 36.62770, -107.47807

Location: San Juan 28-6 Unit #31

Datum:

Driller: GeoMat - KP & FE

Elevation:

Drilling Method: Continuous to Split Spoon - HSA

Logged by: C. Lameman

Depth to Water (ft): –

Time Recorded: 15:04

Total Depth (ft): 30

Depth (ft)	Sample Interval	Sample Type (SPT, Grab, etc)	Sample Time	Blow Count (per 3x6" intervals)	**Soil Description** TYPE, density/consistency, color, grain size, moisture, other (i.e. odor, staining)	USCS Symbol	OVM (ppm)	OVM Time	MW Schematic and Description
0					Loose, Red-Tan, Poorly Graded Sand, Moist, nonplst non cohesive	SP			
5			15:15				9.0	15:39	
5					Loose, Tan, Poorly Graded Sand, Dry, non.plast. non cohesive (5-6.5')	SP			
					Loose, Brown, Poorly Graded Sand, Dry, non.plast non.cohesive (6-9')	SP			
10			15:20		Stiff, Brown, leanclay w/ sand, Moist, med.plast., cohesive. (9-14)	CL	9.2	15:39	
10									
					Very Dense, SS, Grey, Strong odor	SS			
14									
					Unable to continue CONTINOUS, Switch to SPLITSPOON				
15			15:30		Very Dense, SS, Grey, Strong odor	SS	1,100	15:41	
20			15:38		Very Dense, SS, Tan-White, Strong odor	SS	538.4	15:49	
25'			15:47		S.A.A.		1,484	16:05	
30			16:09		Very Dense, Tan, SS, Strong odor	SS	325.5	16:12	
					Total Depth - 30'				

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LOG OF: SVE-1

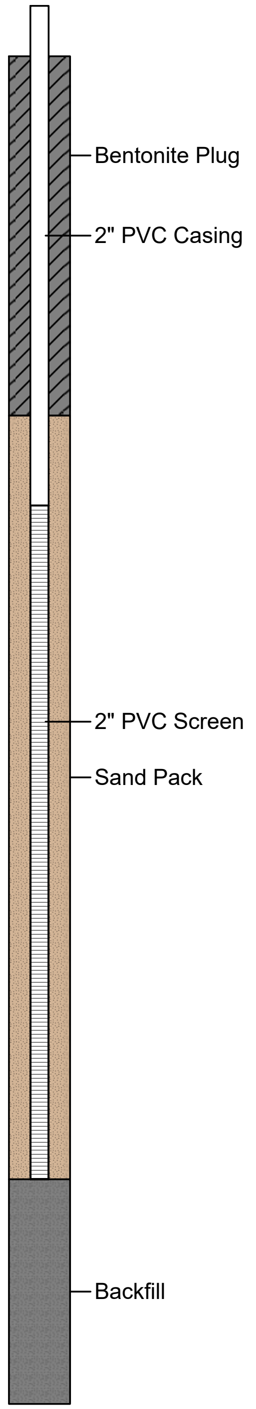
(Page 1 of 1)

HILCORP ENERGY
SAN JUAN 28-6 UNIT #31
API: 30-039-07290
INCIDENT NO. NVK 1816655680
SW1/4 SW1/4, SEC. 28, T28N, R6W

Date Started	: 10/8/2018	Latitude	: 36.62768
Date Completed	: 10/8/2018	Longitude	: -107.47802
Hole Diameter	: 7.25 in.	GPS By	: C. Lameman
Drilling Method	: CME 75 HSA	Logged By	: C. Lameman
Sampling Method	: CONTINOUS/SPLIT-SPOON		

Depth in Feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	PID (ppm)
0		SP		Very Loose, Red-Brown, Poorly Graded Sand, Moist, Non-Plasticity, Non-Cohesive	
		SP-SC		Stiff, Brown, Lean Clay with Sand, Moist, High-Plasticity, Non-Cohesive	
		SP		Loose, Brown, Poorly Graded Sand, Moist, Non-Plasticity, Non-Cohesive, Strong Odor	4.1
8		SP-SC		Dense, Brown, Poorly Graded Sand with Clay, Moist, Medium-Plasticity, Non-Cohesive, Very Strong Odor, Gray	2,365
14		SS		Dense, Tan, Weathered Sandstone, Dry, Very Strong Odor UNABLE TO CONTINUE WITH CONTINOUS BORING. SWITCHED TO SPLIT SPOON AT 15 FEET.	955
20		SS		Dense, Tan, Weathered Sandstone, Dry, Strong Odor	2,763 777
30				Very Dense, Tan, Sandstone, Dry, Strong Odor @ 30'	505

SVE-1



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LOG OF: SVE-2

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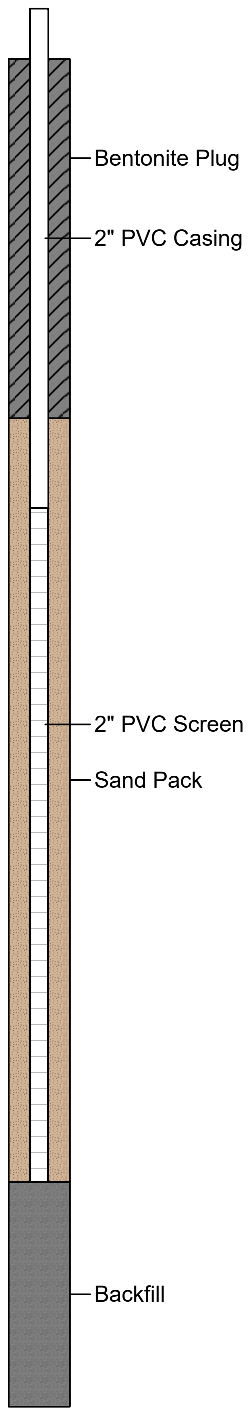
HILCORP ENERGY
SAN JUAN 28-6 UNIT #31
API: 30-039-07290
INCIDENT NO. NVK 1816655680
SW1/4 SW1/4, SEC. 28, T28N, R6W

Date Started	: 10/8/2018	Latitude	: 36.62760
Date Completed	: 10/8/2018	Longitude	: -107.47790
Hole Diameter	: 7.25 in.	GPS By	: C. Lameman
Drilling Method	: CME 75 HSA	Logged By	: C. Lameman
Sampling Method	: CONTINOUS/SPLIT-SPOON		

Depth in Feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	PID (ppm)
0 2 4 6		SP		Very Loose, Red-Tan, Poorly Graded Sand, Moist, Non-Plasticity, Non-Cohesive	5.6
8		SP-SC		Stiff, Brown, Lean Clay with Sand, Moist, Medium-Plasticity, Cohesive	
10 12 14		SS		Dense, Tan-Gray, Weathered Sandstone, Dry, Strong Odor UNABLE TO CONTINUE WITH CONTINOUS BORING. SWITCHED TO SPLIT SPOON AT 11.5 FEET.	3,050
16 18		SS		Very Dense, Tan, Sandstone, Dry, Strong Odor, Poor Recovery	3,460
20 22 24 26 28 30		SS		Very Dense, Tan, Sandstone, Dry, Odor, Poor Recovery	312 186 135

SVE-2



AES animas environmental services
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LOG OF: SVE-3

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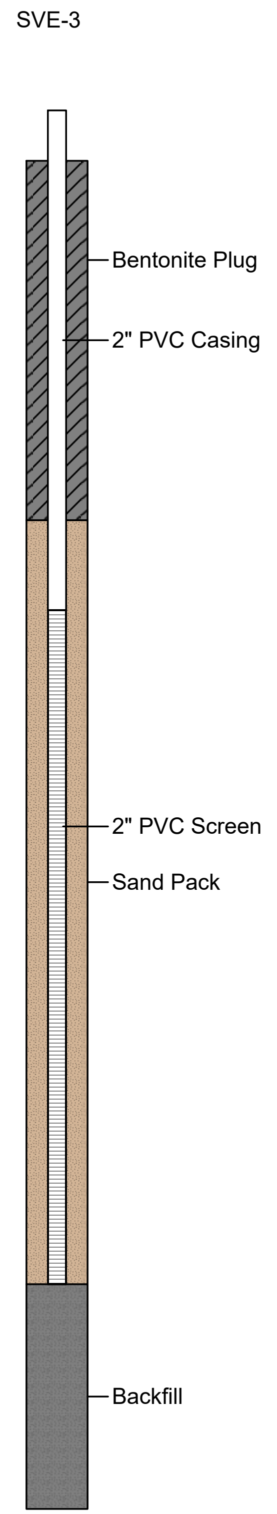
HILCORP ENERGY
SAN JUAN 28-6 UNIT #31
API: 30-039-07290
INCIDENT NO. NVK 1816655680
SW1/4 SW1/4, SEC. 28, T28N, R6W

Date Started	: 10/2/2018	Latitude	: 36.62755
Date Completed	: 10/2/2018	Longitude	: -107.47797
Hole Diameter	: 7.25 in.	GPS By	: C. Lameman
Drilling Method	: CME 75 HSA	Logged By	: C. Lameman
Sampling Method	: CONTINOUS/SPLIT-SPOON		

Depth in Feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	PID (ppm)
0 2		SP	░	Very Loose, Brown, Poorly Graded Sand, Dry, Non-Plasticity, Non-Cohesive	
4 6		SP-SC	▨	Stiff, Brown, Lean Clay with Sand, Moist, Odor, High-Plasticity, Cohesive, Odor	5.6
8 10		SP-SC	▨	Soft, Gray, Lean Clay with Sand, Moist, High-Plasticity, Cohesive, Strong Odor	3,050
12 14		SP	░	Loose, Tan, Poorly Graded Sand, Dry, Non-Plasticity, Non-Cohesive, Strong Odor, Light Gray UNABLE TO CONTINUE WITH CONTINOUS BORING. SWITCHED TO SPLIT-SPOON AT 15 FEET.	3,460
16 18 20 22 24		SS	▤	Dense, Tan, Sandstone, Dry, Slight Odor	312 186
26 28 30		SS	▤	Very Dense, Tan-White, Sandstone, Dry, No Odor	135



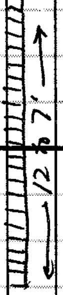
SOIL BORING LOG

Animas Environmental Services
604 W. Piñon St., Farmington, NM 87401
Tel. (505) 564-2281 animasenvironmental.com

Soil Boring No: SB-4R
Monitor Well No: ~~M~~ SVE-4

Project:
Client: Hilcorp
Location: San Juan 28-6 Unit #31
Driller: Louis Trujillo Earth Worx
Drilling Method: Geo Probe Push Rig
Depth to Water (ft): —
Time Recorded: 1100 - 1130

Date: 12-5-18 .62759 .47811
Latitude/Longitude: 36. ~~62758~~, -107 ~~47807~~
Datum:
Elevation:
Logged by: C.Lameman
Total Depth (ft): 12'

Depth (ft)	Sample Interval	Sample Type (SPT, Grab, etc)	Sample Time	Blow Count (per 3x6" intervals)	Soil Description TYPE, density/consistency, color, grain size, moisture, other (i.e. odor, staining)	USCS Symbol	OVM (ppm)	OVM Time	MW Schematic and Description
0					Brown, Medium, High Plasticity, Fine Grain,				
					w/ Sand, Moist, Cohesive, No odor (0-4')	CL			
	3-4'	Grab	11:21		S.A.A (4-5')	CL	32.0	1133	
5									
5					Brown, loose, Fine Grained, Moist, sl. odor.				
					(5-6.5')	SW			
*	7-8'	Grab	11:19		Brown, Medium, Fine Grained & High Plast., Moist		3,232	1134	 12 to 7'
8					Cohesive, Strong odor. (6.5-8')	CL			
8									
					S.A.A. (8-10.5)				
*	11-12'	Grab	11:16		Dense, Tan Light Gray Staining, Medium Grain	SS	3,044	11:35	
12					Dry, Strong odor (10.5-12')				
					Auger Refusal @ 12' on Sandstone				
					Total Depth @ 12'				
					Install well				
					2" Screen @ 12 to 7'				
					Sand Pack @ 12 to 6'				
					Bentonite @ 6' to surface				

SOIL BORING LOG

Animas Environmental Services
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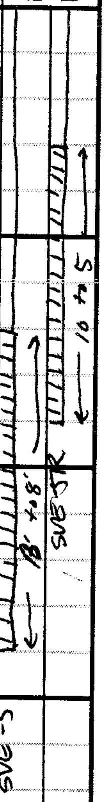
Soil Boring No: SB-5R
Monitor Well No: SVE-5 & SVE-5R
Project:
Client: Hilcorp
Location: San Juan 28-6 Unit #31
Driller: Louis Trujillo w/ Earth Worx
Drilling Method: GeoProbe Push Rig
Depth to Water (ft): —
Time Recorded: 1000 - 1057
Date: 12-5-18
Latitude/Longitude: 36.62758, -107.47807
Datum:
Elevation:
Logged by: C. Lameman
Total Depth (ft): 13' and 10'

Depth (ft)	Sample Interval	Sample Type (SPT, Grab, etc)	Sample Time	Blow Count (per 3x6" intervals)	Soil Description TYPE, density/consistency, color, grain size, moisture, other (i.e. odor, staining)	USCS Symbol	OVM (ppm)	OVM Time	MW Schematic and Description
0		4 Grab	10:34		Brown, Soft, Fine, Med. Plastic., Moist, High Plasticity. (0-5') Clayey Sand	CL	1.7	10:41	
7.5					Brown, Loose, Fine Sand, Moist, Non Plast (5-7.5')	SW			
$ 7.5		7.5-8.5 Grab	10:32		Brown, Stiff, High Plasticity, Moist, Cohesive, Blk Stainin (7.5'-8.5') odor	CL	4.4	10:40	10 to 5
10.75					Brown, Stiff, High Plasticity, Moist, Cohesive (8.5-10.75') odor	CL			
10.75									13' to 8' SVE-5R
$ 13		12-13' Grab	10:19		Tan, Dense, Slight Grey, Medium Grained, Dry, Non Plastic, noncohesive, SS (10.75-13')	SS	2,799	10:39	
					Auger Refusal. Stop Geoprobe. Install well.				SVE-5
					Total Depth = 13' onto SS				
					Well Construction				
					2" screen @ ~~15~~ 13' to 8' Sand Pack @ 13' to 7' Bentonite @ 7' to surface.				
					Additional 2" screen installed as SVE. 2" screen @ 10' to 5' Sand Pack @ 10 to 4' Bentonite @ 4 to surface				

SOIL BORING LOG

Animas Environmental Services
604 W. Piñon St., Farmington, NM 87401
Tel. (505) 564-2281 animasenvironmental.com

Soil Boring No: SB-6R
Monitor Well No: SVE-6
Project:
Date: 12-5-18
Client: Hilcorp
Latitude/Longitude: 36.62763, -107.47810
Location: San Juan 28-6 Unit #1
Datum:
Driller: Louis Trujillo Earth Worx
Elevation:
Drilling Method: Geoprobe Push Rig
Logged by: C. Lameman
Depth to Water (ft): —
Time Recorded: 1230 -
Total Depth (ft): 12'

Depth (ft)	Sample Interval	Sample Type (SPT, Grab, etc)	Sample Time	Blow Count (per 3x6" intervals)	Soil Description TYPE, density/consistency, color, grain size, moisture, other (i.e. odor, staining)	USCS Symbol	OVM (ppm)	OVM Time	MW Schematic and Description
0					Surface. Gravel				
					~~St~~ Very Soft, Brown, Fine Grained Sand, High Plast.,				
					Moist, High Plast, Cohesive, (0-4) No Odor	CL			
4.5	4	Grab	12:51		S.A.A. (4-4.5')	CL	3.2	12:55	
4.5					Loose, Brown, Fine Grained, Moist, Non Plast.,				
					non cohesive, No Odor (4.5-5.5')	SW			
					Stiff, Brown, Fine Grained Sand, High Plast,				
* 8	7- ~~8~~	Grab	12:50		Moist, Cohesive (5.5-8')	CL	188	12:56	
8									
					S.A.A (8-11') strong odor				12' to 7'
					Dense, Tan light Gray, Medium Grained, Dry				
* 12	11 12'	Grab	12:46		non cohesive, strong odor (11-12')	SS	4,247	12:59	
					Total Depth @ 12' on Sandstone				
					Auger Refusal				
					Install Well				
					2" screen @ 12' to 7'				
					Sand Pack @ 12' to 6'				
					Bentonite @ 6' to surface.				

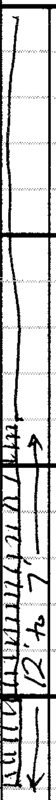
SOIL BORING LOG

Animas Environmental Services
604 W. Piñon St., Farmington, NM 87401
Tel. (505) 564-2281 animasenvironmental.com

Soil Boring No: SB-7R

Monitor Well No: SVE-7

Project:	Date: 12-5-18
Client: Hilcorp	Latitude/Longitude: 36.62761, -107.47812
Location: San Juan 28-6 #31	Datum:
Driller: Laz Trujillo w/ Earth Worx	Elevation:
Drilling Method: GeoProbe Push Rig	Logged by: C. Lameman
Depth to Water (ft): — Time Recorded: 1135 - 11:58	Total Depth (ft): 12'

Depth (ft)	Sample Interval	Sample Type (SPT, Grab, etc)	Sample Time	Blow Count (per 3x6" intervals)	Soil Description TYPE, density/consistency, color, grain size, moisture, other (i.e. odor, staining)	USCS Symbol	OVM (ppm)	OVM Time	MW Schematic and Description
0					Medium, Brown, Fine Grain Sand, High Plast,				
	3-4	Grab	11:36		Moist, Cohesive, No Odor (0-4)	CL	8.1	11:53	
					S.A.A. (4-5')				
5'						CL			
5					Loose, Fine Grain, Moist, Non Plastic,				
					Non cohesive, Dry, No Odor (5-5.5')	SW			
					Brown, Medium, High Plasticity, Moist,				
8	8'	Grab	11:40		Cohesive, No Odor (5.5-8')	CL	1.3	11:54	
8									
					S.A.A. @ 10' Slight Gray Staining odor	CL			
					(8-11)				
11					Dense, Tan Light Gray, Medium Grain,	SS			
11'					Dry, non plastic, non cohesive, ~~Strong~~ Slight odor				
12	11-12'	Grab	11:45		(11-12')		282.1	11:55	
					Total Depth @ 12' on Sandstone				
					Auger Refusal				
					Install Well				
					2" Screen @ 12' to 7'				
					Sandpack @ 12' to 6'				
					Bentonite @ 6' to surface				

SOIL BORING LOG

Animas Environmental Services
604 W. Piñon St., Farmington, NM 87401
Tel. (505) 564-2281 animasenvironmental.com

Soil Boring No: SB-8R
Monitor Well No: SVE-8
Project:
Date: 12-5-18
Client: Hilcorp
Latitude/Longitude: 36.62765, -107.47806
Location: San Juan 28-6 Unit 31
Datum:
Driller: Louis Trujillo Earth Worx
Elevation:
Drilling Method: GeoProbe Push Rig
Logged by: C. Lameman
Depth to Water (ft): —
Time Recorded: 12:56 - 13:27
Total Depth (ft): 12'

Depth (ft)	Sample Interval	Sample Type (SPT, Grab, etc)	Sample Time	Blow Count (per 3x6" intervals)	Soil Description TYPE, density/consistency, color, grain size, moisture, other (i.e. odor, staining)	USCS Symbol	OVM (ppm)	OVM Time	MW Schematic and Description
0					Medium-Soft, Brown, High Plasticity, Moist, Cohesive, Fine Grained Sand, No Oder (0-4)	CL			
*	4'	Grab	13:05		S.A.A. (4-5') Staining, Odor	CL	509	13:25	
5									
5					S. Loose, Tan, Medium Grained, Moist, non-plast. non cohesive, Strong odor (5-6')	SW			
9	7'-8	Grab	13:22		Stiff, Brown, Fine Grained Sand, High Plasticity, Moist, Strong Odor, Cohesive (6-9')	CL	394	13:26	
9					S.A.A. Gray staining, Strong Odor (9-11)	CL			12' to 7'
* 12	11'-12	Grab	13:18		Dense, Medium Grained, Gray, Dry, Strong odor, Non Plastic, Non Cohesive (11-12')	SS	2,969	13:27	
					Total Depth 12' on Sandstone				
					Auger Refusal				
					Install Well				
					2" screen @ 12' to 7'				
					Sand pack @ 12' to 6'				
					Bentonite @ 6' to surface				

SOIL BORING LOG: SB-24 SVE-9

Facility or Pipeline Name: Hilcorp SJ 28-6 Unit 31

Date: 12-5-18

AES personnel: C. Lameman

Buck Machine #_____			
Concentration	50 mg/kg	100 mg/kg	500 mg/kg
Calibration ABS Values			

Sample ID	Collection Date	Time of Sample Collection	Sample Location	Sample Depth (ft)	Composite	PID-OVM (ppm)	PID-OVM Time	~~Field TPH (mg/kg)~~	~~Field TPH Analysis Time~~	~~ABS~~	NOTES (i.e. Soil Type, Color, Odor, Staining)
SB-24	12-5-18										Brown, Medium, Fine Grained Sand, High Plasticity, Moist
											Cohesive, Strong Odor @ 4' (0-4')
		13:50		3-4 ~~13:50~~		324	13:52				Tan, Very Stiff, High Plasticity, Moist, Gray Staining
											Cohesive, Strong Odor (4-6')
											Tan, Loose, Medium Grained, Non Plasticity, Moist,
*		13:48		7-8 ~~13:48~~		4,750	13:53				non cohesive, Strong odor, Gray Staining (6-8')
											Tan, Very Stiff, High Plasticity Moist, Gray Staining.
											Cohesive, Extremely Strong Odor @ 9-11.5' (8-11.5')
											Dense, Tan Gray Staining, Medium Grained, non cohesive
											Dry, V. Strong Odor (11.5-12')
*		13:46		11-12'		4,594	13:54				Total Depth @ 12' on Sandstone. Auger Refusal
											1" Well Install
											1" screen @ 12' to 7'
											Sand pack @12' to 6'; Bentonite @ 6' to Surface

Type of Sample collection?:

Soil Boring Log: SVE-1R

Facility or Pipeline Name: San Juan 28-6 #31

Date: 12-5-18

AES personnel: C. Lameman

~~Buck Machine #_____~~			
Concentration	50 mg/kg	~~100 mg/kg~~	500 mg/kg
Calibration ABS Values			

Sample ID	Collection Date	Time of Sample Collection	Sample Location	Sample Depth (ft)	Composite	PID-OVM (ppm)	PID-OVM Time	Field TPH (mg/kg)	Field TPH Analysis Time	ABS	NOTES (i.e. Soil Type, Color, Odor, Staining)
SVE-1R	12-5-18	NS	NS	NS	N	NA	NA	No BoRING. LoGS.			
								Total Depth inStalled @ 12' Deep			
								1" Well			
								1" screen @ 12' to 7'			
								Sand Pack @ 12' to 6'			
								Bentonite @ 6' to Surface			
								NO LABS			

Type of Sample collection?:

ANALYTICAL REPORT

June 04, 2018

HilCorp-Farmington, NM

Sample Delivery Group:	L998202
Samples Received:	06/01/2018
Project Number:	AFE# 1851542
Description:	Hilcorp San Juan 28-6 #31

Report To:

Lindsay Dumas
382 Road 3100
Aztec, NM 87401

Entire Report Reviewed By: Daphne R Richards

Daphne Richards
Technical Service Representative

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by ESC is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.

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SAMPLE SUMMARY

SB-1 3' L998202-01 Solid

Collected by	Collected date/time	Received date/time
CL / SG	05/31/18 09:36	06/01/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1118680	1	06/01/18 13:11	06/01/18 13:22	JD
Volatile Organic Compounds (GC) by Method 8015/8021	WG1118855	1	06/01/18 11:10	06/01/18 23:52	LRL
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1118768	1	06/01/18 19:24	06/02/18 00:29	DMW

SB-1 7' L998202-02 Solid

Collected by	Collected date/time	Received date/time
CL / SG	05/31/18 09:55	06/01/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1118680	1	06/01/18 13:11	06/01/18 13:22	JD
Volatile Organic Compounds (GC) by Method 8015/8021	WG1118855	1	06/01/18 11:10	06/02/18 00:14	LRL
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1118768	1	06/01/18 19:24	06/02/18 02:17	DMW

SB-2 7' L998202-03 Solid

Collected by	Collected date/time	Received date/time
CL / SG	05/31/18 10:25	06/01/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1118680	1	06/01/18 13:11	06/01/18 13:22	JD
Volatile Organic Compounds (GC) by Method 8015/8021	WG1118855	1	06/01/18 11:10	06/02/18 00:37	LRL
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1118768	1	06/01/18 19:24	06/02/18 02:29	DMW

SB-3 1' L998202-04 Solid

Collected by	Collected date/time	Received date/time
CL / SG	05/31/18 10:30	06/01/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1118680	1	06/01/18 13:11	06/01/18 13:22	JD
Volatile Organic Compounds (GC) by Method 8015/8021	WG1118855-1	1	06/01/18 11:10	06/04/18 00:28	DWR
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1118768	1	06/01/18 19:24	06/02/18 02:41	DMW

SB-3 7.5' L998202-05 Solid

Collected by	Collected date/time	Received date/time
CL / SG	05/31/18 10:46	06/01/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1118680	1	06/01/18 13:11	06/01/18 13:22	JD
Volatile Organic Compounds (GC) by Method 8015/8021	WG1118855	1	06/01/18 11:10	06/02/18 01:21	LRL
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1118768	1	06/01/18 19:24	06/02/18 02:53	DMW

SB-4 8.5' L998202-06 Solid

Collected by	Collected date/time	Received date/time
CL / SG	05/31/18 11:15	06/01/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1118680	1	06/01/18 13:11	06/01/18 13:22	JD
Wet Chemistry by Method 300.0	WG1118594	1	06/01/18 11:11	06/01/18 20:02	MAJ
Volatile Organic Compounds (GC) by Method 8015/8021	WG1118855	500	06/01/18 11:10	06/02/18 01:44	LRL
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1118768	1	06/01/18 19:24	06/02/18 03:05	DMW

			Collected by	Collected date/time	Received date/time
			CL / SG	05/31/18 12:21	06/01/18 08:45

SB-5 11.75' L998202-07 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1118680	1	06/01/18 13:11	06/01/18 13:22	JD
Volatile Organic Compounds (GC) by Method 8015/8021	WG1118855	500	06/01/18 11:10	06/02/18 05:05	LRL
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1118768	1	06/01/18 19:24	06/02/18 03:17	DMW

			Collected by	Collected date/time	Received date/time
			CL / SG	05/31/18 13:02	06/01/18 08:45

SB-6 11' L998202-08 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1118680	1	06/01/18 13:11	06/01/18 13:22	JD
Volatile Organic Compounds (GC) by Method 8015/8021	WG1118855	1000	06/01/18 11:10	06/02/18 05:27	LRL
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1118768	1	06/01/18 19:24	06/02/18 03:29	DMW

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All radiochemical sample results for solids are reported on a dry weight basis with the exception of tritium, carbon-14 and radon, unless wet weight was requested by the client. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Daphne R Richards

Daphne Richards
Technical Service Representative

SB-1 3'
Collected date/time: 05/31/18 09:36

SAMPLE RESULTS - 01

L998202

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	89.4		1	06/01/2018 13:22	WG1118680

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result (dry) mg/kg	Qualifier	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Benzene	0.000844		0.000559	1	06/01/2018 23:52	WG1118855
Toluene	ND		0.00559	1	06/01/2018 23:52	WG1118855
Ethylbenzene	ND		0.000559	1	06/01/2018 23:52	WG1118855
Total Xylene	0.00337		0.00168	1	06/01/2018 23:52	WG1118855
TPH (GC/FID) Low Fraction	ND		0.112	1	06/01/2018 23:52	WG1118855
(S) a,a,a-Trifluorotoluene(FID)	*96.1*		*77.0-120*		*06/01/2018 23:52*	WG1118855
(S) a,a,a-Trifluorotoluene(PID)	*96.6*		*75.0-128*		*06/01/2018 23:52*	WG1118855

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result (dry) mg/kg	Qualifier	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	ND	J6	4.47	1	06/02/2018 00:29	WG1118768
C28-C40 Oil Range	ND		4.47	1	06/02/2018 00:29	WG1118768
(S) o-Terphenyl	*71.8*		*18.0-148*		*06/02/2018 00:29*	WG1118768

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	87.4		1	06/01/2018 13:22	WG1118680

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result (dry) mg/kg	Qualifier	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Benzene	0.00145		0.000572	1	06/02/2018 00:14	WG1118855
Toluene	0.00684		0.00572	1	06/02/2018 00:14	WG1118855
Ethylbenzene	0.000917		0.000572	1	06/02/2018 00:14	WG1118855
Total Xylene	0.0108		0.00172	1	06/02/2018 00:14	WG1118855
TPH (GC/FID) Low Fraction	ND		0.114	1	06/02/2018 00:14	WG1118855
(S) a,a,a-Trifluorotoluene(FID)	*96.3*		*77.0-120*		*06/02/2018 00:14*	WG1118855
(S) a,a,a-Trifluorotoluene(PID)	*97.0*		*75.0-128*		*06/02/2018 00:14*	WG1118855

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result (dry) mg/kg	Qualifier	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	ND		4.58	1	06/02/2018 02:17	WG1118768
C28-C40 Oil Range	ND		4.58	1	06/02/2018 02:17	WG1118768
(S) o-Terphenyl	*62.7*		*18.0-148*		*06/02/2018 02:17*	WG1118768

SB-2 7'

Collected date/time: 05/31/18 10:25

SAMPLE RESULTS - 03

L998202

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Total Solids by Method 2540 G-2011

	Result	Qualifier	Dilution	Analysis	Batch
Analyte	%			date / time	
Total Solids	87.2		1	06/01/2018 13:22	WG1118680

Volatile Organic Compounds (GC) by Method 8015/8021

	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
Analyte	mg/kg		mg/kg		date / time	
Benzene	0.000724		0.000574	1	06/02/2018 00:37	WG1118855
Toluene	ND		0.00574	1	06/02/2018 00:37	WG1118855
Ethylbenzene	ND		0.000574	1	06/02/2018 00:37	WG1118855
Total Xylene	ND		0.00172	1	06/02/2018 00:37	WG1118855
TPH (GC/FID) Low Fraction	ND		0.115	1	06/02/2018 00:37	WG1118855
(S) a,a,a-Trifluorotoluene(FID)	*96.6*		*77.0-120*		*06/02/2018 00:37*	WG1118855
(S) a,a,a-Trifluorotoluene(PID)	*97.1*		*75.0-128*		*06/02/2018 00:37*	WG1118855

Semi-Volatile Organic Compounds (GC) by Method 8015

	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
Analyte	mg/kg		mg/kg		date / time	
C10-C28 Diesel Range	ND		4.59	1	06/02/2018 02:29	WG1118768
C28-C40 Oil Range	ND		4.59	1	06/02/2018 02:29	WG1118768
(S) o-Terphenyl	*58.8*		*18.0-148*		*06/02/2018 02:29*	WG1118768

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	87.9		1	06/01/2018 13:22	WG1118680

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result (dry) mg/kg	Qualifier	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Benzene	0.00115		0.000569	1	06/04/2018 00:28	WG1118855-1
Toluene	ND		0.00569	1	06/04/2018 00:28	WG1118855-1
Ethylbenzene	ND		0.000569	1	06/04/2018 00:28	WG1118855-1
Total Xylene	0.00604		0.00171	1	06/04/2018 00:28	WG1118855-1
TPH (GC/FID) Low Fraction	ND		0.114	1	06/04/2018 00:28	WG1118855-1
(S) a,a,a-Trifluorotoluene(FID)	*99.6*		*77.0-120*		*06/04/2018 00:28*	WG1118855-1
(S) a,a,a-Trifluorotoluene(PID)	*104*		*75.0-128*		*06/04/2018 00:28*	WG1118855-1

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result (dry) mg/kg	Qualifier	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	ND		4.55	1	06/02/2018 02:41	WG1118768
C28-C40 Oil Range	ND		4.55	1	06/02/2018 02:41	WG1118768
(S) o-Terphenyl	*69.5*		*18.0-148*		*06/02/2018 02:41*	WG1118768

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	86.3		1	06/01/2018 13:22	WG1118680

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result (dry) mg/kg	Qualifier	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Benzene	0.00795		0.000580	1	06/02/2018 01:21	WG1118855
Toluene	0.0280		0.00580	1	06/02/2018 01:21	WG1118855
Ethylbenzene	0.00226		0.000580	1	06/02/2018 01:21	WG1118855
Total Xylene	0.0264		0.00174	1	06/02/2018 01:21	WG1118855
TPH (GC/FID) Low Fraction	ND		0.116	1	06/02/2018 01:21	WG1118855
(S) a,a,a-Trifluorotoluene(FID)	*96.2*		*77.0-120*		*06/02/2018 01:21*	WG1118855
(S) a,a,a-Trifluorotoluene(PID)	*96.7*		*75.0-128*		*06/02/2018 01:21*	WG1118855

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result (dry) mg/kg	Qualifier	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	ND		4.64	1	06/02/2018 02:53	WG1118768
C28-C40 Oil Range	ND		4.64	1	06/02/2018 02:53	WG1118768
(S) o-Terphenyl	*54.8*		*18.0-148*		*06/02/2018 02:53*	WG1118768

SB-4 8.5'

Collected date/time: 05/31/18 11:15

SAMPLE RESULTS - 06

L998202

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	85.2		1	06/01/2018 13:22	WG1118680

Wet Chemistry by Method 300.0

Analyte	Result (dry) mg/kg	Qualifier	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Chloride	67.0		11.7	1	06/01/2018 20:02	WG1118594

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result (dry) mg/kg	Qualifier	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Benzene	2.26		0.293	500	06/02/2018 01:44	WG1118855
Toluene	12.9		2.93	500	06/02/2018 01:44	WG1118855
Ethylbenzene	4.09		0.293	500	06/02/2018 01:44	WG1118855
Total Xylene	32.0		0.880	500	06/02/2018 01:44	WG1118855
TPH (GC/FID) Low Fraction	626		58.7	500	06/02/2018 01:44	WG1118855
(S) a,a,a-Trifluorotoluene(FID)	*84.4*		*77.0-120*		*06/02/2018 01:44*	WG1118855
(S) a,a,a-Trifluorotoluene(PID)	*98.7*		*75.0-128*		*06/02/2018 01:44*	WG1118855

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result (dry) mg/kg	Qualifier	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	60.9		4.70	1	06/02/2018 03:05	WG1118768
C28-C40 Oil Range	ND		4.70	1	06/02/2018 03:05	WG1118768
(S) o-Terphenyl	*74.5*		*18.0-148*		*06/02/2018 03:05*	WG1118768

SB-5 11.75'

Collected date/time: 05/31/18 12:21

SAMPLE RESULTS - 07

L998202

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Total Solids by Method 2540 G-2011

	Result	Qualifier	Dilution	Analysis	Batch
Analyte	%			date / time	
Total Solids	91.8		1	06/01/2018 13:22	WG1118680

Volatile Organic Compounds (GC) by Method 8015/8021

	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
Analyte	mg/kg		mg/kg		date / time	
Benzene	3.02		0.272	500	06/02/2018 05:05	WG1118855
Toluene	21.0		2.72	500	06/02/2018 05:05	WG1118855
Ethylbenzene	5.06		0.272	500	06/02/2018 05:05	WG1118855
Total Xylene	43.6		0.817	500	06/02/2018 05:05	WG1118855
TPH (GC/FID) Low Fraction	1050		54.5	500	06/02/2018 05:05	WG1118855
(S) a,a,a-Trifluorotoluene(FID)	*76.9*	J2	*77.0-120*		*06/02/2018 05:05*	WG1118855
(S) a,a,a-Trifluorotoluene(PID)	*97.0*		*75.0-128*		*06/02/2018 05:05*	WG1118855

Semi-Volatile Organic Compounds (GC) by Method 8015

	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
Analyte	mg/kg		mg/kg		date / time	
C10-C28 Diesel Range	132		4.36	1	06/02/2018 03:17	WG1118768
C28-C40 Oil Range	ND		4.36	1	06/02/2018 03:17	WG1118768
(S) o-Terphenyl	*71.8*		*18.0-148*		*06/02/2018 03:17*	WG1118768

Total Solids by Method 2540 G-2011

	Result	Qualifier	Dilution	Analysis	Batch
Analyte	%			date / time	
Total Solids	91.5		1	06/01/2018 13:22	WG1118680

Volatile Organic Compounds (GC) by Method 8015/8021

	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
Analyte	mg/kg		mg/kg		date / time	
Benzene	5.84		0.546	1000	06/02/2018 05:27	WG1118855
Toluene	49.3		5.46	1000	06/02/2018 05:27	WG1118855
Ethylbenzene	12.8		0.546	1000	06/02/2018 05:27	WG1118855
Total Xylene	116		1.64	1000	06/02/2018 05:27	WG1118855
TPH (GC/FID) Low Fraction	2120		109	1000	06/02/2018 05:27	WG1118855
(S) a,a,a-Trifluorotoluene(FID)	*79.3*		*77.0-120*		*06/02/2018 05:27*	WG1118855
(S) a,a,a-Trifluorotoluene(PID)	*98.4*		*75.0-128*		*06/02/2018 05:27*	WG1118855

Semi-Volatile Organic Compounds (GC) by Method 8015

	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
Analyte	mg/kg		mg/kg		date / time	
C10-C28 Diesel Range	331		4.37	1	06/02/2018 03:29	WG1118768
C28-C40 Oil Range	ND		4.37	1	06/02/2018 03:29	WG1118768
(S) o-Terphenyl	*73.3*		*18.0-148*		*06/02/2018 03:29*	WG1118768

Method Blank (MB)

(MB) R3315059-1 06/01/18 13:22

Analyte	MB Result %	MB Qualifier	MB MDL %	MB RDL %
Total Solids	0.000			

L998202-01 Original Sample (OS) • Duplicate (DUP)

(OS) L998202-01 06/01/18 13:22 • (DUP) R3315059-3 06/01/18 13:22

Analyte	Original Result %	DUP Result %	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Total Solids	89.4	89.2	1	0.193		5

Laboratory Control Sample (LCS)

(LCS) R3315059-2 06/01/18 13:22

Analyte	Spike Amount %	LCS Result %	LCS Rec. %	Rec. Limits %	LCS Qualifier
Total Solids	50.0	50.0	100	85.0-115	

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Method Blank (MB)

(MB) R3314607-1 06/01/18 11:37

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/kg		mg/kg	mg/kg
Chloride	U		0.795	10.0

L998025-02 Original Sample (OS) • Duplicate (DUP)

(OS) L998025-02 06/01/18 14:17 • (DUP) R3314607-4 06/01/18 14:33

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/kg	mg/kg		%		%
Chloride	55.3	51.4	1	7.30		20

L998025-13 Original Sample (OS) • Duplicate (DUP)

(OS) L998025-13 06/01/18 18:24 • (DUP) R3314607-7 06/01/18 18:40

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/kg	mg/kg		%		%
Chloride	267	240	1	10.4		20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3314607-2 06/01/18 11:52 • (LCSD) R3314607-3 06/01/18 12:08

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	%	%	%			%	%
Chloride	500	527	522	105	104	90.0-110			1.02	20

L998025-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L998025-06 06/01/18 15:35 • (MS) R3314607-5 06/01/18 15:50 • (MSD) R3314607-6 06/01/18 16:05

	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
Chloride	500	369	977	956	122	117	1	80.0-120	J5		2.19	20

Method Blank (MB)

(MB) R3314803-5 06/01/18 18:18

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Benzene	U		0.000120	0.000500
Toluene	U		0.000150	0.00500
Ethylbenzene	U		0.000110	0.000500
Total Xylene	U		0.000460	0.00150
TPH (GC/FID) Low Fraction	U		0.0217	0.100
(S) a,a,a-Trifluorotoluene(FID)	*99.9*			*77.0-120*
(S) a,a,a-Trifluorotoluene(PID)	*99.6*			*75.0-128*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3314803-2 06/01/18 16:48 • (LCSD) R3314803-1 06/01/18 14:32

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	0.0500	0.0521	0.0519	104	104	71.0-121			0.323	20
Toluene	0.0500	0.0538	0.0534	108	107	72.0-120			0.615	20
Ethylbenzene	0.0500	0.0537	0.0532	107	106	76.0-121			0.951	20
Total Xylene	0.150	0.163	0.162	108	108	75.0-124			0.246	20
(S) a,a,a-Trifluorotoluene(FID)				*99.2*	*98.9*	*77.0-120*				
(S) a,a,a-Trifluorotoluene(PID)				*98.6*	*97.9*	*75.0-128*				

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3314803-3 06/01/18 17:11 • (LCSD) R3314803-4 06/01/18 17:33

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	4.97	4.82	90.3	87.6	70.0-136			3.08	20
(S) a,a,a-Trifluorotoluene(FID)				*102*	*102*	*77.0-120*				
(S) a,a,a-Trifluorotoluene(PID)				*107*	*107*	*75.0-128*				

L998202-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L998202-06 06/02/18 01:44 • (MS) R3314803-6 06/02/18 09:10 • (MSD) R3314803-7 06/02/18 09:33

	Spike Amount (dry)	Original Result (dry)	MS Result (dry)	MSD Result (dry)	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
Benzene	0.0587	2.26	32.2	31.8	102	101	500	10.0-146			1.22	29
Toluene	0.0587	12.9	42.6	42.1	101	99.6	500	10.0-143			1.19	30
Ethylbenzene	0.0587	4.09	34.4	33.5	103	100	500	10.0-147			2.85	31
Total Xylene	0.176	32.0	122	119	102	99.0	500	10.0-149			2.05	30
(S) a,a,a-Trifluorotoluene(FID)					*91.7*	*91.8*		*77.0-120*				
(S) a,a,a-Trifluorotoluene(PID)					*98.3*	*98.8*		*75.0-128*				

L998202-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L998202-06 06/02/18 01:44 • (MS) R3314803-8 06/02/18 09:56 • (MSD) R3314803-9 06/02/18 10:18

	Spike Amount (dry)	Original Result (dry)	MS Result (dry)	MSD Result (dry)	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
TPH (GC/FID) Low Fraction	6.46	626	4130	4390	108	116	500	10.0-147			6.06	30
(S) a,a,a-Trifluorotoluene(FID)					*103*	*104*		*77.0-120*				
(S) a,a,a-Trifluorotoluene(PID)					*110*	*111*		*75.0-128*				

Method Blank (MB)

(MB) R3315019-5 06/03/18 20:52

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Benzene	U		0.000120	0.000500
Toluene	0.000406	J	0.000150	0.00500
Ethylbenzene	U		0.000110	0.000500
Total Xylene	U		0.000460	0.00150
TPH (GC/FID) Low Fraction	U		0.0217	0.100
(S) a,a,a-Trifluorotoluene(FID)	*103*			*77.0-120*
(S) a,a,a-Trifluorotoluene(PID)	*107*			*75.0-128*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3315019-1 06/03/18 19:07 • (LCSD) R3315019-2 06/03/18 19:28

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	0.0500	0.0494	0.0494	98.9	98.8	71.0-121			0.0431	20
Toluene	0.0500	0.0489	0.0486	97.8	97.2	72.0-120			0.598	20
Ethylbenzene	0.0500	0.0540	0.0539	108	108	76.0-121			0.335	20
Total Xylene	0.150	0.164	0.163	109	108	75.0-124			0.736	20
(S) a,a,a-Trifluorotoluene(FID)				*97.9*	*98.5*	*77.0-120*				
(S) a,a,a-Trifluorotoluene(PID)				*103*	*103*	*75.0-128*				

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3315019-3 06/03/18 19:49 • (LCSD) R3315019-4 06/03/18 20:10

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	5.34	5.34	97.0	97.2	70.0-136			0.159	20
(S) a,a,a-Trifluorotoluene(FID)				*94.2*	*92.9*	*77.0-120*				
(S) a,a,a-Trifluorotoluene(PID)				*114*	*114*	*75.0-128*				

WG1118768

Semi-Volatile Organic Compounds (GC) by Method 8015

QUALITY CONTROL SUMMARY

L998202-01,02,03,04,05,06,07,08

Method Blank (MB)

(MB) R3314806-1 06/01/18 23:54

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
C10-C28 Diesel Range	U		1.61	4.00
C28-C40 Oil Range	U		0.274	4.00
(S) o-Terphenyl	*74.3*			*18.0-148*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3314806-2 06/02/18 00:06 • (LCSD) R3314806-3 06/02/18 00:17

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
C10-C28 Diesel Range	50.0	27.6	27.3	55.2	54.6	50.0-150			1.08	20
(S) o-Terphenyl				*102*	*103*	*18.0-148*				

L998202-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L998202-01 06/02/18 00:29 • (MS) R3314806-4 06/02/18 00:41 • (MSD) R3314806-5 06/02/18 00:53

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
C10-C28 Diesel Range	55.9	ND	26.4	30.4	47.3	54.4	1	50.0-150	J6		13.9	20
(S) o-Terphenyl					*78.3*	*88.2*		*18.0-148*				

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Abbreviations and Definitions

(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].
MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
RDL (dry)	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
J	The identification of the analyte is acceptable; the reported value is an estimate.
J2	Surrogate recovery limits have been exceeded; values are outside lower control limits.
J5	The sample matrix interfered with the ability to make any accurate determination; spike value is high.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.

ACCREDITATIONS & LOCATIONS

ESC Lab Sciences is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.
* Not all certifications held by the laboratory are applicable to the results reported in the attached report.
* Accreditation is only applicable to the test methods specified on each scope of accreditation held by ESC Lab Sciences.

State Accreditations

Alabama	40660
Alaska	17-026
Arizona	AZ0612
Arkansas	88-0469
California	2932
Colorado	TN00003
Connecticut	PH-0197
Florida	E87487
Georgia	NELAP
Georgia [1]	923
Idaho	TN00003
Illinois	200008
Indiana	C-TN-01
Iowa	364
Kansas	E-10277
Kentucky [1,6]	90010
Kentucky [2]	16
Louisiana	AI30792
Louisiana [1]	LA180010
Maine	TN0002
Maryland	324
Massachusetts	M-TN003
Michigan	9958
Minnesota	047-999-395
Mississippi	TN00003
Missouri	340
Montana	CERT0086

Nebraska	NE-OS-15-05
Nevada	TN-03-2002-34
New Hampshire	2975
New Jersey–NELAP	TN002
New Mexico [1]	n/a
New York	11742
North Carolina	Env375
North Carolina [1]	DW21704
North Carolina [3]	41
North Dakota	R-140
Ohio–VAP	CL0069
Oklahoma	9915
Oregon	TN200002
Pennsylvania	68-02979
Rhode Island	LAO00356
South Carolina	84004
South Dakota	n/a
Tennessee [1,4]	2006
Texas	T 104704245-17-14
Texas [5]	LAB0152
Utah	TN00003
Vermont	VT2006
Virginia	460132
Washington	C847
West Virginia	233
Wisconsin	9980939910
Wyoming	A2LA

Third Party Federal Accreditations

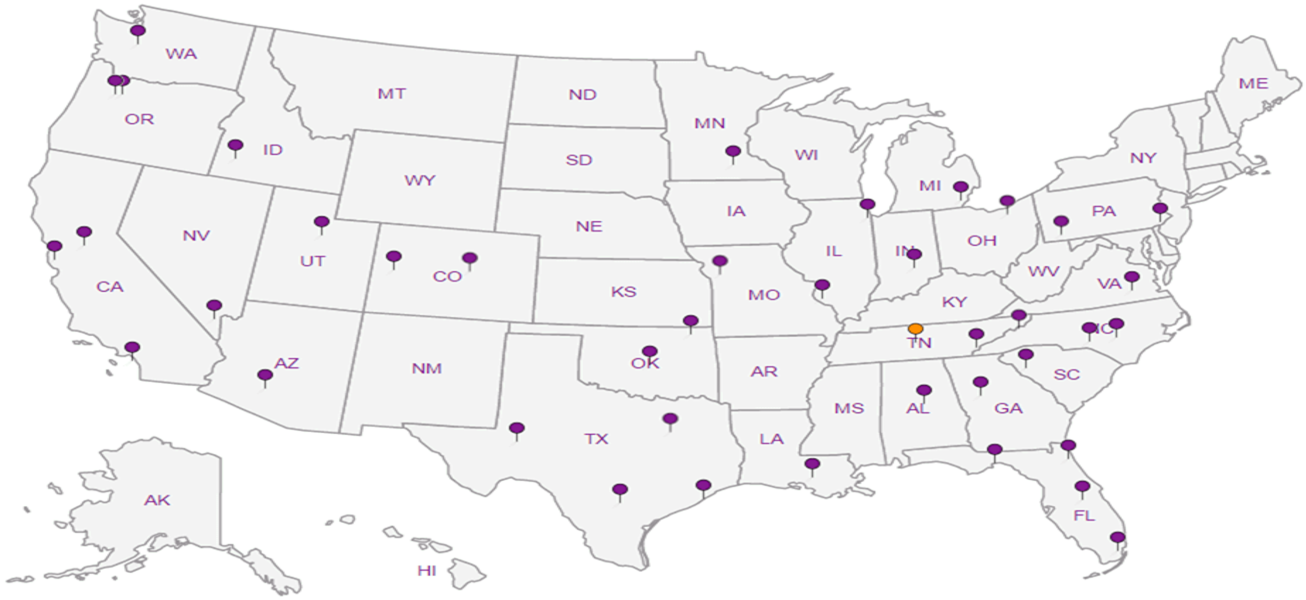
A2LA – ISO 17025	1461.01
A2LA – ISO 17025 [5]	1461.02
Canada	1461.01
EPA–Crypto	TN00003

AIHA-LAP,LLC EMLAP	100789
DOD	1461.01
USDA	P330-15-00234

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

Our Locations

ESC Lab Sciences has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. ESC Lab Sciences performs all testing at our central laboratory.



Billing Information:

Bill to Hilcorp - CALL LINDSAY DUMAS

Pres Chk

Analysis / Container / Preservative

Chain of Custody Page ___ of ___

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Fax: 615-758-5859

L# 998202

A015

Acctnum:
Template:
Prelogin:
TSR:
PB:
Shipped Via:

Report to: **Lindsay Dumas**

Email To: **ldumas@hilcorp.com**

Project Description: **Hilcorp San Juan 28-6 #31**

City/State Collected: **New Mexico**

Phone: **832-839-4585**
Fax:

Client Project #

Lab Project #

Collected by (print): **Corwin Lameman, Sam Glasses**

Site/Facility ID #

P.O. #

Collected by (signature):

Immediately Packed on Ice N____ Y_X_

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
_X_ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote #

Date Results Needed **June 4, 2018**

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	BTEX - 8021	TPH (GRO/DRO/MRO) - 8015	Chlorides - 300.0	Remarks	Sample # (lab only)
SB-1 @ 3 ft	**Grab**	**SS**	**3**	**5/31/18**	**9:36**	**2**	X	X			01
SB-1 @ 7 ft	**Grab**	**SS**	**7**	**5/31/18**	**9:55**	**2**	X	X			02
SB-2 @ 7 ft	**Grab**	**SS**	**7**	**5/31/18**	**10:25**	**2**	X	X			03
SB-3 @ 1 ft	**Grab**	**SS**	**1**	**5/31/18**	**10:30**	**2**	X	X			04
SB-3 @ 7.5 ft	**Grab**	**SS**	**7.5**	**5/31/18**	**10:46**	**2**	X	X			05
SB-4 @ 8.5 ft	**Grab**	**SS**	**8.5**	**5/31/18**	**11:15**	**2**	X	X	X		06
SB-5 @ 11.75 ft	**Grab**	**SS**	**11.75**	**5/31/18**	**12:21**	**2**	X	X			07
SB-6 @ 11 ft	**Grab**	**SS**	**11**	**5/31/18**	**13:02**	**2**	X	X			08

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other________

Remarks:

Email results to Elizabeth McNally - emcnally@animasenvironmental.com

pH ______ Temp ______

Flow ______ Other ______

Samples returned via:
__ UPS __ FedEx __ Courier ______

Tracking # 7305 8947 4827

Sample Receipt Checklist
COC Seal Present/Intact: __NP _✓Y __N
COC Signed/Accurate: _✓Y __N
Bottles arrive intact: _✓Y __N
Correct bottles used: _✓Y __N
Sufficient volume sent: _✓Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: __Y __N

Relinquished by : (Signature)

Date: 5-31-18

Time: 16:49

Received by: (Signature)

Trip Blank Received: Yes / [✓ No]
HCL / MeoH
TBR

Relinquished by : (Signature)

Date:

Time:

Received by: (Signature)

Temp: 1.0 °C

Bottles Received: 16

If preservation required by Login: Date/Time

Relinquished by : (Signature)

Date:

Time:

Received for lab by: (Signature) 8617

Date: 5/31/18

Time: 845

Hold:

Condition: NCF / [✓ OK]

Pace Analytical®
National Center for Testing & Innovation

ANALYTICAL REPORT

July 10, 2018

HilCorp-Farmington, NM

Sample Delivery Group:	L1006375
Samples Received:	06/29/2018
Project Number:	
Description:	Hilcomp San Juan 28-6 #31
Report To:	Kurt Hoekstra and Lindsay Dumas 382 Road 3100 Aztec, NM 87401

Entire Report Reviewed By: Daphne R Richards

Daphne Richards
Technical Service Representative

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace National is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.

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SB-7 25' L1006375-01 Solid

Collected by	Collected date/time	Received date/time
CL	06/27/18 10:19	06/29/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC) by Method 8015/8021	WG1133929	1	07/03/18 10:08	07/05/18 13:03	LRL
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1135023	1	07/07/18 00:01	07/08/18 20:13	MTJ

SB-8 15' L1006375-02 Solid

Collected by	Collected date/time	Received date/time
CL	06/27/18 12:13	06/29/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC) by Method 8015/8021	WG1133929	100	07/03/18 10:08	07/05/18 15:33	LRL
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1135023	1	07/07/18 00:01	07/08/18 20:53	MTJ

SB-9 10' L1006375-03 Solid

Collected by	Collected date/time	Received date/time
CL	06/27/18 13:09	06/29/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC) by Method 8015/8021	WG1133929	1	07/03/18 10:08	07/05/18 13:24	LRL
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1135023	1	07/07/18 00:01	07/08/18 21:07	MTJ

SB-10 10' L1006375-04 Solid

Collected by	Collected date/time	Received date/time
CL	06/27/18 14:11	06/29/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC) by Method 8015/8021	WG1133929	1000	07/03/18 10:08	07/05/18 16:16	LRL
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1135023	1	07/07/18 00:01	07/08/18 21:20	CLG
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1135023	20	07/07/18 00:01	07/09/18 18:27	MG

SB-11 10' L1006375-05 Solid

Collected by	Collected date/time	Received date/time
CL	06/27/18 14:34	06/29/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC) by Method 8015/8021	WG1133929	1	07/03/18 10:08	07/05/18 13:45	LRL
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1135023	1	07/07/18 00:01	07/08/18 21:34	MTJ

SB-12 10' L1006375-06 Solid

Collected by	Collected date/time	Received date/time
CL	06/27/18 15:17	06/29/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC) by Method 8015/8021	WG1134677	2000	07/03/18 10:08	07/09/18 14:48	BMB
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1135023	1	07/07/18 00:01	07/08/18 21:47	MTJ
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1135023	5	07/07/18 00:01	07/09/18 16:25	MTJ

SB-13 10' L1006375-07 Solid

Collected by	Collected date/time	Received date/time
CL	06/27/18 16:02	06/29/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC) by Method 8015/8021	WG1133929	1000	07/03/18 10:08	07/05/18 16:37	LRL
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1135023	1	07/07/18 00:01	07/08/18 22:01	MTJ
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1135023	10	07/07/18 00:01	07/09/18 16:38	MTJ

Collected by	Collected date/time	Received date/time
CL	06/27/18 16:41	06/29/18 08:45

SB-14 10' L1006375-08 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC) by Method 8015/8021	WG1133929	1000	07/03/18 10:08	07/05/18 16:58	LRL
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1135023	1	07/07/18 00:01	07/08/18 22:14	MTJ
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1135023	10	07/07/18 00:01	07/09/18 16:52	MTJ

Collected by	Collected date/time	Received date/time
CL	06/27/18 17:15	06/29/18 08:45

SB-15 10' L1006375-09 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC) by Method 8015/8021	WG1133929	1000	07/03/18 10:08	07/05/18 17:19	LRL
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1135023	1	07/07/18 00:01	07/08/18 22:28	MTJ
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1135023	10	07/07/18 00:01	07/09/18 17:06	MTJ

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All radiochemical sample results for solids are reported on a dry weight basis with the exception of tritium, carbon-14 and radon, unless wet weight was requested by the client. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Daphne R Richards

Daphne Richards
Technical Service Representative

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	0.00101	B	0.000500	1	07/05/2018 13:03	WG1133929
Toluene	ND		0.00500	1	07/05/2018 13:03	WG1133929
Ethylbenzene	0.000669	B	0.000500	1	07/05/2018 13:03	WG1133929
Total Xylene	0.00308	B	0.00150	1	07/05/2018 13:03	WG1133929
TPH (GC/FID) Low Fraction	0.247		0.100	1	07/05/2018 13:03	WG1133929
(S) a,a,a-Trifluorotoluene(FID)	*99.7*		*77.0-120*		*07/05/2018 13:03*	WG1133929
(S) a,a,a-Trifluorotoluene(PID)	*104*		*75.0-128*		*07/05/2018 13:03*	WG1133929

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	14.2		4.00	1	07/08/2018 20:13	WG1135023
C28-C40 Oil Range	ND		4.00	1	07/08/2018 20:13	WG1135023
(S) o-Terphenyl	*77.5*		*18.0-148*		*07/08/2018 20:13*	WG1135023

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	0.417		0.0500	100	07/05/2018 15:33	WG1133929
Toluene	ND		0.500	100	07/05/2018 15:33	WG1133929
Ethylbenzene	0.339		0.0500	100	07/05/2018 15:33	WG1133929
Total Xylene	4.19		0.150	100	07/05/2018 15:33	WG1133929
TPH (GC/FID) Low Fraction	362		10.0	100	07/05/2018 15:33	WG1133929
(S) a,a,a-Trifluorotoluene(FID)	*94.9*		*77.0-120*		*07/05/2018 15:33*	WG1133929
(S) a,a,a-Trifluorotoluene(PID)	*105*		*75.0-128*		*07/05/2018 15:33*	WG1133929

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	82.6		4.00	1	07/08/2018 20:53	WG1135023
C28-C40 Oil Range	ND		4.00	1	07/08/2018 20:53	WG1135023
(S) o-Terphenyl	*78.8*		*18.0-148*		*07/08/2018 20:53*	WG1135023

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	ND		0.000500	1	07/05/2018 13:24	WG1133929
Toluene	ND		0.00500	1	07/05/2018 13:24	WG1133929
Ethylbenzene	0.000649	B	0.000500	1	07/05/2018 13:24	WG1133929
Total Xylene	0.00749		0.00150	1	07/05/2018 13:24	WG1133929
TPH (GC/FID) Low Fraction	0.700		0.100	1	07/05/2018 13:24	WG1133929
(S) a,a,a-Trifluorotoluene(FID)	*101*		*77.0-120*		*07/05/2018 13:24*	WG1133929
(S) a,a,a-Trifluorotoluene(PID)	*104*		*75.0-128*		*07/05/2018 13:24*	WG1133929

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	ND		4.00	1	07/08/2018 21:07	WG1135023
C28-C40 Oil Range	ND		4.00	1	07/08/2018 21:07	WG1135023
(S) o-Terphenyl	*87.5*		*18.0-148*		*07/08/2018 21:07*	WG1135023

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	19.6		0.500	1000	07/05/2018 16:16	WG1133929
Toluene	178		5.00	1000	07/05/2018 16:16	WG1133929
Ethylbenzene	33.0		0.500	1000	07/05/2018 16:16	WG1133929
Total Xylene	400		1.50	1000	07/05/2018 16:16	WG1133929
TPH (GC/FID) Low Fraction	10800		100	1000	07/05/2018 16:16	WG1133929
(S) a,a,a-Trifluorotoluene(FID)	*90.1*		*77.0-120*		*07/05/2018 16:16*	WG1133929
(S) a,a,a-Trifluorotoluene(PID)	*101*		*75.0-128*		*07/05/2018 16:16*	WG1133929

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	1330		80.0	20	07/09/2018 18:27	WG1135023
C28-C40 Oil Range	6.67		4.00	1	07/08/2018 21:20	WG1135023
(S) o-Terphenyl	*84.4*		*18.0-148*		*07/08/2018 21:20*	WG1135023
(S) o-Terphenyl	*73.2*	J7	*18.0-148*		*07/09/2018 18:27*	WG1135023

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	0.000664	B	0.000500	1	07/05/2018 13:45	WG1133929
Toluene	ND		0.00500	1	07/05/2018 13:45	WG1133929
Ethylbenzene	0.000751	B	0.000500	1	07/05/2018 13:45	WG1133929
Total Xylene	0.0127		0.00150	1	07/05/2018 13:45	WG1133929
TPH (GC/FID) Low Fraction	0.119		0.100	1	07/05/2018 13:45	WG1133929
(S) a,a,a-Trifluorotoluene(FID)	*100*		*77.0-120*		*07/05/2018 13:45*	WG1133929
(S) a,a,a-Trifluorotoluene(PID)	*104*		*75.0-128*		*07/05/2018 13:45*	WG1133929

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	ND		4.00	1	07/08/2018 21:34	WG1135023
C28-C40 Oil Range	ND		4.00	1	07/08/2018 21:34	WG1135023
(S) o-Terphenyl	*92.7*		*18.0-148*		*07/08/2018 21:34*	WG1135023

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	4.12		1.00	2000	07/09/2018 14:48	WG1134677
Toluene	25.6		10.0	2000	07/09/2018 14:48	WG1134677
Ethylbenzene	14.2		1.00	2000	07/09/2018 14:48	WG1134677
Total Xylene	189		3.00	2000	07/09/2018 14:48	WG1134677
TPH (GC/FID) Low Fraction	4970		200	2000	07/09/2018 14:48	WG1134677
(S) a,a,a-Trifluorotoluene(FID)	*96.3*		*77.0-120*		*07/09/2018 14:48*	WG1134677
(S) a,a,a-Trifluorotoluene(PID)	*106*		*75.0-128*		*07/09/2018 14:48*	WG1134677

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	372		20.0	5	07/09/2018 16:25	WG1135023
C28-C40 Oil Range	ND		4.00	1	07/08/2018 21:47	WG1135023
(S) o-Terphenyl	*79.3*		*18.0-148*		*07/08/2018 21:47*	WG1135023
(S) o-Terphenyl	*70.0*		*18.0-148*		*07/09/2018 16:25*	WG1135023

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	1.65	B	0.500	1000	07/05/2018 16:37	WG1133929
Toluene	16.6		5.00	1000	07/05/2018 16:37	WG1133929
Ethylbenzene	7.99		0.500	1000	07/05/2018 16:37	WG1133929
Total Xylene	128		1.50	1000	07/05/2018 16:37	WG1133929
TPH (GC/FID) Low Fraction	3270		100	1000	07/05/2018 16:37	WG1133929
(S) a,a,a-Trifluorotoluene(FID)	*102*		*77.0-120*		*07/05/2018 16:37*	WG1133929
(S) a,a,a-Trifluorotoluene(PID)	*105*		*75.0-128*		*07/05/2018 16:37*	WG1133929

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	813		40.0	10	07/09/2018 16:38	WG1135023
C28-C40 Oil Range	ND		4.00	1	07/08/2018 22:01	WG1135023
(S) o-Terphenyl	*83.9*		*18.0-148*		*07/09/2018 16:38*	WG1135023
(S) o-Terphenyl	*101*		*18.0-148*		*07/08/2018 22:01*	WG1135023

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	5.82		0.500	1000	07/05/2018 16:58	WG1133929
Toluene	69.2		5.00	1000	07/05/2018 16:58	WG1133929
Ethylbenzene	18.1		0.500	1000	07/05/2018 16:58	WG1133929
Total Xylene	249		1.50	1000	07/05/2018 16:58	WG1133929
TPH (GC/FID) Low Fraction	5810		100	1000	07/05/2018 16:58	WG1133929
(S) a,a,a-Trifluorotoluene(FID)	*88.2*		*77.0-120*		*07/05/2018 16:58*	WG1133929
(S) a,a,a-Trifluorotoluene(PID)	*104*		*75.0-128*		*07/05/2018 16:58*	WG1133929

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	932		40.0	10	07/09/2018 16:52	WG1135023
C28-C40 Oil Range	ND		4.00	1	07/08/2018 22:14	WG1135023
(S) o-Terphenyl	*89.1*		*18.0-148*		*07/08/2018 22:14*	WG1135023
(S) o-Terphenyl	*81.4*		*18.0-148*		*07/09/2018 16:52*	WG1135023

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	4.05		0.500	1000	07/05/2018 17:19	WG1133929
Toluene	52.2		5.00	1000	07/05/2018 17:19	WG1133929
Ethylbenzene	19.5		0.500	1000	07/05/2018 17:19	WG1133929
Total Xylene	289		1.50	1000	07/05/2018 17:19	WG1133929
TPH (GC/FID) Low Fraction	6130		100	1000	07/05/2018 17:19	WG1133929
(S) a,a,a-Trifluorotoluene(FID)	*93.4*		*77.0-120*		*07/05/2018 17:19*	WG1133929
(S) a,a,a-Trifluorotoluene(PID)	*105*		*75.0-128*		*07/05/2018 17:19*	WG1133929

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	877		40.0	10	07/09/2018 17:06	WG1135023
C28-C40 Oil Range	ND		4.00	1	07/08/2018 22:28	WG1135023
(S) o-Terphenyl	*98.6*		*18.0-148*		*07/08/2018 22:28*	WG1135023
(S) o-Terphenyl	*87.7*		*18.0-148*		*07/09/2018 17:06*	WG1135023

Method Blank (MB)

(MB) R3323705-5 07/05/18 12:07

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Benzene	0.000217	J	0.000120	0.000500
Toluene	0.000315	J	0.000150	0.00500
Ethylbenzene	0.000122	J	0.000110	0.000500
Total Xylene	U		0.000460	0.00150
TPH (GC/FID) Low Fraction	U		0.0217	0.100
(S) a,a,a-Trifluorotoluene(FID)	*101*			*77.0-120*
(S) a,a,a-Trifluorotoluene(PID)	*105*			*75.0-128*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3323705-1 07/05/18 10:22 • (LCSD) R3323705-6 07/05/18 10:43

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	5.23	5.15	95.0	93.6	70.0-136			1.54	20
(S) a,a,a-Trifluorotoluene(FID)				*85.8*	*88.7*	*77.0-120*				
(S) a,a,a-Trifluorotoluene(PID)				*113*	*113*	*75.0-128*				

Laboratory Control Sample (LCS)

(LCS) R3323705-2 07/05/18 10:43

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
TPH (GC/FID) Low Fraction	5.50	5.15	93.6	70.0-136	
(S) a,a,a-Trifluorotoluene(FID)			*88.7*	*77.0-120*	
(S) a,a,a-Trifluorotoluene(PID)			*113*	*75.0-128*	

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3323705-3 07/05/18 11:04 • (LCSD) R3323705-7 07/05/18 11:25

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	0.0500	0.0456	0.0472	91.1	94.5	71.0-121			3.59	20
Toluene	0.0500	0.0480	0.0494	96.0	98.9	72.0-120			2.93	20
Ethylbenzene	0.0500	0.0552	0.0569	110	114	76.0-121			3.07	20
Total Xylene	0.150	0.169	0.174	113	116	75.0-124			2.74	20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3323705-3 07/05/18 11:04 • (LCSD) R3323705-7 07/05/18 11:25

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
(S) a,a,a-Trifluorotoluene(FID)				*99.9*	*99.5*	*77.0-120*				
(S) a,a,a-Trifluorotoluene(PID)				*104*	*104*	*75.0-128*				

Laboratory Control Sample (LCS)

(LCS) R3323705-4 07/05/18 11:25

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Benzene	0.0500	0.0472	94.5	71.0-121	
Toluene	0.0500	0.0494	98.9	72.0-120	
Ethylbenzene	0.0500	0.0569	114	76.0-121	
Total Xylene	0.150	0.174	116	75.0-124	
(S) a,a,a-Trifluorotoluene(FID)			*99.5*	*77.0-120*	
(S) a,a,a-Trifluorotoluene(PID)			*104*	*75.0-128*	

L1006064-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1006064-01 07/05/18 15:55 • (MS) R3323705-8 07/05/18 17:40 • (MSD) R3323705-9 07/05/18 18:01

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Benzene	0.0500	0.587	8.69	10.7	32.4	40.4	500	10.0-146			20.6	29
Toluene	0.0500	ND	9.30	11.3	35.0	42.9	500	10.0-143			19.2	30
Ethylbenzene	0.0500	2.61	13.0	15.4	41.4	51.3	500	10.0-147			17.4	31
Total Xylene	0.150	1.81	33.4	40.5	42.1	51.6	500	10.0-149	J6	J6	19.2	30
(S) a,a,a-Trifluorotoluene(FID)					*101*	*101*		*77.0-120*				
(S) a,a,a-Trifluorotoluene(PID)					*106*	*106*		*75.0-128*				

L1006064-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1006064-01 07/05/18 15:55 • (MS) R3323705-10 07/05/18 18:22 • (MSD) R3323705-11 07/05/18 18:43

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	152	678	753	19.1	21.8	500	10.0-147			10.5	30
(S) a,a,a-Trifluorotoluene(FID)					*103*	*101*		*77.0-120*				

L1006064-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1006064-01 07/05/18 15:55 • (MS) R3323705-10 07/05/18 18:22 • (MSD) R3323705-11 07/05/18 18:43

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
(S) a,a,a-Trifluorotoluene(PID)					*108*	*107*		*75.0-128*				

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Method Blank (MB)

(MB) R3324099-5 07/09/18 13:13

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Benzene	U		0.000120	0.000500
Toluene	U		0.000150	0.00500
Ethylbenzene	0.000134	J	0.000110	0.000500
Total Xylene	U		0.000460	0.00150
TPH (GC/FID) Low Fraction	U		0.0217	0.100
(S) a,a,a-Trifluorotoluene(FID)	*104*			*77.0-120*
(S) a,a,a-Trifluorotoluene(PID)	*107*			*75.0-128*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3324099-1 07/09/18 11:02 • (LCSD) R3324099-2 07/09/18 11:23

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	0.0500	0.0489	0.0510	97.7	102	71.0-121			4.25	20
Toluene	0.0500	0.0482	0.0498	96.4	99.5	72.0-120			3.21	20
Ethylbenzene	0.0500	0.0523	0.0539	105	108	76.0-121			2.94	20
Total Xylene	0.150	0.158	0.163	106	108	75.0-124			2.74	20
(S) a,a,a-Trifluorotoluene(FID)				*98.0*	*97.8*	*77.0-120*				
(S) a,a,a-Trifluorotoluene(PID)				*102*	*102*	*75.0-128*				

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3324099-3 07/09/18 12:10 • (LCSD) R3324099-4 07/09/18 12:31

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	5.41	5.22	98.3	94.9	70.0-136			3.55	20
(S) a,a,a-Trifluorotoluene(FID)				*88.8*	*88.1*	*77.0-120*				
(S) a,a,a-Trifluorotoluene(PID)				*111*	*113*	*75.0-128*				

Method Blank (MB)

(MB) R3324028-1 07/08/18 19:32

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
C10-C28 Diesel Range	U		1.61	4.00
C28-C40 Oil Range	U		0.274	4.00
(S) o-Terphenyl	*97.0*			*18.0-148*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3324028-2 07/08/18 19:45 • (LCSD) R3324028-3 07/08/18 19:59

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
C10-C28 Diesel Range	50.0	39.6	44.1	79.2	88.1	50.0-150			10.6	20
(S) o-Terphenyl				*88.7*	*98.3*	*18.0-148*				

L1006375-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1006375-01 07/08/18 20:13 • (MS) R3324028-4 07/08/18 20:26 • (MSD) R3324028-5 07/08/18 20:40

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
C10-C28 Diesel Range	50.0	14.2	59.1	56.9	89.8	85.3	1	50.0-150			3.84	20
(S) o-Terphenyl					*70.7*	*77.1*		*18.0-148*				

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state "ND" (Not Detected) or "BDL" (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
B	The same analyte is found in the associated blank.
J	The identification of the analyte is acceptable; the reported value is an estimate.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.
J7	Surrogate recovery cannot be used for control limit evaluation due to dilution.

ACCREDITATIONS & LOCATIONS

Pace National is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.
* Not all certifications held by the laboratory are applicable to the results reported in the attached report.
* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace National.

State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO00356
Kentucky [1,6]	90010	South Carolina	84004
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1,4]	2006
Louisiana [1]	LA180010	Texas	T 104704245-17-14
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	TN00003
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	460132
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA

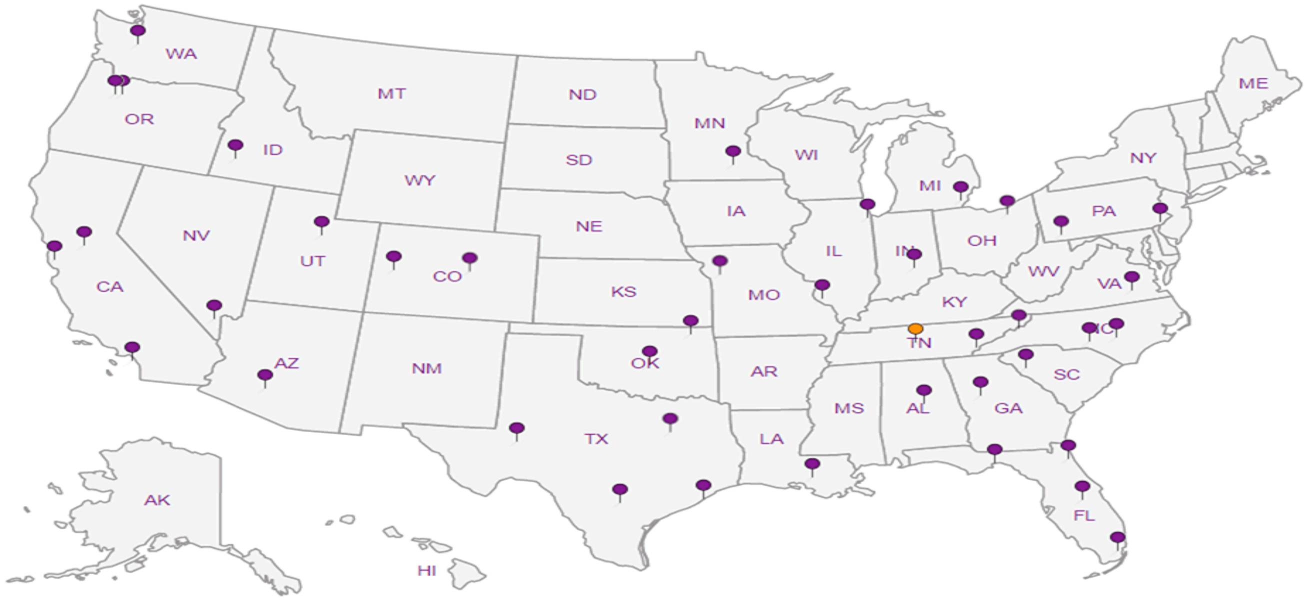
Third Party Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

Our Locations

Pace National has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. Pace National performs all testing at our central laboratory.



Billing Information: Bill

Pres Chk

Report to: Lindsay Dumas

Email To: ldumas@hilcorp.com

Project Description: Hilcorp San Juan 28-6 #31

City/State Collected: New Mexico

Phone: 832-839-4585

Fax:

Client Project #

Lab Project #

Collected by (print): Corwin Lameman

Site/Facility ID #

P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)

___ Same Day X Five Day

___ Next Day ___ 5 Day (Rad Only)

___ Two Day ___ 10 Day (Rad Only)

___ Three Day STANDARD

Quote #

Date Results Needed

Analysis / Container / Preservative

Chain of Custody Page 1 of 2

ESC

LAB SCIENCES

a subsidiary of Pace Analytical

12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# 1006375

F207

Acctnum:

Template:

Prelogin:

TSR:

PB:

Shipped Via:

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	8021	8015	Remarks	Sample # (lab only)
SB-7 @ 25 ft	Grab	SS	25	6-27-18	10:19	1	X	X		01
SB-7 @ 35 ft	Grab	SS	35	6-27-18	10:41	2	X	X	Hold ~~Pending~~	
SB-8 @ 15 ft	Grab	SS	15	6-27-18	12:13	1	X	X		02
SB-8 @ 25ft	Grab	SS	25	6-27-18	12:24	1	X	X	Hold	
SB-9 @ 10 ft	Grab	SS	10	6-27-18	13:09	2	X	X		03
SB-9 @ 25 ft	Grab	SS	25	6-27-18	13:15	1	X	X	Hold	
SB-10 @ 10 ft	Grab	SS	10	6-27-18	13:55	2	X	X		04
SB-10 @ 25 ft	Grab	SS	25	6-27-18	14:11	1	X	X	Hold	
SB-11 @ 10 ft	Grab	SS	10	6-27-18	14:34	2	X	X		05
SB-11 @ 25ft	Grab	SS	25	6-27-18	14:51	2	X	X	Hold	

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other ________

Remarks: Some samples not completely full due to limited recovery from drilling auger.

pH ______ Temp ______

Flow ______ Other ______

Samples returned via:
__ UPS X FedEx __ Courier ______

Tracking # 7305 8947 4816

Sample Receipt Checklist
COC Seal Present/Intact: X NP __Y __N
COC Signed/Accurate: ✓Y __N
Bottles arrive intact: ✓Y __N
Correct bottles used: ✓Y __N
Sufficient volume sent: ✓Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: __Y __N

Relinquished by : (Signature) Date: Time: Received by: (Signature)

Trip Blank Received: Yes / [✓ No]
HCL / MeoH
TBR

Relinquished by : (Signature) Date: Time: Received by: (Signature)

Temp: 2.7 ICT °C Bottles Received: 28-4oz

If preservation required by Login: Date/Time

Relinquished by : (Signature) Date: Time: Received for lab by: (Signature) ATM

Date: 6/29/18 Time: 845

6-183

Condition: NCF / OK

Billing Information:

Pres Chk

Analysis / Container / Preservative

Chain of Custody Page 2 of 2

ESC
LAB SCIENCES
a subsidiary of Pace Analytical

12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

Report to: Lindsay Dumas

Email To: ldumas@hilcorp.com

Project Description: Hilcorp San Juan 28-6 #31

City/State Collected: New Mexico

Phone: 832-839-4585
Fax:

Client Project #

Lab Project #

L# 1006375

Table #

Collected by (print): Corwin Lameman

Site/Facility ID #

P.O. #

Acctnum:

Template:

Prelogin:

TSR:

PB:

Shipped Via:

Collected by (signature):

Immediately Packed on Ice N___ Y X

Quote #

Rush? (Lab MUST Be Notified)
___ Same Day
X Five Day
___ Next Day
___ 5 Day (Rad Only)
___ Two Day
___ 10 Day (Rad Only)
___ Three Day

Date Results Needed: Standard

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	8021	8015									Remarks	Sample # (lab only)
SB-12 @ 10 ft	Grab	SS	10	6-27-18	15:17	2	X	X										06
SB-12 @ 25 ft	Grab	SS	25	6-27-18	15:30	1	X	X									Hold	
SB-13 @ 10 ft	Grab	SS	10	6-27-18	16:02	2	X	X										07
SB-13 @ 25 ft	Grab	SS	25	6-27-18	16:17	1	X	X									Hold	
SB-14 @ 10 ft	Grab	SS	10	6-27-18	16:41	2	X	X										08
SB-14 @ 25 ft	Grab	SS	25	6-27-18	17:15	1	X	X									Hold	
SB-15 @ 10 ft	Grab	SS	10	6-27-18	17:28	2	X	X										09
SB-15 @ 25 ft	Grab	SS	25	6-27-18	17:42	2	X	X									Hold	

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other________

Remarks: Some samples not completely filled due to limited recovery from drilling auger.

pH ______ Temp ______

Flow ______ Other ______

Samples returned via:
__ UPS __ FedEx __ Courier ______

Tracking #

Sample Receipt Checklist
COC Seal Present/Intact: NP __Y __N
COC Signed/Accurate: ✓Y __N
Bottles arrive intact: ✓Y __N
Correct bottles used: ✓Y __N
Sufficient volume sent: ✓Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: __Y __N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / [✓ No] HCL / MeoH TBR
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: 2.7 °C Bottles Received: 28
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature) adm	Date: 6/29/18 Time: 845

If preservation required by Login: Date/Time

Hold:

Condition: NCF / OK

ANALYTICAL REPORT

July 16, 2018

HilCorp-Farmington, NM

Sample Delivery Group: L1008712
Samples Received: 06/29/2018
Project Number:
Description: Hilcomp San Juan 28-6 #31

Report To: Kurt Hoekstra and Lindsay Dumas
382 Road 3100
Aztec, NM 87401

Entire Report Reviewed By: Daphne R Richards

Daphne Richards
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace National is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.

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1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

SB-10 25FT L1008712-01 Solid

Collected by	Collected date/time	Received date/time
CL	06/27/18 14:11	06/29/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC) by Method 8015/8021	WG1137283	1000	07/12/18 15:40	07/13/18 01:36	RAS
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1137313	1	07/12/18 21:38	07/13/18 15:30	KLM

SB-12 25FT L1008712-02 Solid

Collected by	Collected date/time	Received date/time
CL	06/27/18 15:30	06/29/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC) by Method 8015/8021	WG1137283	1000	07/12/18 15:40	07/13/18 01:58	RAS
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1137313	1	07/12/18 21:38	07/13/18 15:44	KLM

SB-13 25FT L1008712-03 Solid

Collected by	Collected date/time	Received date/time
CL	06/27/18 16:17	06/29/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC) by Method 8015/8021	WG1137283	1000	07/12/18 15:40	07/13/18 02:20	RAS
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1137313	1	07/12/18 21:38	07/13/18 15:57	KLM

SB-14 25FT L1008712-04 Solid

Collected by	Collected date/time	Received date/time
CL	06/27/18 17:15	06/29/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC) by Method 8015/8021	WG1137283	1000	07/12/18 15:40	07/13/18 02:43	RAS
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1137313	1	07/12/18 21:38	07/13/18 16:11	KLM

SB-15 25FT L1008712-05 Solid

Collected by	Collected date/time	Received date/time
CL	06/27/18 17:42	06/29/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC) by Method 8015/8021	WG1137283	1000	07/12/18 15:40	07/13/18 03:05	RAS
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1137313	1	07/12/18 21:38	07/13/18 16:24	KLM

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All radiochemical sample results for solids are reported on a dry weight basis with the exception of tritium, carbon-14 and radon, unless wet weight was requested by the client. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Daphne R Richards

Daphne Richards
Project Manager

Volatile Organic Compounds (GC) by Method 8015/8021

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/kg		mg/kg		date / time	
Benzene	ND	T8	0.500	1000	07/13/2018 01:36	WG1137283
Toluene	21.1	T8	5.00	1000	07/13/2018 01:36	WG1137283
Ethylbenzene	13.4	T8	0.500	1000	07/13/2018 01:36	WG1137283
Total Xylene	109	T8	1.50	1000	07/13/2018 01:36	WG1137283
TPH (GC/FID) Low Fraction	1860	T8	100	1000	07/13/2018 01:36	WG1137283
(S) a,a,a-Trifluorotoluene(FID)	*89.4*		*77.0-120*		*07/13/2018 01:36*	WG1137283
(S) a,a,a-Trifluorotoluene(PID)	*98.9*		*75.0-128*		*07/13/2018 01:36*	WG1137283

Semi-Volatile Organic Compounds (GC) by Method 8015

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/kg		mg/kg		date / time	
C10-C28 Diesel Range	15.7	T8	4.00	1	07/13/2018 15:30	WG1137313
C28-C40 Oil Range	ND	T8	4.00	1	07/13/2018 15:30	WG1137313
(S) o-Terphenyl	*111*		*18.0-148*		*07/13/2018 15:30*	WG1137313

SB-12 25FT
Collected date/time: 06/27/18 15:30

SAMPLE RESULTS - 02

L1008712

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	0.519	T8	0.500	1000	07/13/2018 01:58	WG1137283
Toluene	ND	T8	5.00	1000	07/13/2018 01:58	WG1137283
Ethylbenzene	3.73	T8	0.500	1000	07/13/2018 01:58	WG1137283
Total Xylene	19.7	T8	1.50	1000	07/13/2018 01:58	WG1137283
TPH (GC/FID) Low Fraction	625	T8	100	1000	07/13/2018 01:58	WG1137283
(S) a,a,a-Trifluorotoluene(FID)	*97.5*		*77.0-120*		*07/13/2018 01:58*	WG1137283
(S) a,a,a-Trifluorotoluene(PID)	*100*		*75.0-128*		*07/13/2018 01:58*	WG1137283

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	11.4	T8	4.00	1	07/13/2018 15:44	WG1137313
C28-C40 Oil Range	ND	T8	4.00	1	07/13/2018 15:44	WG1137313
(S) o-Terphenyl	*110*		*18.0-148*		*07/13/2018 15:44*	WG1137313

SB-13 25FT
Collected date/time: 06/27/18 16:17

SAMPLE RESULTS - 03

L1008712

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	ND	T8	0.500	1000	07/13/2018 02:20	WG1137283
Toluene	ND	T8	5.00	1000	07/13/2018 02:20	WG1137283
Ethylbenzene	5.76	T8	0.500	1000	07/13/2018 02:20	WG1137283
Total Xylene	40.4	T8	1.50	1000	07/13/2018 02:20	WG1137283
TPH (GC/FID) Low Fraction	1020	T8	100	1000	07/13/2018 02:20	WG1137283
(S) a,a,a-Trifluorotoluene(FID)	*95.1*		*77.0-120*		*07/13/2018 02:20*	WG1137283
(S) a,a,a-Trifluorotoluene(PID)	*99.0*		*75.0-128*		*07/13/2018 02:20*	WG1137283

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	6.49	T8	4.00	1	07/13/2018 15:57	WG1137313
C28-C40 Oil Range	ND	T8	4.00	1	07/13/2018 15:57	WG1137313
(S) o-Terphenyl	*109*		*18.0-148*		*07/13/2018 15:57*	WG1137313

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	ND	T8	0.500	1000	07/13/2018 02:43	WG1137283
Toluene	5.02	T8	5.00	1000	07/13/2018 02:43	WG1137283
Ethylbenzene	8.26	T8	0.500	1000	07/13/2018 02:43	WG1137283
Total Xylene	64.1	T8	1.50	1000	07/13/2018 02:43	WG1137283
TPH (GC/FID) Low Fraction	1240	T8	100	1000	07/13/2018 02:43	WG1137283
(S) a,a,a-Trifluorotoluene(FID)	*94.6*		*77.0-120*		*07/13/2018 02:43*	WG1137283
(S) a,a,a-Trifluorotoluene(PID)	*99.4*		*75.0-128*		*07/13/2018 02:43*	WG1137283

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	10.4	T8	4.00	1	07/13/2018 16:11	WG1137313
C28-C40 Oil Range	ND	T8	4.00	1	07/13/2018 16:11	WG1137313
(S) o-Terphenyl	*108*		*18.0-148*		*07/13/2018 16:11*	WG1137313

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	ND	T8	0.500	1000	07/13/2018 03:05	WG1137283
Toluene	6.76	T8	5.00	1000	07/13/2018 03:05	WG1137283
Ethylbenzene	11.6	T8	0.500	1000	07/13/2018 03:05	WG1137283
Total Xylene	90.9	T8	1.50	1000	07/13/2018 03:05	WG1137283
TPH (GC/FID) Low Fraction	1800	T8	100	1000	07/13/2018 03:05	WG1137283
(S) a,a,a-Trifluorotoluene(FID)	*96.0*		*77.0-120*		*07/13/2018 03:05*	WG1137283
(S) a,a,a-Trifluorotoluene(PID)	*100*		*75.0-128*		*07/13/2018 03:05*	WG1137283

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	4.19	T8	4.00	1	07/13/2018 16:24	WG1137313
C28-C40 Oil Range	ND	T8	4.00	1	07/13/2018 16:24	WG1137313
(S) o-Terphenyl	*110*		*18.0-148*		*07/13/2018 16:24*	WG1137313

QUALITY CONTROL SUMMARY

Method Blank (MB)

(MB) R3325329-4 07/12/18 22:09

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/kg		mg/kg	mg/kg
Benzene	U		0.000120	0.000500
Toluene	U		0.000150	0.00500
Ethylbenzene	U		0.000110	0.000500
Total Xylene	U		0.000460	0.00150
TPH (GC/FID) Low Fraction	U		0.0217	0.100
(S) a,a,a-Trifluorotoluene(FID)	*99.4*			*77.0-120*
(S) a,a,a-Trifluorotoluene(PID)	*99.9*			*75.0-128*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3325329-1 07/12/18 20:18 • (LCSD) R3325329-5 07/13/18 10:30

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	%	%	%			%	%
Benzene	0.0500	0.0494	0.0499	98.7	99.8	71.0-121			1.07	20
Toluene	0.0500	0.0511	0.0507	102	101	72.0-120			0.924	20
Ethylbenzene	0.0500	0.0512	0.0499	102	99.7	76.0-121			2.60	20
Total Xylene	0.150	0.155	0.151	103	101	75.0-124			2.81	20
(S) a,a,a-Trifluorotoluene(FID)				*99.6*	*99.4*	*77.0-120*				
(S) a,a,a-Trifluorotoluene(PID)				*98.1*	*98.3*	*75.0-128*				

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3325329-2 07/12/18 21:03 • (LCSD) R3325329-3 07/12/18 21:25

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	%	%	%			%	%
TPH (GC/FID) Low Fraction	5.50	5.00	5.24	90.9	95.3	70.0-136			4.75	20
(S) a,a,a-Trifluorotoluene(FID)				*103*	*103*	*77.0-120*				
(S) a,a,a-Trifluorotoluene(PID)				*106*	*108*	*75.0-128*				

Method Blank (MB)

(MB) R3325389-1 07/13/18 10:33

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
C10-C28 Diesel Range	U		1.61	4.00
C28-C40 Oil Range	U		0.274	4.00
(S) o-Terphenyl	*119*			*18.0-148*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3325389-2 07/13/18 10:46 • (LCSD) R3325389-3 07/13/18 11:00

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
C10-C28 Diesel Range	50.0	50.8	47.8	102	95.7	50.0-150			6.07	20
(S) o-Terphenyl				*123*	*116*	*18.0-148*				

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state "ND" (Not Detected) or "BDL" (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
T8	Sample(s) received past/too close to holding time expiration.

ACCREDITATIONS & LOCATIONS

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Pace National is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.
* Not all certifications held by the laboratory are applicable to the results reported in the attached report.
* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace National.

State Accreditations

Alabama	40660
Alaska	17-026
Arizona	AZ0612
Arkansas	88-0469
California	2932
Colorado	TN00003
Connecticut	PH-0197
Florida	E87487
Georgia	NELAP
Georgia [1]	923
Idaho	TN00003
Illinois	200008
Indiana	C-TN-01
Iowa	364
Kansas	E-10277
Kentucky [1 6]	90010
Kentucky [2]	16
Louisiana	AI30792
Louisiana [1]	LA180010
Maine	TN0002
Maryland	324
Massachusetts	M-TN003
Michigan	9958
Minnesota	047-999-395
Mississippi	TN00003
Missouri	340
Montana	CERT0086

Nebraska	NE-OS-15-05
Nevada	TN-03-2002-34
New Hampshire	2975
New Jersey–NELAP	TN002
New Mexico [1]	n/a
New York	11742
North Carolina	Env375
North Carolina [1]	DW21704
North Carolina [3]	41
North Dakota	R-140
Ohio–VAP	CL0069
Oklahoma	9915
Oregon	TN200002
Pennsylvania	68-02979
Rhode Island	LAO00356
South Carolina	84004
South Dakota	n/a
Tennessee [1 4]	2006
Texas	T 104704245-17-14
Texas [5]	LAB0152
Utah	TN00003
Vermont	VT2006
Virginia	460132
Washington	C847
West Virginia	233
Wisconsin	9980939910
Wyoming	A2LA

Third Party Federal Accreditations

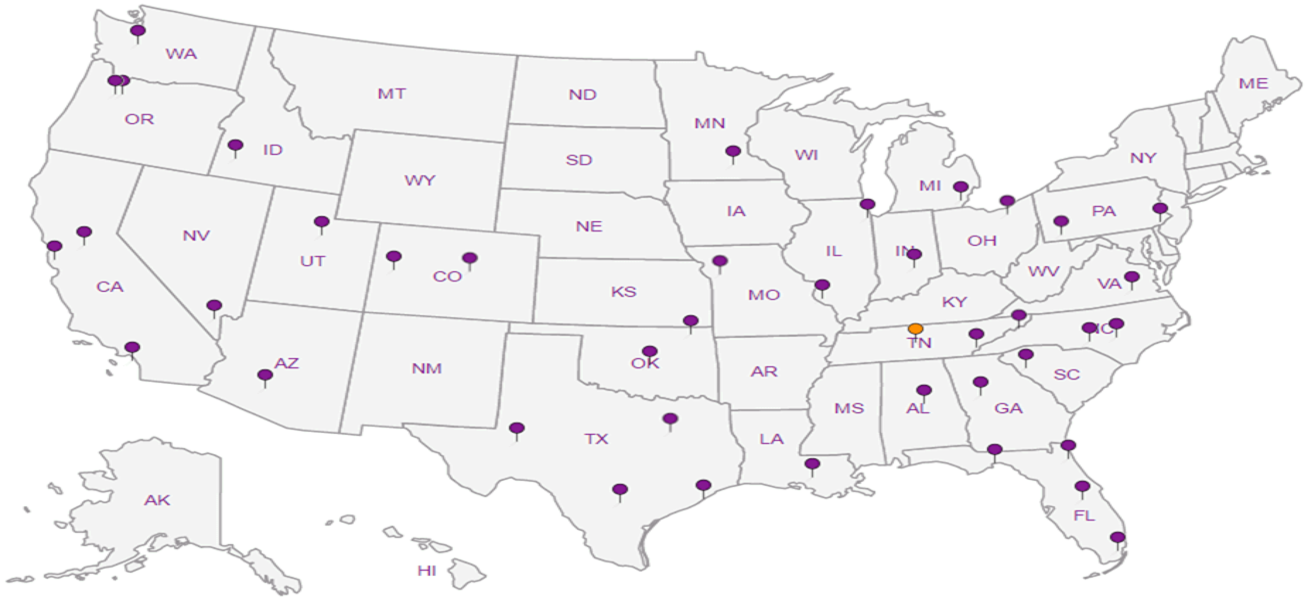
A2LA – ISO 17025	1461.01
A2LA – ISO 17025 [5]	1461.02
Canada	1461.01
EPA–Crypto	TN00003

AIHA-LAP,LLC EMLAP	100789
DOD	1461.01
USDA	P330-15-00234

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

Our Locations

Pace National has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. Pace National performs all testing at our central laboratory.



Chain of Custody Page 1 of 2

ESC

12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# ~~1006~~ 915

1215
L1008712

AU 7/1/18

Billing Information: Bill

Pres Chk

Report to: Lindsay Dumas

Email To: ldumas@hilcorp.com

Project Description: Hilcorp San Juan 28-6 #31

City/State Collected: New Mexico

Phone: 832-839-4585

Fax:

Client Project #

Lab Project #

Collected by (print): Corwin Lameman

Site/Facility ID #

P.O. #

Collected by (signature):

Immediately Packed on Ice N___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day X Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day STANDARD

Quote #

Date Results Needed

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	8021	8015	Remarks	Sample # (lab only)
SB-7 @ 25 ft	Grab	SS	25	6-27-18	10:19	1	X	X		~~01~~
SB-7 @ 35 ft	Grab	SS	35	6-27-18	10:41	2	X	X	Hold ~~[illegible]~~	
SB-8 @ 15 ft	Grab	SS	15	6-27-18	12:13	1	X	X		02
SB-8 @ 25 ft	Grab	SS	25	6-27-18	12:24	1	X	X	Hold	
SB-9 @ 10 ft	Grab	SS	10	6-27-18	13:09	2	X	X		~~03~~
SB-9 @ 25 ft	Grab	SS	25	6-27-18	13:15	1	X	X	Hold	
SB-10 @ 10 ft	Grab	SS	10	6-27-18	13:55	2	X	X		~~04~~
SB-10 @ 25 ft	Grab	SS	25	6-27-18	14:11	1	X	X	Hold	-01
SB-11 @ 10 ft	Grab	SS	10	6-27-18	14:34	2	X	X		~~05~~
SB-11 @ 25 ft	Grab	SS	25	6-27-18	14:51	2	X	X	Hold	

Acctnum:
Template:
Prelogin:
TSR:
PB:
Shipped Via:

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other ________

Remarks: Some samples not completely full due to limited recovery from drilling auger.

pH ______ Temp ______
Flow ______ Other ______

Samples returned via:
__ UPS X FedEx __ Courier ______

Tracking # 7305 8947 4816

Sample Receipt Checklist
COC Seal Present/Intact: X NP __Y __N
COC Signed/Accurate: Y __N
Bottles arrive intact: Y __N
Correct bottles used: Y __N
Sufficient volume sent: Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: __Y __N

Relinquished by: (Signature) Date: Time:

Received by: (Signature)

Trip Blank Received: Yes / [✓ No]
HCL / MeoH
TBR

Relinquished by: (Signature) Date: Time:

Received by: (Signature)

Temp: 2.7°C ±1 °C Bottles Received: 22-40

If preservation required by Login: Date/Time

Relinquished by: (Signature) Date: Time:

Received for lab by: (Signature)

Date: 6/29/18 Time: 845

6-183

Condition: NCF / OK

Chain of Custody Page 2 of 2

ESC LAB SCIENCES

12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# ~~1006975~~ N 7/12/18

Table # L1008712

Acctnum:

Template:

Prelogin:

TSR:

PB:

Shipped Via:

Billing Information:

Pres Chk

Report to: Lindsay Dumas

Email To: ldumas@hilcorp.com

Project Description: Hilcorp San Juan 28-6 #31

City/State Collected: New Mexico

Phone: 832-839-4585

Fax:

Client Project #

Lab Project #

Collected by (print): Corwin Lameman

Site/Facility ID #

P.O. #

Collected by (signature):

Rush? (Lab MUST Be Notified)
___ Same Day X Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day Standard

Quote #

Date Results Needed

Immediately Packed on Ice N ___ Y X

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	8021	8015	Remarks	Sample # (lab only)
SB-12 @ 16 ft	Grab	SS	10	6-27-18	15:17	2	X	X		~~06~~
SB-12 @ 25 ft	Grab	SS	25	6-27-18	15:30	1	X	X	Hold	-02
SB-13 @ 10 ft	Grab	SS	10	6-27-18	16:02	2	X	X		~~07~~
SB-13 @ 25 ft	Grab	SS	25	6-27-18	16:17	1	X	X	Hold	-03
SB-14 @ 10 ft	Grab	SS	10	6-27-18	16:41	2	X	X		~~08~~
SB-14 @ 25 ft	Grab	SS	25	6-27-18	17:15	1	X	X	Hold	-04
SB-15 @ 10 ft	Grab	SS	10	6-27-18	17:28	2	X	X		~~07~~
SB-15 @ 25 ft	Grab	SS	25	6-27-18	17:42	2	X	X	Hold	-05

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other________

Remarks: Some samples not completely filled due to limited recovery from drilling auger.

pH ______ Temp ______

Flow ______ Other ______

Samples returned via:
__ UPS __ FedEx __ Courier ______

Tracking #

Sample Receipt Checklist
COC Seal Present/Intact: NP _Y _N
COC Signed/Accurate: ✓Y _N
Bottles arrive intact: ✓Y _N
Correct bottles used: ✓Y _N
Sufficient volume sent: ✓Y _N
If Applicable
VOA Zero Headspace: _Y _N
Preservation Correct/Checked: _Y _N

Relinquished by : (Signature)

Date:

Time:

Received by: (Signature)

Trip Blank Received: Yes / [✓ No]
HCL / MeoH
TBR

Relinquished by : (Signature)

Date:

Time:

Received by: (Signature)

Temp: 2.7 °C

Bottles Received: 29

If preservation required by Login: Date/Time

Relinquished by : (Signature)

Date:

Time:

Received for lab by: (Signature)

Date: 6/29/18

Time: 845

Hold:

Condition: NCF / OK

Andy Vann

From: Daphne Richards
Sent: Thursday, July 12, 2018 12:29 PM
To: Login
Cc: Chris Johnson; Brian Gwaltney
Subject: Taking samples off HOLD L1006375 HILCORANM RUSH R3

Please refer to 6-183 from L1006375

Log sample id's
SB-10 25FT
SB-12 25FT
SB-13 25FT
SB-14 25FT
SB-15 25FT

For BTEXGRO, DRORLA. Log as R3 due 7/16

Thanks

Daphne Richards
Project Manager
Pace Analytical National Center for Testing & Innovation
12065 Lebanon Road | Mt. Juliet, TN 37122
615.773.9653 | Cell 615.418.1495
drichards@pacenational.com| pacenational.com

ESC Lab Sciences is now Pace Analytical National Center for Testing & Innovation! Please make note of my new email address and website.

ANALYTICAL REPORT

August 30, 2018

HilCorp-Farmington, NM

Sample Delivery Group:	L1020740
Samples Received:	08/25/2018
Project Number:	
Description:	Hilcorp San Juan 28-6 #31
Report To:	Lindsay Dumas 382 Road 3100 Aztec, NM 87401

Entire Report Reviewed By: Olivia S

Olivia Studebaker
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace National is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.

12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 www.pacenational.com

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5 Sr
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8 Al
9 Sc

SB-16 @ 12 FT L1020740-01 Solid

Collected by	Collected date/time	Received date/time
Corwin Lameman	08/22/18 09:30	08/25/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1157976	1	08/27/18 15:28	08/27/18 15:35	KDW
Volatile Organic Compounds (GC) by Method 8015/8021	WG1157682	1	08/25/18 13:47	08/27/18 01:20	DWR
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1157633	1	08/26/18 22:33	08/27/18 18:19	MTJ

SB-16 @ 20 FT L1020740-02 Solid

Collected by	Collected date/time	Received date/time
Corwin Lameman	08/22/18 09:57	08/25/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1157976	1	08/27/18 15:28	08/27/18 15:35	KDW
Volatile Organic Compounds (GC) by Method 8015/8021	WG1157682	1	08/25/18 13:47	08/27/18 01:41	DWR
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1157633	1	08/26/18 22:33	08/27/18 19:46	MTJ

SB-17 @ 15 FT L1020740-03 Solid

Collected by	Collected date/time	Received date/time
Corwin Lameman	08/22/18 11:07	08/25/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1158017	1	08/28/18 07:10	08/28/18 07:18	JD
Volatile Organic Compounds (GC) by Method 8015/8021	WG1157682	1	08/25/18 13:47	08/27/18 02:02	DWR
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1157633	1	08/26/18 22:33	08/27/18 19:59	MTJ

SB-17 @ 25 FT L1020740-04 Solid

Collected by	Collected date/time	Received date/time
Corwin Lameman	08/22/18 13:30	08/25/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1158017	1	08/28/18 07:10	08/28/18 07:18	JD
Volatile Organic Compounds (GC) by Method 8015/8021	WG1157682	1	08/25/18 13:47	08/27/18 02:22	DWR
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1157633	1	08/26/18 22:33	08/27/18 20:13	MTJ

SB-18 @ 15 FT L1020740-05 Solid

Collected by	Collected date/time	Received date/time
Corwin Lameman	08/22/18 14:12	08/25/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1158017	1	08/28/18 07:10	08/28/18 07:18	JD
Volatile Organic Compounds (GC) by Method 8015/8021	WG1157682	1	08/25/18 13:47	08/27/18 02:43	DWR
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1157633	1	08/26/18 22:33	08/27/18 20:26	MTJ

SB-18 @ 25 FT L1020740-06 Solid

Collected by	Collected date/time	Received date/time
Corwin Lameman	08/22/18 14:36	08/25/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1158017	1	08/28/18 07:10	08/28/18 07:18	JD
Volatile Organic Compounds (GC) by Method 8015/8021	WG1157682	1	08/25/18 13:47	08/27/18 03:04	DWR
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1157633	1	08/26/18 22:33	08/27/18 20:40	MTJ

SB-23 @ 15 FT L1020740-07 Solid

Collected by	Collected date/time	Received date/time
Corwin Lameman	08/22/18 15:30	08/25/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1158017	1	08/28/18 07:10	08/28/18 07:18	JD
Volatile Organic Compounds (GC) by Method 8015/8021	WG1157682	500	08/25/18 13:47	08/27/18 03:25	DWR
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1157633	1	08/26/18 22:33	08/27/18 20:53	MTJ

SB-23 @ 30 FT L1020740-08 Solid

Collected by	Collected date/time	Received date/time
Corwin Lameman	08/22/18 16:09	08/25/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1158017	1	08/28/18 07:10	08/28/18 07:18	JD
Volatile Organic Compounds (GC) by Method 8015/8021	WG1157682	1	08/25/18 13:47	08/27/18 03:46	DWR
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1157633	1	08/26/18 22:33	08/27/18 21:07	MTJ

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Olivia S

Olivia Studebaker
Project Manager

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	90.1		1	08/27/2018 15:35	WG1157976

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	ND		0.000500	1	08/27/2018 01:20	WG1157682
Toluene	ND		0.00500	1	08/27/2018 01:20	WG1157682
Ethylbenzene	0.00176		0.000500	1	08/27/2018 01:20	WG1157682
Total Xylene	ND		0.00150	1	08/27/2018 01:20	WG1157682
TPH (GC/FID) Low Fraction	0.325		0.100	1	08/27/2018 01:20	WG1157682
(S) a,a,a-Trifluorotoluene(FID)	*95.1*		*77.0-120*		*08/27/2018 01:20*	WG1157682
(S) a,a,a-Trifluorotoluene(PID)	*99.8*		*72.0-128*		*08/27/2018 01:20*	WG1157682

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	6.00	J3	4.00	1	08/27/2018 18:19	WG1157633
C28-C40 Oil Range	ND		4.00	1	08/27/2018 18:19	WG1157633
(S) o-Terphenyl	*72.7*		*18.0-148*		*08/27/2018 18:19*	WG1157633

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	96.8		1	08/27/2018 15:35	WG1157976

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	0.000586	B	0.000500	1	08/27/2018 01:41	WG1157682
Toluene	ND		0.00500	1	08/27/2018 01:41	WG1157682
Ethylbenzene	ND		0.000500	1	08/27/2018 01:41	WG1157682
Total Xylene	ND		0.00150	1	08/27/2018 01:41	WG1157682
TPH (GC/FID) Low Fraction	ND		0.100	1	08/27/2018 01:41	WG1157682
(S) a,a,a-Trifluorotoluene(FID)	*91.1*		*77.0-120*		*08/27/2018 01:41*	WG1157682
(S) a,a,a-Trifluorotoluene(PID)	*93.8*		*72.0-128*		*08/27/2018 01:41*	WG1157682

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	10.0		4.00	1	08/27/2018 19:46	WG1157633
C28-C40 Oil Range	ND		4.00	1	08/27/2018 19:46	WG1157633
(S) o-Terphenyl	*61.1*		*18.0-148*		*08/27/2018 19:46*	WG1157633

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	91.6		1	08/28/2018 07:18	WG1158017

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	ND		0.000500	1	08/27/2018 02:02	WG1157682
Toluene	ND		0.00500	1	08/27/2018 02:02	WG1157682
Ethylbenzene	ND		0.000500	1	08/27/2018 02:02	WG1157682
Total Xylene	ND		0.00150	1	08/27/2018 02:02	WG1157682
TPH (GC/FID) Low Fraction	ND		0.100	1	08/27/2018 02:02	WG1157682
(S) a,a,a-Trifluorotoluene(FID)	*91.2*		*77.0-120*		*08/27/2018 02:02*	WG1157682
(S) a,a,a-Trifluorotoluene(PID)	*94.7*		*72.0-128*		*08/27/2018 02:02*	WG1157682

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	ND		4.00	1	08/27/2018 19:59	WG1157633
C28-C40 Oil Range	ND		4.00	1	08/27/2018 19:59	WG1157633
(S) o-Terphenyl	*72.6*		*18.0-148*		*08/27/2018 19:59*	WG1157633

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	97.7		1	08/28/2018 07:18	WG1158017

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	ND		0.000500	1	08/27/2018 02:22	WG1157682
Toluene	ND		0.00500	1	08/27/2018 02:22	WG1157682
Ethylbenzene	ND		0.000500	1	08/27/2018 02:22	WG1157682
Total Xylene	ND		0.00150	1	08/27/2018 02:22	WG1157682
TPH (GC/FID) Low Fraction	ND		0.100	1	08/27/2018 02:22	WG1157682
(S) a,a,a-Trifluorotoluene(FID)	*91.4*		*77.0-120*		*08/27/2018 02:22*	WG1157682
(S) a,a,a-Trifluorotoluene(PID)	*94.6*		*72.0-128*		*08/27/2018 02:22*	WG1157682

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	10.4		4.00	1	08/27/2018 20:13	WG1157633
C28-C40 Oil Range	ND		4.00	1	08/27/2018 20:13	WG1157633
(S) o-Terphenyl	*60.1*		*18.0-148*		*08/27/2018 20:13*	WG1157633

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	93.0		1	08/28/2018 07:18	WG1158017

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	ND		0.000500	1	08/27/2018 02:43	WG1157682
Toluene	ND		0.00500	1	08/27/2018 02:43	WG1157682
Ethylbenzene	0.000929	B	0.000500	1	08/27/2018 02:43	WG1157682
Total Xylene	0.00228		0.00150	1	08/27/2018 02:43	WG1157682
TPH (GC/FID) Low Fraction	0.182		0.100	1	08/27/2018 02:43	WG1157682
(S) a,a,a-Trifluorotoluene(FID)	*92.1*		*77.0-120*		*08/27/2018 02:43*	WG1157682
(S) a,a,a-Trifluorotoluene(PID)	*95.2*		*72.0-128*		*08/27/2018 02:43*	WG1157682

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	10.7		4.00	1	08/27/2018 20:26	WG1157633
C28-C40 Oil Range	ND		4.00	1	08/27/2018 20:26	WG1157633
(S) o-Terphenyl	*63.6*		*18.0-148*		*08/27/2018 20:26*	WG1157633

SB-18 @ 25 FT

Collected date/time: 08/22/18 14:36

SAMPLE RESULTS - 06

L1020740

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	96.7		1	08/28/2018 07:18	WG1158017

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	ND		0.000500	1	08/27/2018 03:04	WG1157682
Toluene	ND		0.00500	1	08/27/2018 03:04	WG1157682
Ethylbenzene	ND		0.000500	1	08/27/2018 03:04	WG1157682
Total Xylene	ND		0.00150	1	08/27/2018 03:04	WG1157682
TPH (GC/FID) Low Fraction	ND		0.100	1	08/27/2018 03:04	WG1157682
(S) a,a,a-Trifluorotoluene(FID)	*91.1*		*77.0-120*		*08/27/2018 03:04*	WG1157682
(S) a,a,a-Trifluorotoluene(PID)	*93.5*		*72.0-128*		*08/27/2018 03:04*	WG1157682

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	5.47		4.00	1	08/27/2018 20:40	WG1157633
C28-C40 Oil Range	ND		4.00	1	08/27/2018 20:40	WG1157633
(S) o-Terphenyl	*67.3*		*18.0-148*		*08/27/2018 20:40*	WG1157633

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	92.0		1	08/28/2018 07:18	WG1158017

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	0.562	B	0.250	500	08/27/2018 03:25	WG1157682
Toluene	ND		2.50	500	08/27/2018 03:25	WG1157682
Ethylbenzene	ND		0.250	500	08/27/2018 03:25	WG1157682
Total Xylene	2.60		0.750	500	08/27/2018 03:25	WG1157682
TPH (GC/FID) Low Fraction	825		50.0	500	08/27/2018 03:25	WG1157682
(S) a,a,a-Trifluorotoluene(FID)	*85.6*		*77.0-120*		*08/27/2018 03:25*	WG1157682
(S) a,a,a-Trifluorotoluene(PID)	*94.0*		*72.0-128*		*08/27/2018 03:25*	WG1157682

Sample Narrative:

L1020740-07 WG1157682: Elevated RL do to Sample matrix. Non-target compounds too high to run at a lower dilution.

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	81.1		4.00	1	08/27/2018 20:53	WG1157633
C28-C40 Oil Range	ND		4.00	1	08/27/2018 20:53	WG1157633
(S) o-Terphenyl	*61.2*		*18.0-148*		*08/27/2018 20:53*	WG1157633

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	98.0		1	08/28/2018 07:18	WG1158017

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	0.000883	B	0.000500	1	08/27/2018 03:46	WG1157682
Toluene	0.00585		0.00500	1	08/27/2018 03:46	WG1157682
Ethylbenzene	0.00612		0.000500	1	08/27/2018 03:46	WG1157682
Total Xylene	0.0147		0.00150	1	08/27/2018 03:46	WG1157682
TPH (GC/FID) Low Fraction	0.988		0.100	1	08/27/2018 03:46	WG1157682
(S) a,a,a-Trifluorotoluene(FID)	*95.7*		*77.0-120*		*08/27/2018 03:46*	WG1157682
(S) a,a,a-Trifluorotoluene(PID)	*102*		*72.0-128*		*08/27/2018 03:46*	WG1157682

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	15.8		4.00	1	08/27/2018 21:07	WG1157633
C28-C40 Oil Range	ND		4.00	1	08/27/2018 21:07	WG1157633
(S) o-Terphenyl	*67.2*		*18.0-148*		*08/27/2018 21:07*	WG1157633

Method Blank (MB)

(MB) R3337136-1 08/27/18 15:35

Analyte	MB Result %	MB Qualifier	MB MDL %	MB RDL %
Total Solids	0.00200			

L1020740-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1020740-01 08/27/18 15:35 • (DUP) R3337136-3 08/27/18 15:35

Analyte	Original Result %	DUP Result %	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Total Solids	90.1	90.1	1	0.0189		10

Laboratory Control Sample (LCS)

(LCS) R3337136-2 08/27/18 15:35

Analyte	Spike Amount %	LCS Result %	LCS Rec. %	Rec. Limits %	LCS Qualifier
Total Solids	50.0	50.0	100	85.0-115	

Method Blank (MB)

(MB) R3337295-1 08/28/18 07:18

Analyte	MB Result %	MB Qualifier	MB MDL %	MB RDL %
Total Solids	0.00100			

L1020758-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1020758-01 08/28/18 07:18 • (DUP) R3337295-3 08/28/18 07:18

Analyte	Original Result %	DUP Result %	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Total Solids	93.6	93.6	1	0.0213		10

Laboratory Control Sample (LCS)

(LCS) R3337295-2 08/28/18 07:18

Analyte	Spike Amount %	LCS Result %	LCS Rec. %	Rec. Limits %	LCS Qualifier
Total Solids	50.0	50.0	100	85.0-115	

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Method Blank (MB)

(MB) R3336862-4 08/26/18 21:29

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Benzene	0.000261	J	0.000120	0.000500
Toluene	0.000366	J	0.000150	0.00500
Ethylbenzene	0.000167	J	0.000110	0.000500
Total Xylene	U		0.000460	0.00150
TPH (GC/FID) Low Fraction	U		0.0217	0.100
(S) a,a,a-Trifluorotoluene(FID)	*93.0*			*77.0-120*
(S) a,a,a-Trifluorotoluene(PID)	*96.4*			*72.0-128*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3336862-2 08/26/18 20:26 • (LCSD) R3336862-3 08/26/18 20:47

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	5.62	5.05	102	91.8	72.0-127			10.7	20
(S) a,a,a-Trifluorotoluene(FID)				*107*	*106*	*77.0-120*				
(S) a,a,a-Trifluorotoluene(PID)				*108*	*107*	*72.0-128*				

Laboratory Control Sample (LCS)

(LCS) R3336862-1 08/26/18 20:04

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Benzene	0.0500	0.0527	105	76.0-121	
Toluene	0.0500	0.0551	110	80.0-120	
Ethylbenzene	0.0500	0.0541	108	80.0-124	
Total Xylene	0.150	0.163	108	37.0-160	
(S) a,a,a-Trifluorotoluene(FID)			*91.7*	*77.0-120*	
(S) a,a,a-Trifluorotoluene(PID)			*93.8*	*72.0-128*	

L1020425-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1020425-02 08/27/18 04:49 • (MS) R3336862-5 08/27/18 05:10 • (MSD) R3336862-6 08/27/18 05:30

	Spike Amount (dry)	Original Result (dry)	MS Result (dry)	MSD Result (dry)	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
Benzene	0.0655	1.10	15.9	16.9	90.4	96.3	250	10.0-155			5.89	32
Toluene	0.0655	3.14	24.8	25.7	132	137	250	10.0-160			3.24	34
Ethylbenzene	0.0655	22.3	33.2	34.0	66.5	71.9	250	10.0-160			2.64	32
Total Xylene	0.197	33.3	82.4	85.0	100	105	250	10.0-160			3.13	32
(S) a,a,a-Trifluorotoluene(FID)					*107*	*104*		*77.0-120*				
(S) a,a,a-Trifluorotoluene(PID)					*107*	*106*		*72.0-128*				

L1020425-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1020425-02 08/27/18 04:49 • (MS) R3336862-7 08/27/18 05:51 • (MSD) R3336862-8 08/27/18 06:12

	Spike Amount (dry)	Original Result (dry)	MS Result (dry)	MSD Result (dry)	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
TPH (GC/FID) Low Fraction	7.21	3060	3690	3690	35.2	35.0	250	10.0-151	E	E	0.125	28
(S) a,a,a-Trifluorotoluene(FID)					*112*	*113*		*77.0-120*				
(S) a,a,a-Trifluorotoluene(PID)					*113*	*113*		*72.0-128*				

Method Blank (MB)

(MB) R3337086-1 08/27/18 17:36

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
C10-C28 Diesel Range	U		1.61	4.00
C28-C40 Oil Range	U		0.274	4.00
(S) o-Terphenyl	*78.2*			*18.0-148*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3337086-2 08/27/18 17:49 • (LCSD) R3337086-3 08/27/18 18:03

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
C10-C28 Diesel Range	50.0	40.0	40.8	80.0	81.6	50.0-150			1.98	20
(S) o-Terphenyl				*73.6*	*74.3*	*18.0-148*				

L1020740-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1020740-01 08/27/18 18:19 • (MS) R3337086-4 08/27/18 18:33 • (MSD) R3337086-5 08/27/18 19:32

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
C10-C28 Diesel Range	50.0	6.00	42.2	33.5	72.4	55.0	1	50.0-150		J3	23.0	20
(S) o-Terphenyl					*62.6*	*44.7*		*18.0-148*				

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Abbreviations and Definitions

(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].
MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state "ND" (Not Detected) or "BDL" (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
B	The same analyte is found in the associated blank.
E	The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL).
J	The identification of the analyte is acceptable; the reported value is an estimate.
J3	The associated batch QC was outside the established quality control range for precision.

ACCREDITATIONS & LOCATIONS

Pace National is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace National.

State Accreditations

Alabama	40660
Alaska	17-026
Arizona	AZ0612
Arkansas	88-0469
California	2932
Colorado	TN00003
Connecticut	PH-0197
Florida	E87487
Georgia	NELAP
Georgia[1]	923
Idaho	TN00003
Illinois	200008
Indiana	C-TN-01
Iowa	364
Kansas	E-10277
Kentucky[1,6]	90010
Kentucky[2]	16
Louisiana	AI30792
Louisiana[1]	LA180010
Maine	TN0002
Maryland	324
Massachusetts	M-TN003
Michigan	9958
Minnesota	047-999-395
Mississippi	TN00003
Missouri	340
Montana	CERT0086

Nebraska	NE-OS-15-05
Nevada	TN-03-2002-34
New Hampshire	2975
New Jersey–NELAP	TN002
New Mexico[1]	n/a
New York	11742
North Carolina	Env375
North Carolina[1]	DW21704
North Carolina[3]	41
North Dakota	R-140
Ohio–VAP	CL0069
Oklahoma	9915
Oregon	TN200002
Pennsylvania	68-02979
Rhode Island	LAO00356
South Carolina	84004
South Dakota	n/a
Tennessee[1,4]	2006
Texas	T 104704245-17-14
Texas[5]	LAB0152
Utah	TN00003
Vermont	VT2006
Virginia	460132
Washington	C847
West Virginia	233
Wisconsin	9980939910
Wyoming	A2LA

Third Party Federal Accreditations

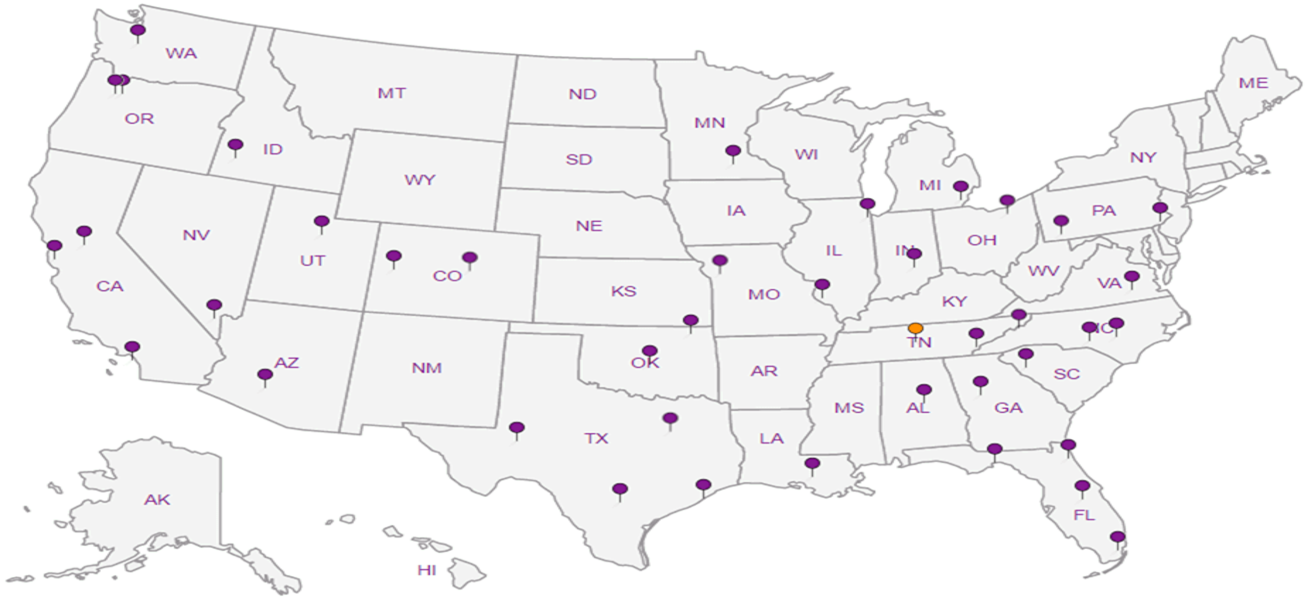
A2LA – ISO 17025	1461.01
A2LA – ISO 17025[5]	1461.02
Canada	1461.01
EPA–Crypto	TN00003

AIHA-LAP,LLC EMLAP	100789
DOD	1461.01
USDA	P330-15-00234

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

Our Locations

Pace National has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. Pace National performs all testing at our central laboratory.



Billing Information:

Bill to Hilcorp - CALL LINDSAY DUMAS

Pres Chk

Analysis / Container / Preservative

Chain of Custody Page ___ of ___

ESC
L·A·B S·C·I·E·N·C·E·S
YOUR LAB OF CHOICE

12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

Report to: **Lindsay Dumas**

Email To: **ldumas@hilcorp.com**

Project Description: **Hilcorp San Juan 28-6 #31**

City/State Collected: **New Mexico**

Phone: **832-839-4585**
Fax:

Client Project #

Lab Project #

L# L1020140

C184

Collected by (print): **Corwin Lameman**

Site/Facility ID #

P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y _X_

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
_X_ Three Day

Quote #

Date Results Needed **August 29, 2018**

Acctnum:
Template:
Prelogin:
TSR:
PB:
Shipped Via:

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	BTEX - 8021	TPH (GRO/DRO/MRO) - 8015	Remarks	Sample # (lab only)
SB-16 @ 12 ft	**Grab**	**SS**	**12**	**8/22/18**	**9:30**	**2**	X	X		-01
SB-16 @ 20 ft	**Grab**	**SS**	**20**	**8/22/18**	**9:57**	**1**	X	X		-02
SB-17 @ 15 ft	**Grab**	**SS**	**15**	**8/22/18**	**11:07**	**1**	X	X		-03
SB-17 @ 25 ft	**Grab**	**SS**	**25**	**8/22/18**	**13:30**	**1**	X	X		-04
SB-18 @ 15 ft	**Grab**	**SS**	**15**	**8/22/18**	**14:12**	**1**	X	X		-05
SB-18 @ 25 ft	**Grab**	**SS**	**25**	**8/22/18**	**14:36**	**1**	X	X		-06
SB-23 @ 15 ft	**Grab**	**SS**	**15**	**8/22/18**	**15:30**	**2**	X	X		-07
SB-23 @ 30 ft	**Grab**	**SS**	**30**	**8/22/18**	**16:09**	**1**	X	X		-08

RAD SCREEN: <0.5 mR/hr

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other________

Remarks:
Samples were on very dense sandstone resulting in small recovery.
Email results to Elizabeth McNally - emcnally@animasenvironmental.com

pH ______ Temp ______
Flow ______ Other ______

Samples returned via:
__ UPS _✓_ FedEx __ Courier ______

Tracking # 7305 8447 5124

Sample Receipt Checklist
COC Seal Present/Intact: _✓_NP __Y __N
COC Signed/Accurate: _✓_Y __N
Bottles arrive intact: _✓_Y __N
Correct bottles used: _✓_Y __N
Sufficient volume sent: _✓_Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: __Y __N

Relinquished by : (Signature) Date: 8-24-18 Time: 13:05 Received by: (Signature)

Trip Blank Received: Yes / [✓ No]
HCL / MeoH
TBR

Relinquished by : (Signature) Date: Time: Received by: (Signature)

Temp: 2.3 °C Bottles Received: 10 = 4oz

If preservation required by Login: Date/Time

Relinquished by : (Signature) Date: Time: Received for lab by: (Signature)

Date: 8/25/18 Time: 0845

Hold:

Condition: NCF / [✓ OK]

Pace Analytical®
National Center for Testing & Innovation

ANALYTICAL REPORT

October 19, 2018

HilCorp-Farmington, NM

Sample Delivery Group: L1033649
Samples Received: 10/10/2018
Project Number:
Description: Hilcorp San Juan 28-6 #31

Report To: Lindsay Dumas
382 Road 3100
Aztec, NM 87401

Entire Report Reviewed By: Olivia S

Olivia Studebaker
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace National is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.

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SB-19 @ 30FT L1033649-01 Solid

Collected by	Collected date/time	Received date/time
Corwin Lameman	10/02/18 11:59	10/10/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1180558	1	10/15/18 11:31	10/15/18 11:36	JAV
Volatile Organic Compounds (GC) by Method 8015/8021	WG1179895	1	10/11/18 11:30	10/12/18 13:38	LRL
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1180944	1	10/14/18 16:37	10/16/18 19:01	AAT

SB-20 @ 30FT L1033649-02 Solid

Collected by	Collected date/time	Received date/time
Corwin Lameman	10/08/18 12:33	10/10/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1180558	1	10/15/18 11:31	10/15/18 11:36	JAV
Volatile Organic Compounds (GC) by Method 8015/8021	WG1179895	1	10/11/18 11:30	10/12/18 13:59	LRL
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1180944	1	10/14/18 16:37	10/16/18 19:14	AAT

SB-21 @ 30FT L1033649-03 Solid

Collected by	Collected date/time	Received date/time
Corwin Lameman	10/08/18 11:07	10/10/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1180560	1	10/16/18 12:16	10/16/18 12:21	KS
Volatile Organic Compounds (GC) by Method 8015/8021	WG1179895	1	10/11/18 11:30	10/12/18 14:20	LRL
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1180944	1	10/14/18 16:37	10/16/18 19:28	AAT

SB-22 @ 10FT L1033649-04 Solid

Collected by	Collected date/time	Received date/time
Corwin Lameman	10/02/18 09:41	10/10/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1180560	1	10/16/18 12:16	10/16/18 12:21	KS
Volatile Organic Compounds (GC) by Method 8015/8021	WG1179895	1	10/11/18 11:30	10/12/18 14:41	LRL
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1180944	1	10/14/18 16:37	10/16/18 19:41	AAT

SB-22 @ 25FT L1033649-05 Solid

Collected by	Collected date/time	Received date/time
Corwin Lameman	10/02/18 10:27	10/10/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1180560	1	10/16/18 12:16	10/16/18 12:21	KS
Volatile Organic Compounds (GC) by Method 8015/8021	WG1179895	1	10/11/18 11:30	10/12/18 15:02	LRL
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1180944	1	10/14/18 16:37	10/16/18 19:55	AAT

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Olivia S

Olivia Studebaker
Project Manager

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	97.2		1	10/15/2018 11:36	WG1180558

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	0.000670	B	0.000500	1	10/12/2018 13:38	WG1179895
Toluene	ND		0.00500	1	10/12/2018 13:38	WG1179895
Ethylbenzene	ND		0.000500	1	10/12/2018 13:38	WG1179895
Total Xylene	ND		0.00150	1	10/12/2018 13:38	WG1179895
TPH (GC/FID) Low Fraction	ND		0.100	1	10/12/2018 13:38	WG1179895
(S) a,a,a-Trifluorotoluene(FID)	*92.1*		*77.0-120*		*10/12/2018 13:38*	WG1179895
(S) a,a,a-Trifluorotoluene(PID)	*87.1*		*72.0-128*		*10/12/2018 13:38*	WG1179895

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	50.5		4.00	1	10/16/2018 19:01	WG1180944
C28-C40 Oil Range	10.3		4.00	1	10/16/2018 19:01	WG1180944
(S) o-Terphenyl	*51.4*		*18.0-148*		*10/16/2018 19:01*	WG1180944

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	97.3		1	10/15/2018 11:36	WG1180558

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	0.000842	B	0.000500	1	10/12/2018 13:59	WG1179895
Toluene	ND		0.00500	1	10/12/2018 13:59	WG1179895
Ethylbenzene	0.00213		0.000500	1	10/12/2018 13:59	WG1179895
Total Xylene	0.00508		0.00150	1	10/12/2018 13:59	WG1179895
TPH (GC/FID) Low Fraction	0.278		0.100	1	10/12/2018 13:59	WG1179895
(S) a,a,a-Trifluorotoluene(FID)	*95.7*		*77.0-120*		*10/12/2018 13:59*	WG1179895
(S) a,a,a-Trifluorotoluene(PID)	*90.6*		*72.0-128*		*10/12/2018 13:59*	WG1179895

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	32.5		4.00	1	10/16/2018 19:14	WG1180944
C28-C40 Oil Range	5.95		4.00	1	10/16/2018 19:14	WG1180944
(S) o-Terphenyl	*50.0*		*18.0-148*		*10/16/2018 19:14*	WG1180944

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	97.5		1	10/16/2018 12:21	WG1180560

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	0.00102	B	0.000500	1	10/12/2018 14:20	WG1179895
Toluene	0.00932		0.00500	1	10/12/2018 14:20	WG1179895
Ethylbenzene	0.00885		0.000500	1	10/12/2018 14:20	WG1179895
Total Xylene	0.00955		0.00150	1	10/12/2018 14:20	WG1179895
TPH (GC/FID) Low Fraction	1.42		0.100	1	10/12/2018 14:20	WG1179895
(S) a,a,a-Trifluorotoluene(FID)	*107*		*77.0-120*		*10/12/2018 14:20*	WG1179895
(S) a,a,a-Trifluorotoluene(PID)	*103*		*72.0-128*		*10/12/2018 14:20*	WG1179895

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	15.4		4.00	1	10/16/2018 19:28	WG1180944
C28-C40 Oil Range	ND		4.00	1	10/16/2018 19:28	WG1180944
(S) o-Terphenyl	*54.7*		*18.0-148*		*10/16/2018 19:28*	WG1180944

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	87.0		1	10/16/2018 12:21	WG1180560

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	0.000591	B	0.000500	1	10/12/2018 14:41	WG1179895
Toluene	ND		0.00500	1	10/12/2018 14:41	WG1179895
Ethylbenzene	0.000514		0.000500	1	10/12/2018 14:41	WG1179895
Total Xylene	ND		0.00150	1	10/12/2018 14:41	WG1179895
TPH (GC/FID) Low Fraction	ND		0.100	1	10/12/2018 14:41	WG1179895
(S) a,a,a-Trifluorotoluene(FID)	*93.1*		*77.0-120*		*10/12/2018 14:41*	WG1179895
(S) a,a,a-Trifluorotoluene(PID)	*88.1*		*72.0-128*		*10/12/2018 14:41*	WG1179895

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	ND		4.00	1	10/16/2018 19:41	WG1180944
C28-C40 Oil Range	ND		4.00	1	10/16/2018 19:41	WG1180944
(S) o-Terphenyl	*46.3*		*18.0-148*		*10/16/2018 19:41*	WG1180944

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	96.6		1	10/16/2018 12:21	WG1180560

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	0.000842	B	0.000500	1	10/12/2018 15:02	WG1179895
Toluene	ND		0.00500	1	10/12/2018 15:02	WG1179895
Ethylbenzene	ND		0.000500	1	10/12/2018 15:02	WG1179895
Total Xylene	0.00173		0.00150	1	10/12/2018 15:02	WG1179895
TPH (GC/FID) Low Fraction	ND		0.100	1	10/12/2018 15:02	WG1179895
(S) a,a,a-Trifluorotoluene(FID)	*94.7*		*77.0-120*		*10/12/2018 15:02*	WG1179895
(S) a,a,a-Trifluorotoluene(PID)	*89.1*		*72.0-128*		*10/12/2018 15:02*	WG1179895

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	120		4.00	1	10/16/2018 19:55	WG1180944
C28-C40 Oil Range	26.5		4.00	1	10/16/2018 19:55	WG1180944
(S) o-Terphenyl	*55.1*		*18.0-148*		*10/16/2018 19:55*	WG1180944

Method Blank (MB)

(MB) R3351004-1 10/15/18 11:36

Analyte	MB Result %	MB Qualifier	MB MDL %	MB RDL %
Total Solids	0.000			

L1033649-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1033649-01 10/15/18 11:36 • (DUP) R3351004-3 10/15/18 11:36

Analyte	Original Result %	DUP Result %	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Total Solids	97.2	97.1	1	0.107		10

Laboratory Control Sample (LCS)

(LCS) R3351004-2 10/15/18 11:36

Analyte	Spike Amount %	LCS Result %	LCS Rec. %	Rec. Limits %	LCS Qualifier
Total Solids	50.0	50.0	100	85.0-115	

Method Blank (MB)

(MB) R3351355-1 10/16/18 12:21

Analyte	MB Result %	MB Qualifier	MB MDL %	MB RDL %
Total Solids	0.000			

L1034191-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1034191-01 10/16/18 12:21 • (DUP) R3351355-3 10/16/18 12:21

Analyte	Original Result %	DUP Result %	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Total Solids	82.1	82.8	1	0.762		10

Laboratory Control Sample (LCS)

(LCS) R3351355-2 10/16/18 12:21

Analyte	Spike Amount %	LCS Result %	LCS Rec. %	Rec. Limits %	LCS Qualifier
Total Solids	50.0	50.0	100	85.0-115	

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Method Blank (MB)

(MB) R3350068-5 10/12/18 07:16

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Benzene	0.000203	J	0.000120	0.000500
Toluene	0.000245	J	0.000150	0.00500
Ethylbenzene	U		0.000110	0.000500
Total Xylene	U		0.000460	0.00150
TPH (GC/FID) Low Fraction	U		0.0217	0.100
(S) a,a,a-Trifluorotoluene(FID)	*95.1*			*77.0-120*
(S) a,a,a-Trifluorotoluene(PID)	*90.6*			*72.0-128*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3350068-1 10/12/18 05:31 • (LCSD) R3350068-2 10/12/18 05:52

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	0.0500	0.0464	0.0463	92.8	92.5	76.0-121			0.331	20
Toluene	0.0500	0.0469	0.0463	93.7	92.5	80.0-120			1.28	20
Ethylbenzene	0.0500	0.0467	0.0466	93.4	93.1	80.0-124			0.323	20
Total Xylene	0.150	0.144	0.144	96.2	96.1	37.0-160			0.139	20
(S) a,a,a-Trifluorotoluene(FID)				*96.1*	*95.7*	*77.0-120*				
(S) a,a,a-Trifluorotoluene(PID)				*90.0*	*89.7*	*72.0-128*				

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3350068-3 10/12/18 06:13 • (LCSD) R3350068-4 10/12/18 06:34

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	5.03	5.60	91.4	102	72.0-127			10.7	20
(S) a,a,a-Trifluorotoluene(FID)				*107*	*109*	*77.0-120*				
(S) a,a,a-Trifluorotoluene(PID)				*101*	*102*	*72.0-128*				

L1033803-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1033803-01 10/12/18 10:08 • (MS) R3350068-6 10/12/18 15:44 • (MSD) R3350068-7 10/12/18 16:05

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Benzene	0.0500	21.6	62.0	64.1	80.8	84.9	1000	10.0-155			3.28	32
Toluene	0.0500	185	213	216	56.7	62.3	1000	10.0-160			1.29	34
Ethylbenzene	0.0500	33.1	75.9	76.9	85.8	87.8	1000	10.0-160			1.31	32
Total Xylene	0.150	438	533	530	63.3	61.3	1000	10.0-160	J6	J6	0.564	32
(S) a,a,a-Trifluorotoluene(FID)					*93.7*	*94.1*		*77.0-120*				
(S) a,a,a-Trifluorotoluene(PID)					*92.6*	*92.5*		*72.0-128*				

L1033803-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1033803-01 10/12/18 10:08 • (MS) R3350068-8 10/12/18 16:25 • (MSD) R3350068-9 10/12/18 16:46

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	6440	10700	10800	76.6	79.6	1000	10.0-151			1.53	28
(S) a,a,a-Trifluorotoluene(FID)					*103*	*104*		*77.0-120*				
(S) a,a,a-Trifluorotoluene(PID)					*101*	*102*		*72.0-128*				

QUALITY CONTROL SUMMARY

L1033649-01,02,03,04,05

Method Blank (MB)

(MB) R3351310-1 10/16/18 18:06

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
C10-C28 Diesel Range	U		1.61	4.00
C28-C40 Oil Range	U		0.274	4.00
(S) o-Terphenyl	*74.2*			*18.0-148*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3351310-2 10/16/18 18:20 • (LCSD) R3351310-3 10/16/18 18:34

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
C10-C28 Diesel Range	50.0	35.4	33.3	70.8	66.6	50.0-150			6.11	20
(S) o-Terphenyl				*86.3*	*76.1*	*18.0-148*				

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
B	The same analyte is found in the associated blank.
J	The identification of the analyte is acceptable; the reported value is an estimate.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.

ACCREDITATIONS & LOCATIONS

Pace National is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.
* Not all certifications held by the laboratory are applicable to the results reported in the attached report.
* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace National.

State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO00356
Kentucky [1,6]	90010	South Carolina	84004
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1,4]	2006
Louisiana [1]	LA180010	Texas	T 104704245-17-14
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	TN00003
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	460132
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA

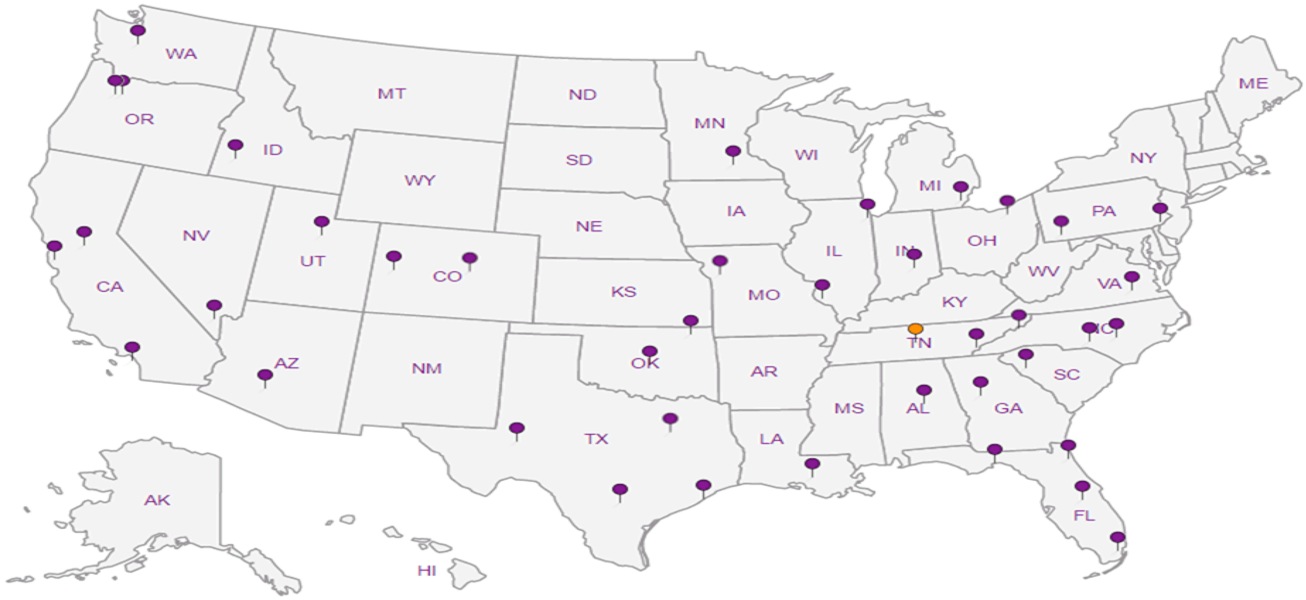
Third Party Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

Our Locations

Pace National has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. Pace National performs all testing at our central laboratory.



Billing Information:

Bill to Hilcorp - CALL LINDSAY DUMAS

Pres Chk

Chain of Custody Page ___ of ___

ESC
L·A·B S·C·I·E·N·C·E·S
YOUR LAB OF CHOICE
12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# L1033649
D002

Acctnum:
Template:
Prelogin:
TSR:
PB:
Shipped Via:

Report to: **Lindsay Dumas**

Email To: **ldumas@hilcorp.com**

Project Description: **Hilcorp San Juan 28-6 #31**

City/State Collected: **New Mexico**

Phone: **832-839-4585**

Fax:

Client Project #

Lab Project #

Collected by (print): **Corwin Lameman**

Site/Facility ID #

P.O. #

Collected by (signature):

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote #

Date Results Needed: **Oct 15, 2018**

Immediately Packed on Ice N ___ Y X

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	BTEX - 8021	TPH (GRO/DRO/MRO) - 8015	Remarks	Sample # (lab only)
SB-19 @ 30 ft	**Grab**	**SS**	**30**	**10/2/18**	**11:59**	1	X	X		-01
SB-20 @ 30 ft	**Grab**	**SS**	**30**	**10/8/18**	**12:33**	1	X	X		-02
SB-21 @ 30 ft	**Grab**	**SS**	**30**	**10/8/18**	**11:07**	1	X	X		-03
SB-22 @ 10 ft	**Grab**	**SS**	**10**	**10/2/18**	**9:41**	2	X	X		-04
SB-22 @ 25 ft	**Grab**	**SS**	**25**	**10/2/18**	**10:27**	1	X	X		-05

RAD SCREEN: <0.5 mR/hr

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other______

Remarks:
Samples were on very dense sandstone resulting in small recovery.
Email results to Elizabeth McNally - emcnally@animasenvironmental.com

pH _____ Temp _____
Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier ____

Tracking # 5704 6065 8395

Sample Receipt Checklist
COC Seal Present/Intact: _NP ✓Y _N
COC Signed/Accurate: ✓Y _N
Bottles arrive intact: ✓Y _N
Correct bottles used: ✓Y _N
Sufficient volume sent: ✓Y _N
If Applicable
VOA Zero Headspace: _Y _N
Preservation Correct/Checked: _Y _N

Relinquished by : (Signature) Cor	Date: 10-8-18	Time: 16:42	Received by: (Signature)	Trip Blank Received: Yes / [✓ No] HCL / MeoH TBR	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: °C IR +.1 4.2=4.3 Bottles Received: 6 4oz	If preservation required by Login: Date/Time
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 10/10/18 Time: 8:45	Hold: Condition: NCF / [✓ OK]

ANALYTICAL REPORT

December 13, 2018

HilCorp-Farmington, NM

Sample Delivery Group:	L1050751
Samples Received:	12/07/2018
Project Number:	
Description:	Hilcorp San Juan 28-6 #31
Report To:	Lindsay Dumas 382 Road 3100 Aztec, NM 87401

Entire Report Reviewed By: Daphne R Richards

Daphne Richards
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace National is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.

12065 Lebanon Rd   Mount Juliet, TN 37122   615-758-5858   800-767-5859   www.pacenational.com

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Collected by	Collected date/time	Received date/time
Corwin Lameman	12/05/18 11:19	12/07/18 09:00

SB-4R @ 8 FT L1050751-01 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1207678	1	12/10/18 14:10	12/10/18 14:21	JD
Volatile Organic Compounds (GC) by Method 8015/8021	WG1209024	25	12/07/18 16:41	12/11/18 17:52	CAH
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1208013	1	12/10/18 08:11	12/10/18 20:13	AAT

Collected by	Collected date/time	Received date/time
Corwin Lameman	12/05/18 11:16	12/07/18 09:00

SB-4R @ 12 FT L1050751-02 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1207678	1	12/10/18 14:10	12/10/18 14:21	JD
Volatile Organic Compounds (GC) by Method 8015/8021	WG1209024	500	12/07/18 16:41	12/11/18 18:14	CAH
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1208013	5	12/10/18 08:11	12/11/18 01:30	AAT

Collected by	Collected date/time	Received date/time
Corwin Lameman	12/05/18 10:32	12/07/18 09:00

SB-5R @ 8.5 FT L1050751-03 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1207678	1	12/10/18 14:10	12/10/18 14:21	JD
Volatile Organic Compounds (GC) by Method 8015/8021	WG1207972	1	12/07/18 16:41	12/09/18 15:41	ACG
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1208013	1	12/10/18 08:11	12/10/18 21:04	AAT

Collected by	Collected date/time	Received date/time
Corwin Lameman	12/05/18 10:19	12/07/18 09:00

SB-5R @ 12 FT L1050751-04 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1207678	1	12/10/18 14:10	12/10/18 14:21	JD
Volatile Organic Compounds (GC) by Method 8015/8021	WG1209667	2500	12/07/18 16:41	12/12/18 11:45	BMB
Volatile Organic Compounds (GC) by Method 8021	WG1209024	500	12/07/18 16:41	12/11/18 18:35	CAH
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1208013	5	12/10/18 08:11	12/11/18 12:22	DMW

Collected by	Collected date/time	Received date/time
Corwin Lameman	12/05/18 12:50	12/07/18 09:00

SB-6R @ 8 FT L1050751-05 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1207678	1	12/10/18 14:10	12/10/18 14:21	JD
Volatile Organic Compounds (GC) by Method 8015	WG1209150	25	12/07/18 16:41	12/11/18 20:46	DWR
Volatile Organic Compounds (GC) by Method 8021	WG1207972	1	12/07/18 16:41	12/09/18 16:02	ACG
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1208013	1	12/10/18 08:11	12/10/18 22:15	AAT

Collected by	Collected date/time	Received date/time
Corwin Lameman	12/05/18 12:46	12/07/18 09:00

SB-6R @ 12 FT L1050751-06 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1207678	1	12/10/18 14:10	12/10/18 14:21	JD
Volatile Organic Compounds (GC) by Method 8015	WG1209667	2500	12/07/18 16:41	12/12/18 12:06	BMB
Volatile Organic Compounds (GC) by Method 8021	WG1209024	500	12/07/18 16:41	12/11/18 19:22	CAH
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1208013	5	12/10/18 08:11	12/11/18 12:34	DMW

SAMPLE SUMMARY

SB-7R @ 8 FT L1050751-07 Solid

Collected by	Collected date/time	Received date/time
Corwin Lameman	12/05/18 11:40	12/07/18 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1207678	1	12/10/18 14:10	12/10/18 14:21	JD
Volatile Organic Compounds (GC) by Method 8015/8021	WG1207972	1	12/07/18 16:41	12/09/18 16:22	ACG
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1208013	1	12/10/18 08:11	12/10/18 22:51	AAT

SB-7R @ 12 FT L1050751-08 Solid

Collected by	Collected date/time	Received date/time
Corwin Lameman	12/05/18 11:45	12/07/18 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1207678	1	12/10/18 14:10	12/10/18 14:21	JD
Volatile Organic Compounds (GC) by Method 8015/8021	WG1207972	1	12/07/18 16:41	12/09/18 16:43	ACG
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1208013	1	12/10/18 08:11	12/10/18 23:03	AAT

SB-8R @ 4 FT L1050751-09 Solid

Collected by	Collected date/time	Received date/time
Corwin Lameman	12/05/18 13:05	12/07/18 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1207678	1	12/10/18 14:10	12/10/18 14:21	JD
Volatile Organic Compounds (GC) by Method 8015/8021	WG1209667	25	12/07/18 16:41	12/12/18 12:27	BMB
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1208013	1	12/10/18 08:11	12/10/18 23:15	AAT

SB-8R @ 12 FT L1050751-10 Solid

Collected by	Collected date/time	Received date/time
Corwin Lameman	12/05/18 13:18	12/07/18 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1207678	1	12/10/18 14:10	12/10/18 14:21	JD
Volatile Organic Compounds (GC) by Method 8015/8021	WG1209024	500	12/07/18 16:41	12/11/18 20:04	CAH
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1208013	1	12/10/18 08:11	12/10/18 23:26	AAT

SB-24 @ 8 FT L1050751-11 Solid

Collected by	Collected date/time	Received date/time
Corwin Lameman	12/05/18 13:48	12/07/18 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1207679	1	12/10/18 13:48	12/10/18 14:01	JD
Volatile Organic Compounds (GC) by Method 8015/8021	WG1209150	10000	12/07/18 16:41	12/11/18 21:08	DWR
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1208013	1	12/10/18 08:11	12/10/18 23:38	AAT

SB-24 @ 12 FT L1050751-12 Solid

Collected by	Collected date/time	Received date/time
Corwin Lameman	12/05/18 13:46	12/07/18 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Total Solids by Method 2540 G-2011	WG1210135	1	12/13/18 08:29	12/13/18 08:37	JD
Volatile Organic Compounds (GC) by Method 8015/8021	WG1210228	5000	12/12/18 14:04	12/13/18 16:47	DWR
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1210039	20	12/12/18 18:57	12/13/18 11:10	DMW

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Daphne R Richards

Daphne Richards
Project Manager

SB-4R @ 8 FT
Collected date/time: 12/05/18 11:19

SAMPLE RESULTS - 01

L1050751

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	86.6		1	12/10/2018 14:21	WG1207678

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	0.268		0.0125	25	12/11/2018 17:52	WG1209024
Toluene	0.921		0.125	25	12/11/2018 17:52	WG1209024
Ethylbenzene	0.0993		0.0125	25	12/11/2018 17:52	WG1209024
Total Xylene	1.03		0.0375	25	12/11/2018 17:52	WG1209024
TPH (GC/FID) Low Fraction	11.2		2.50	25	12/11/2018 17:52	WG1209024
(S) a,a,a-Trifluorotoluene(FID)	*102*		*77.0-120*		*12/11/2018 17:52*	WG1209024
(S) a,a,a-Trifluorotoluene(PID)	*98.0*		*72.0-128*		*12/11/2018 17:52*	WG1209024

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
TPH (GC/FID) High Fraction	46.1	J5	4.00	1	12/10/2018 20:13	WG1208013
(S) o-Terphenyl	*71.9*		*18.0-148*		*12/10/2018 20:13*	WG1208013

SB-4R @ 12 FT

Collected date/time: 12/05/18 11:16

SAMPLE RESULTS - 02

L1050751

Total Solids by Method 2540 G-2011

	Result	Qualifier	Dilution	Analysis	Batch
Analyte	%			date / time	
Total Solids	91.9		1	12/10/2018 14:21	WG1207678

Volatile Organic Compounds (GC) by Method 8015/8021

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/kg		mg/kg		date / time	
Benzene	5.45		0.250	500	12/11/2018 18:14	WG1209024
Toluene	35.3		2.50	500	12/11/2018 18:14	WG1209024
Ethylbenzene	10.4		0.250	500	12/11/2018 18:14	WG1209024
Total Xylene	156		0.750	500	12/11/2018 18:14	WG1209024
TPH (GC/FID) Low Fraction	3940		50.0	500	12/11/2018 18:14	WG1209024
(S) a,a,a-Trifluorotoluene(FID)	*86.7*		*77.0-120*		*12/11/2018 18:14*	WG1209024
(S) a,a,a-Trifluorotoluene(PID)	*98.4*		*72.0-128*		*12/11/2018 18:14*	WG1209024

Semi-Volatile Organic Compounds (GC) by Method 8015

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/kg		mg/kg		date / time	
TPH (GC/FID) High Fraction	251	J3	20.0	5	12/11/2018 01:30	WG1208013
(S) o-Terphenyl	*79.5*		*18.0-148*		*12/11/2018 01:30*	WG1208013

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	86.5		1	12/10/2018 14:21	WG1207678

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	0.00427		0.000500	1	12/09/2018 15:41	WG1207972
Toluene	0.00736		0.00500	1	12/09/2018 15:41	WG1207972
Ethylbenzene	ND		0.000500	1	12/09/2018 15:41	WG1207972
Total Xylene	0.00494		0.00150	1	12/09/2018 15:41	WG1207972
TPH (GC/FID) Low Fraction	0.180		0.100	1	12/09/2018 15:41	WG1207972
(S) a,a,a-Trifluorotoluene(FID)	*101*		*77.0-120*		*12/09/2018 15:41*	WG1207972
(S) a,a,a-Trifluorotoluene(PID)	*94.4*		*72.0-128*		*12/09/2018 15:41*	WG1207972

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
TPH (GC/FID) High Fraction	ND	J3	4.00	1	12/10/2018 21:04	WG1208013
(S) o-Terphenyl	*47.6*		*18.0-148*		*12/10/2018 21:04*	WG1208013

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	91.0		1	12/10/2018 14:21	WG1207678

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	10.8		0.250	500	12/11/2018 18:35	WG1209024
Toluene	140		12.5	2500	12/12/2018 11:45	WG1209667
Ethylbenzene	15.1		0.250	500	12/11/2018 18:35	WG1209024
Total Xylene	216		0.750	500	12/11/2018 18:35	WG1209024
TPH (GC/FID) Low Fraction	6020		250	2500	12/12/2018 11:45	WG1209667
(S) a,a,a-Trifluorotoluene(FID)	*74.7*	J2	*77.0-120*		*12/11/2018 18:35*	WG1209024
(S) a,a,a-Trifluorotoluene(FID)	*90.6*		*77.0-120*		*12/12/2018 11:45*	WG1209667
(S) a,a,a-Trifluorotoluene(PID)	*95.6*		*72.0-128*		*12/11/2018 18:35*	WG1209024
(S) a,a,a-Trifluorotoluene(PID)	*102*		*72.0-128*		*12/12/2018 11:45*	WG1209667

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
TPH (GC/FID) High Fraction	423	J3	20.0	5	12/11/2018 12:22	WG1208013
(S) o-Terphenyl	*80.0*		*18.0-148*		*12/11/2018 12:22*	WG1208013

SB-6R @ 8 FT
Collected date/time: 12/05/18 12:50

SAMPLE RESULTS - 05
L1050751

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	89.8		1	12/10/2018 14:21	WG1207678

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	0.0151		0.000500	1	12/09/2018 16:02	WG1207972
Toluene	0.0956		0.00500	1	12/09/2018 16:02	WG1207972
Ethylbenzene	0.0470		0.000500	1	12/09/2018 16:02	WG1207972
Total Xylene	0.322		0.00150	1	12/09/2018 16:02	WG1207972
TPH (GC/FID) Low Fraction	23.8		2.50	25	12/11/2018 20:46	WG1209150
(S) a,a,a-Trifluorotoluene(FID)	*83.0*		*77.0-120*		*12/09/2018 16:02*	WG1207972
(S) a,a,a-Trifluorotoluene(FID)	*103*		*77.0-120*		*12/11/2018 20:46*	WG1209150
(S) a,a,a-Trifluorotoluene(PID)	*95.7*		*72.0-128*		*12/09/2018 16:02*	WG1207972
(S) a,a,a-Trifluorotoluene(PID)	*97.0*		*72.0-128*		*12/11/2018 20:46*	WG1209150

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
TPH (GC/FID) High Fraction	9.93	J3	4.00	1	12/10/2018 22:15	WG1208013
(S) o-Terphenyl	*77.9*		*18.0-148*		*12/10/2018 22:15*	WG1208013

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	90.7		1	12/10/2018 14:21	WG1207678

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	8.70		0.250	500	12/11/2018 19:22	WG1209024
Toluene	98.5		2.50	500	12/11/2018 19:22	WG1209024
Ethylbenzene	17.3		0.250	500	12/11/2018 19:22	WG1209024
Total Xylene	257		0.750	500	12/11/2018 19:22	WG1209024
TPH (GC/FID) Low Fraction	6970		250	2500	12/12/2018 12:06	WG1209667
(S) a,a,a-Trifluorotoluene(FID)	*82.1*		*77.0-120*		*12/11/2018 19:22*	WG1209024
(S) a,a,a-Trifluorotoluene(FID)	*91.8*		*77.0-120*		*12/12/2018 12:06*	WG1209667
(S) a,a,a-Trifluorotoluene(PID)	*97.5*		*72.0-128*		*12/11/2018 19:22*	WG1209024
(S) a,a,a-Trifluorotoluene(PID)	*104*		*72.0-128*		*12/12/2018 12:06*	WG1209667

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
TPH (GC/FID) High Fraction	385	J3	20.0	5	12/11/2018 12:34	WG1208013
(S) o-Terphenyl	*76.3*		*18.0-148*		*12/11/2018 12:34*	WG1208013

SB-7R @ 8 FT

Collected date/time: 12/05/18 11:40

SAMPLE RESULTS - 07

L1050751

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	85.7		1	12/10/2018 14:21	WG1207678

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	ND		0.000500	1	12/09/2018 16:22	WG1207972
Toluene	ND		0.00500	1	12/09/2018 16:22	WG1207972
Ethylbenzene	ND		0.000500	1	12/09/2018 16:22	WG1207972
Total Xylene	ND		0.00150	1	12/09/2018 16:22	WG1207972
TPH (GC/FID) Low Fraction	ND		0.100	1	12/09/2018 16:22	WG1207972
(S) a,a,a-Trifluorotoluene(FID)	*102*		*77.0-120*		*12/09/2018 16:22*	WG1207972
(S) a,a,a-Trifluorotoluene(PID)	*93.8*		*72.0-128*		*12/09/2018 16:22*	WG1207972

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
TPH (GC/FID) High Fraction	ND	J3	4.00	1	12/10/2018 22:51	WG1208013
(S) o-Terphenyl	*47.6*		*18.0-148*		*12/10/2018 22:51*	WG1208013

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	88.6		1	12/10/2018 14:21	WG1207678

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	0.00593		0.000500	1	12/09/2018 16:43	WG1207972
Toluene	0.00977		0.00500	1	12/09/2018 16:43	WG1207972
Ethylbenzene	0.0119		0.000500	1	12/09/2018 16:43	WG1207972
Total Xylene	0.0420		0.00150	1	12/09/2018 16:43	WG1207972
TPH (GC/FID) Low Fraction	3.41		0.100	1	12/09/2018 16:43	WG1207972
(S) a,a,a-Trifluorotoluene(FID)	*86.5*		*77.0-120*		*12/09/2018 16:43*	WG1207972
(S) a,a,a-Trifluorotoluene(PID)	*94.4*		*72.0-128*		*12/09/2018 16:43*	WG1207972

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
TPH (GC/FID) High Fraction	ND	J3	4.00	1	12/10/2018 23:03	WG1208013
(S) o-Terphenyl	*73.8*		*18.0-148*		*12/10/2018 23:03*	WG1208013

SB-8R @ 4 FT

Collected date/time: 12/05/18 13:05

SAMPLE RESULTS - 09

L1050751

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Total Solids by Method 2540 G-2011

	Result	Qualifier	Dilution	Analysis	Batch
Analyte	%			date / time	
Total Solids	88.8		1	12/10/2018 14:21	WG1207678

Volatile Organic Compounds (GC) by Method 8015/8021

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/kg		mg/kg		date / time	
Benzene	0.0520		0.0125	25	12/12/2018 12:27	WG1209667
Toluene	0.204		0.125	25	12/12/2018 12:27	WG1209667
Ethylbenzene	ND		0.0125	25	12/12/2018 12:27	WG1209667
Total Xylene	1.29		0.0375	25	12/12/2018 12:27	WG1209667
TPH (GC/FID) Low Fraction	65.7		2.50	25	12/12/2018 12:27	WG1209667
(S) a,a,a-Trifluorotoluene(FID)	*92.1*		*77.0-120*		*12/12/2018 12:27*	WG1209667
(S) a,a,a-Trifluorotoluene(PID)	*102*		*72.0-128*		*12/12/2018 12:27*	WG1209667

Semi-Volatile Organic Compounds (GC) by Method 8015

	Result	Qualifier	RDL	Dilution	Analysis	Batch
Analyte	mg/kg		mg/kg		date / time	
TPH (GC/FID) High Fraction	9.84	J3	4.00	1	12/10/2018 23:15	WG1208013
(S) o-Terphenyl	*62.7*		*18.0-148*		*12/10/2018 23:15*	WG1208013

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	89.8		1	12/10/2018 14:21	WG1207678

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	6.09		0.250	500	12/11/2018 20:04	WG1209024
Toluene	52.5		2.50	500	12/11/2018 20:04	WG1209024
Ethylbenzene	11.3		0.250	500	12/11/2018 20:04	WG1209024
Total Xylene	173		0.750	500	12/11/2018 20:04	WG1209024
TPH (GC/FID) Low Fraction	4250		50.0	500	12/11/2018 20:04	WG1209024
(S) a,a,a-Trifluorotoluene(FID)	*85.6*		*77.0-120*		*12/11/2018 20:04*	WG1209024
(S) a,a,a-Trifluorotoluene(PID)	*98.1*		*72.0-128*		*12/11/2018 20:04*	WG1209024

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
TPH (GC/FID) High Fraction	277	J3	4.00	1	12/10/2018 23:26	WG1208013
(S) o-Terphenyl	*76.6*		*18.0-148*		*12/10/2018 23:26*	WG1208013

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	93.1		1	12/10/2018 14:01	WG1207679

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	30.3		5.00	10000	12/11/2018 21:08	WG1209150
Toluene	241		50.0	10000	12/11/2018 21:08	WG1209150
Ethylbenzene	58.0		5.00	10000	12/11/2018 21:08	WG1209150
Total Xylene	897		15.0	10000	12/11/2018 21:08	WG1209150
TPH (GC/FID) Low Fraction	20200		1000	10000	12/11/2018 21:08	WG1209150
(S) a,a,a-Trifluorotoluene(FID)	*101*		*77.0-120*		*12/11/2018 21:08*	WG1209150
(S) a,a,a-Trifluorotoluene(PID)	*98.4*		*72.0-128*		*12/11/2018 21:08*	WG1209150

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
TPH (GC/FID) High Fraction	41.6	J3	4.00	1	12/10/2018 23:38	WG1208013
(S) o-Terphenyl	*69.1*		*18.0-148*		*12/10/2018 23:38*	WG1208013

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	86.1		1	12/13/2018 08:37	WG1210135

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	29.8		2.50	5000	12/13/2018 16:47	WG1210228
Toluene	341		25.0	5000	12/13/2018 16:47	WG1210228
Ethylbenzene	74.3		2.50	5000	12/13/2018 16:47	WG1210228
Total Xylene	646		7.50	5000	12/13/2018 16:47	WG1210228
TPH (GC/FID) Low Fraction	15500		500	5000	12/13/2018 16:47	WG1210228
(S) a,a,a-Trifluorotoluene(FID)	*89.7*		*77.0-120*		*12/13/2018 16:47*	WG1210228
(S) a,a,a-Trifluorotoluene(PID)	*104*		*72.0-128*		*12/13/2018 16:47*	WG1210228

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
TPH (GC/FID) High Fraction	1710		80.0	20	12/13/2018 11:10	WG1210039
(S) o-Terphenyl	*0.000*	J7	*18.0-148*		*12/13/2018 11:10*	WG1210039

Method Blank (MB)

(MB) R3367032-1 12/10/18 14:21

Analyte	MB Result %	MB Qualifier	MB MDL %	MB RDL %
Total Solids	0.000			

L1050751-05 Original Sample (OS) • Duplicate (DUP)

(OS) L1050751-05 12/10/18 14:21 • (DUP) R3367032-3 12/10/18 14:21

Analyte	Original Result %	DUP Result %	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Total Solids	89.8	89.8	1	0.0546		10

Laboratory Control Sample (LCS)

(LCS) R3367032-2 12/10/18 14:21

Analyte	Spike Amount %	LCS Result %	LCS Rec. %	Rec. Limits %	LCS Qualifier
Total Solids	50.0	50.0	100	85.0-115	

Method Blank (MB)

(MB) R3367031-1 12/10/18 14:01

Analyte	MB Result %	MB Qualifier	MB MDL %	MB RDL %
Total Solids	0.00200			

L1050766-05 Original Sample (OS) • Duplicate (DUP)

(OS) L1050766-05 12/10/18 14:01 • (DUP) R3367031-3 12/10/18 14:01

Analyte	Original Result %	DUP Result %	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Total Solids	90.1	87.4	1	3.02		10

Laboratory Control Sample (LCS)

(LCS) R3367031-2 12/10/18 14:01

Analyte	Spike Amount %	LCS Result %	LCS Rec. %	Rec. Limits %	LCS Qualifier
Total Solids	50.0	50.0	100	85.0-115	

Method Blank (MB)

(MB) R3368002-1 12/13/18 08:37

Analyte	MB Result %	MB Qualifier	MB MDL %	MB RDL %
Total Solids	0.000			

L1050948-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1050948-02 12/13/18 08:37 • (DUP) R3368002-3 12/13/18 08:37

Analyte	Original Result %	DUP Result %	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Total Solids	97.5	97.7	1	0.179		10

Laboratory Control Sample (LCS)

(LCS) R3368002-2 12/13/18 08:37

Analyte	Spike Amount %	LCS Result %	LCS Rec. %	Rec. Limits %	LCS Qualifier
Total Solids	50.0	50.0	100	85.0-115	

Method Blank (MB)

(MB) R3367191-5 12/09/18 14:57

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Benzene	U		0.000120	0.000500
Toluene	U		0.000150	0.00500
Ethylbenzene	U		0.000110	0.000500
Total Xylene	U		0.000460	0.00150
TPH (GC/FID) Low Fraction	U		0.0217	0.100
(S) a,a,a-Trifluorotoluene(FID)	*104*			*77.0-120*
(S) a,a,a-Trifluorotoluene(PID)	*95.8*			*72.0-128*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3367191-1 12/09/18 13:15 • (LCSD) R3367191-2 12/09/18 13:35

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	0.0500	0.0458	0.0447	91.6	89.5	76.0-121			2.30	20
Toluene	0.0500	0.0489	0.0469	97.8	93.7	80.0-120			4.21	20
Ethylbenzene	0.0500	0.0506	0.0490	101	97.9	80.0-124			3.32	20
Total Xylene	0.150	0.150	0.145	100	96.6	37.0-160			3.66	20
(S) a,a,a-Trifluorotoluene(FID)				*103*	*103*	*77.0-120*				
(S) a,a,a-Trifluorotoluene(PID)				*96.5*	*96.3*	*72.0-128*				

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3367191-3 12/09/18 13:55 • (LCSD) R3367191-4 12/09/18 14:16

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	5.54	5.63	101	102	72.0-127			1.70	20
(S) a,a,a-Trifluorotoluene(FID)				*104*	*104*	*77.0-120*				
(S) a,a,a-Trifluorotoluene(PID)				*103*	*103*	*72.0-128*				

WG1209024

Volatile Organic Compounds (GC) by Method 8015/8021

QUALITY CONTROL SUMMARY

L1050751-01,02,04,06,10

Method Blank (MB)

(MB) R3367481-3 12/11/18 13:39

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Benzene	U		0.000120	0.000500
Toluene	0.000778	J	0.000150	0.00500
Ethylbenzene	0.000140	J	0.000110	0.000500
Total Xylene	U		0.000460	0.00150
TPH (GC/FID) Low Fraction	U		0.0217	0.100
(S) a,a,a-Trifluorotoluene(FID)	*101*			*77.0-120*
(S) a,a,a-Trifluorotoluene(PID)	*98.7*			*72.0-128*

Laboratory Control Sample (LCS)

(LCS) R3367481-1 12/11/18 12:14

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Benzene	0.0500	0.0486	97.2	76.0-121	
Toluene	0.0500	0.0492	98.5	80.0-120	
Ethylbenzene	0.0500	0.0490	97.9	80.0-124	
Total Xylene	0.150	0.145	96.7	37.0-160	
(S) a,a,a-Trifluorotoluene(FID)			*101*	*77.0-120*	
(S) a,a,a-Trifluorotoluene(PID)			*98.5*	*72.0-128*	

Laboratory Control Sample (LCS)

(LCS) R3367481-2 12/11/18 12:57

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
TPH (GC/FID) Low Fraction	5.50	5.44	98.9	72.0-127	
(S) a,a,a-Trifluorotoluene(FID)			*90.9*	*77.0-120*	
(S) a,a,a-Trifluorotoluene(PID)			*106*	*72.0-128*	

L1050751-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1050751-01 12/11/18 17:52 • (MS) R3367481-4 12/12/18 07:50 • (MSD) R3367481-5 12/12/18 08:11

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Benzene	0.0500	0.268	1.24	1.14	77.5	70.0	25	10.0-155			7.95	32
Toluene	0.0500	0.921	1.98	1.88	84.6	76.3	25	10.0-160			5.36	34
Ethylbenzene	0.0500	0.0993	1.14	1.04	83.2	75.5	25	10.0-160			8.77	32
Total Xylene	0.150	1.03	4.07	3.79	81.0	73.6	25	10.0-160			7.12	32
(S) a,a,a-Trifluorotoluene(FID)					*103*	*102*		*77.0-120*				
(S) a,a,a-Trifluorotoluene(PID)					*99.9*	*99.2*		*72.0-128*				

L1050751-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1050751-01 12/11/18 17:52 • (MS) R3367481-6 12/12/18 08:32 • (MSD) R3367481-7 12/12/18 08:53

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	11.2	104	114	67.5	74.8	25	10.0-151			9.21	28
(S) a,a,a-Trifluorotoluene(FID)					*96.8*	*96.5*		*77.0-120*				
(S) a,a,a-Trifluorotoluene(PID)					*104*	*104*		*72.0-128*				

Method Blank (MB)

(MB) R3367482-3 12/11/18 13:39

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Benzene	U		0.000120	0.000500
Toluene	0.000778	J	0.000150	0.00500
Ethylbenzene	0.000140	J	0.000110	0.000500
Total Xylene	U		0.000460	0.00150
TPH (GC/FID) Low Fraction	U		0.0217	0.100
(S) a,a,a-Trifluorotoluene(FID)	*101*			*77.0-120*
(S) a,a,a-Trifluorotoluene(PID)	*98.7*			*72.0-128*

Laboratory Control Sample (LCS)

(LCS) R3367482-1 12/11/18 12:14

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Benzene	0.0500	0.0486	97.2	76.0-121	
Toluene	0.0500	0.0492	98.5	80.0-120	
Ethylbenzene	0.0500	0.0490	97.9	80.0-124	
Total Xylene	0.150	0.145	96.7	37.0-160	
(S) a,a,a-Trifluorotoluene(FID)			*101*	*77.0-120*	
(S) a,a,a-Trifluorotoluene(PID)			*98.5*	*72.0-128*	

Laboratory Control Sample (LCS)

(LCS) R3367482-2 12/11/18 12:57

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
TPH (GC/FID) Low Fraction	5.50	5.44	98.9	72.0-127	
(S) a,a,a-Trifluorotoluene(FID)			*90.9*	*77.0-120*	
(S) a,a,a-Trifluorotoluene(PID)			*106*	*72.0-128*	

Method Blank (MB)

(MB) R3367641-3 12/12/18 01:47

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Benzene	0.000151	J	0.000120	0.000500
Toluene	U		0.000150	0.00500
Ethylbenzene	0.000112	J	0.000110	0.000500
Total Xylene	U		0.000460	0.00150
TPH (GC/FID) Low Fraction	U		0.0217	0.100
(S) a,a,a-Trifluorotoluene(FID)	*93.5*			*77.0-120*
(S) a,a,a-Trifluorotoluene(PID)	*104*			*72.0-128*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3367641-1 12/12/18 00:44 • (LCSD) R3367641-2 12/12/18 01:05

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	5.72	5.28	104	96.0	72.0-127			7.96	20
(S) a,a,a-Trifluorotoluene(FID)				*109*	*107*	*77.0-120*				
(S) a,a,a-Trifluorotoluene(PID)				*117*	*116*	*72.0-128*				

Laboratory Control Sample (LCS)

(LCS) R3367641-4 12/12/18 04:37

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Benzene	0.0500	0.0457	91.5	76.0-121	
Toluene	0.0500	0.0472	94.4	80.0-120	
Ethylbenzene	0.0500	0.0476	95.1	80.0-124	
Total Xylene	0.150	0.139	92.9	37.0-160	
(S) a,a,a-Trifluorotoluene(FID)			*93.3*	*77.0-120*	
(S) a,a,a-Trifluorotoluene(PID)			*102*	*72.0-128*	

Method Blank (MB)

(MB) R3368054-5 12/13/18 13:34

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Benzene	0.000139	J	0.000120	0.000500
Toluene	0.000321	J	0.000150	0.00500
Ethylbenzene	0.000220	J	0.000110	0.000500
Total Xylene	U		0.000460	0.00150
TPH (GC/FID) Low Fraction	U		0.0217	0.100
(S) a,a,a-Trifluorotoluene(FID)	*93.9*			*77.0-120*
(S) a,a,a-Trifluorotoluene(PID)	*105*			*72.0-128*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3368054-1 12/13/18 10:59 • (LCSD) R3368054-2 12/13/18 11:20

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	0.0500	0.0454	0.0443	90.8	88.6	76.0-121			2.37	20
Toluene	0.0500	0.0474	0.0456	94.8	91.2	80.0-120			3.77	20
Ethylbenzene	0.0500	0.0482	0.0455	96.5	90.9	80.0-124			5.94	20
Total Xylene	0.150	0.142	0.133	94.5	88.8	37.0-160			6.25	20
(S) a,a,a-Trifluorotoluene(FID)				*93.4*	*93.6*	*77.0-120*				
(S) a,a,a-Trifluorotoluene(PID)				*103*	*102*	*72.0-128*				

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3368054-3 12/13/18 11:41 • (LCSD) R3368054-4 12/13/18 12:02

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	5.29	4.95	96.1	90.0	72.0-127			6.52	20
(S) a,a,a-Trifluorotoluene(FID)				*107*	*106*	*77.0-120*				
(S) a,a,a-Trifluorotoluene(PID)				*116*	*115*	*72.0-128*				

Method Blank (MB)

(MB) R3367035-1 12/10/18 18:45

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
TPH (GC/FID) High Fraction	U		0.769	4.00
(S) o-Terphenyl	*74.5*			*18.0-148*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3367035-2 12/10/18 18:57 • (LCSD) R3367035-3 12/10/18 19:09

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) High Fraction	50.0	35.0	44.0	70.0	88.0	50.0-150		J3	22.8	20
(S) o-Terphenyl				*86.3*	*109*	*18.0-148*				

L1050751-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1050751-01 12/10/18 20:13 • (MS) R3367035-4 12/10/18 20:25 • (MSD) R3367035-5 12/10/18 20:50

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) High Fraction	50.0	46.1	129	113	166	134	1	50.0-150	J5		13.2	20
(S) o-Terphenyl					*86.5*	*86.0*		*18.0-148*				

Method Blank (MB)

(MB) R3367780-1 12/13/18 01:35

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
TPH (GC/FID) High Fraction	U		0.769	4.00
(S) o-Terphenyl	*81.4*			*18.0-148*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3367780-2 12/13/18 01:47 • (LCSD) R3367780-3 12/13/18 01:58

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) High Fraction	25.1	24.4	24.8	97.2	98.8	50.0-150			1.63	20
(S) o-Terphenyl				*77.8*	*79.7*	*18.0-148*				

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state "ND" (Not Detected) or "BDL" (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
J	The identification of the analyte is acceptable; the reported value is an estimate.
J2	Surrogate recovery limits have been exceeded; values are outside lower control limits.
J3	The associated batch QC was outside the established quality control range for precision.
J5	The sample matrix interfered with the ability to make any accurate determination; spike value is high.
J7	Surrogate recovery cannot be used for control limit evaluation due to dilution.

ACCREDITATIONS & LOCATIONS

Pace National is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.
* Not all certifications held by the laboratory are applicable to the results reported in the attached report.
* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace National.

State Accreditations

Alabama	40660
Alaska	17-026
Arizona	AZ0612
Arkansas	88-0469
California	2932
Colorado	TN00003
Connecticut	PH-0197
Florida	E87487
Georgia	NELAP
Georgia [1]	923
Idaho	TN00003
Illinois	200008
Indiana	C-TN-01
Iowa	364
Kansas	E-10277
Kentucky [1,6]	90010
Kentucky [2]	16
Louisiana	AI30792
Louisiana [1]	LA180010
Maine	TN0002
Maryland	324
Massachusetts	M-TN003
Michigan	9958
Minnesota	047-999-395
Mississippi	TN00003
Missouri	340
Montana	CERT0086

Nebraska	NE-OS-15-05
Nevada	TN-03-2002-34
New Hampshire	2975
New Jersey–NELAP	TN002
New Mexico [1]	n/a
New York	11742
North Carolina	Env375
North Carolina [1]	DW21704
North Carolina [3]	41
North Dakota	R-140
Ohio–VAP	CL0069
Oklahoma	9915
Oregon	TN200002
Pennsylvania	68-02979
Rhode Island	LAO00356
South Carolina	84004
South Dakota	n/a
Tennessee [1,4]	2006
Texas	T 104704245-17-14
Texas [5]	LAB0152
Utah	TN00003
Vermont	VT2006
Virginia	460132
Washington	C847
West Virginia	233
Wisconsin	9980939910
Wyoming	A2LA

Third Party Federal Accreditations

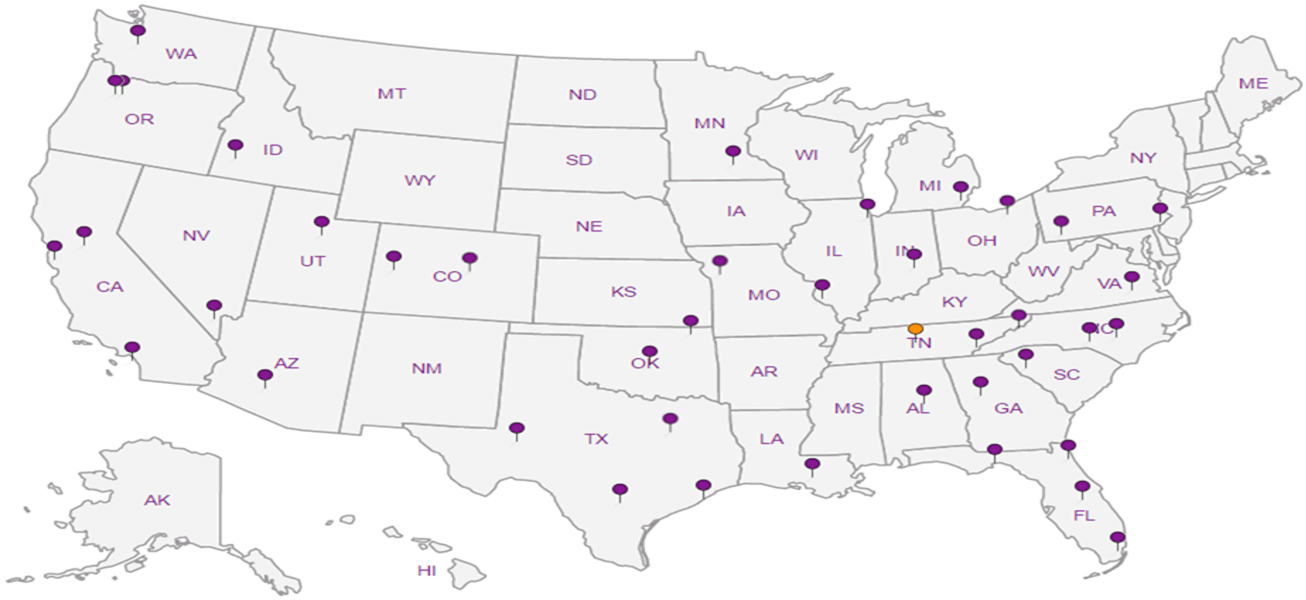
A2LA – ISO 17025	1461.01
A2LA – ISO 17025 [5]	1461.02
Canada	1461.01
EPA–Crypto	TN00003

AIHA-LAP,LLC EMLAP	100789
DOD	1461.01
USDA	P330-15-00234

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

Our Locations

Pace National has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. Pace National performs all testing at our central laboratory.



Chain of Custody Page ___ of ___

ESC LAB SCIENCES
a subsidiary of Pace Analytical

12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# L1050751

F117

Acctnum:
Template:
Prelogin:
TSR:
PB:
Shipped Via:

Billing Information:
Bill to Hilcorp - CALL LINDSAY DUMAS

Pres Chk

Report to:
Lindsay Dumas

Email To:
ldumas@hilcorp.com

Project Description: **Hilcorp San Juan 28-6 #31**

City/State Collected: **New Mexico**

Phone: **832-839-4585**
Fax:

Client Project #

Lab Project #

Collected by (print):
Corwin Lameman

Site/Facility ID #

P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y _X_

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
_X_ Three Day

Quote #

Date Results Needed
Dec 10, 2018

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	BTEX - 8021	TPH (GRO/DRO/MRO) - 8015	Remarks	Sample # (lab only)
SB-4R @ 8 ft	**Grab**	**SS**	**8**	**12/5/18**	**11:19**	**2**	X	X		-01
SB-4R @ 12 ft	**Grab**	**SS**	**12**	**12/5/18**	**11:16**	**2**	X	X		02
SB-5R @ 8.5 ft	**Grab**	**SS**	**8.5**	**12/5/18**	**10:32**	**2**	X	X		03
SB-5R @ 12 ft	**Grab**	**SS**	**12**	**12/5/18**	**10:19**	**2**	X	X		04
SB-6R @ 8 ft	**Grab**	**SS**	**8**	**12/5/18**	**12:50**	**2**	X	X		05
SB-6R @ 12 ft	**Grab**	**SS**	**12**	**12/5/18**	**12:46**	**2**	X	X		06
SB-7R @ 8 ft	**Grab**	**SS**	**8**	**12/5/18**	**11:40**	**2**	X	X		07
SB-7R @ 12 ft	**Comp**	**SS**	**12**	**12/5/18**	**11:45**	**2**	X	X		08
SB-8R @ 4 ft	**Comp**	**SS**	**8**	**12/5/18**	**13:05**	**2**	X	X	RAD SCREEN: <0.5 mR/hr	09
SB-8R @ 12 ft	**Grab**	**SS**	**12**	**12/5/18**	**13:18**	**2**	X	X		10

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other________

Remarks: 1062
Email results to Elizabeth McNally - emcnally@animasenvironmental.com

pH ______ Temp ______

Flow ______ Other ______

Samples returned via:
__ UPS ✓ FedEx __ Courier __ ______

Tracking # 4430 3422 8386

Sample Receipt Checklist
COC Seal Present/Intact: ✓ NP __ Y __ N
COC Signed/Accurate: ✓ Y __ N
Bottles arrive intact: ✓ Y __ N
Correct bottles used: ✓ Y __ N
Sufficient volume sent: ✓ Y __ N
If Applicable
VOA Zero Headspace: __ Y __ N
Preservation Correct/Checked: __ Y __ N

Relinquished by : (Signature)
Date: 12-6-18
Time: 15:00

Received by: (Signature)

Trip Blank Received: Yes / [✓ No]
HCL / MeoH
TBR

Relinquished by : (Signature)
Date:
Time:

Received by: (Signature)

Temp: 0.1+.4=05 °C AM
Bottles Received: 24=4oz

If preservation required by Login: Date/Time

Relinquished by : (Signature)
Date:
Time:

Received for lab by: (Signature)

Date: 12/7/18
Time: 900

Hold:

Condition: [✓ NCF] / [✓ OK]

Chain of Custody Page ___ of ___

ESC

LAB SCIENCES

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12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# L1050751

Table #

Acctnum:

Template:

Prelogin:

TSR:

PB:

Shipped Via:

Billing Information:

Bill to Hilcorp - CALL LINDSAY DUMAS

Pres Chk

Report to: **Lindsay Dumas**

Email To: **ldumas@hilcorp.com**

Project Description: **Hilcorp San Juan 28-6 #31**

City/State Collected: **New Mexico**

Phone: **832-839-4585**

Fax:

Client Project #

Lab Project #

Collected by (print): **Corwin Lameman**

Site/Facility ID #

P.O. #

Collected by (signature): Cwi Lm

Immediately Packed on Ice N ___ Y _X_

Rush? (Lab MUST Be Notified)

- ___ Same Day
- ___ Next Day
- ___ Two Day
- _X_ Three Day
- ___ Five Day
- ___ 5 Day (Rad Only)
- ___ 10 Day (Rad Only)

Quote #

Date Results Needed: **Dec 10, 2018**

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	BTEX - 8021	TPH (GRO/DRO/MRO) - 8015	Remarks	Sample # (lab only)
SB-24 @ 8 ft	**Grab**	**SS**	**8**	**12/5/18**	**13:48**	**2**	X	X		-11
SB-24 @ 12 ft	**Grab**	**SS**	**12**	**12/5/18**	**13:46**	**2**	X	X		12

RAD SCREEN: <0.5 mR/hr

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other________

Remarks: 2062

Email results to Elizabeth McNally - emcnally@animasenvironmental.com

pH ______ Temp ______

Flow ______ Other ______

Samples returned via:
__ UPS _✓_ FedEx __ Courier __ ______

Tracking # 4430 3422 8386

Sample Receipt Checklist
COC Seal Present/Intact: ✓NP __Y __N
COC Signed/Accurate: ✓Y __N
Bottles arrive intact: ✓Y __N
Correct bottles used: ✓Y __N
Sufficient volume sent: ✓Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: __Y __N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Cwi Lm	12-6-18	15:00	

Trip Blank Received: Yes [✓ No]
HCL / MeoH
TBR

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)

Temp: 0.1+.4=0.5 °C

Bottles Received: 24=4oz

If preservation required by Login: Date/Time

Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)

Date: 12/7/18

Time: 900

Hold:

Condition: [✓ NCF] / OK

Jeremy W. Watkins

Pace Analytical®
National Center for Testing & Innovation

Login #: L1050751	Client: HILCORANM	Date: 12/7/18	Evaluated by: Jeremy

Non-Conformance (check applicable items)

	Sample Integrity		Chain of Custody Clarification		
	Parameter(s) past holding time	x	Login Clarification Needed		**If Broken Container:**
	Temperature not in range		Chain of custody is incomplete		Insufficient packing material around container
	Improper container type		Please specify Metals requested.		Insufficient packing material inside cooler
	pH not in range.		Please specify TCLP requested.		Improper handling by carrier (FedEx / UPS / Courie
	Insufficient sample volume.		Received additional samples not listed on coc.		Sample was frozen
	Sample is biphasic.		Sample ids on containers do not match ids on coc		Container lid not intact
	Vials received with headspace.		Trip Blank not received.		**If no Chain of Custody:**
	Broken container		Client did not "X" analysis.		Received by:
	Broken container:		Chain of Custody is missing		Date/Time:
	Sufficient sample remains				Temp./Cont. Rec./pH:
					Carrier:
					Tracking#

Login Comments: For SB-24 @ 12 FT received 2 different colored samples on the lighter looking sample the client marked
Out the depth and time and changed them. See pictures for reference.

Client informed by:		Call		Email x		Voice Mail		Date:	Time:
TSR Initials: OS	Client Contact: Lindsay Dumas								

Login Instructions:

Client confirmed both containers are for SB-24 @ 12ft. Please continue as received.

Soil Vapor Extraction Systems

geotech

Geotech SVE

The Geotech Soil Vapor Extraction system is designed to remove hazardous vapors from the subsurface by drawing air through contaminated soil, and volatilizing adsorbed phase pollutants. Geotech SVE systems are ideal for well point or trench type vapor barriers.

FEATURES

- **Compact, durable design**
- **Skid Mounted with moisture separator drum/mist eliminator**
  - 37 gallon (140 liters) liquid holding capacity
  - Hi Water level switch
  - Hi Vacuum switch
- **Continuous reliable operation**
- **Many blower types are available to meet your requirements:**
  - Regenerative
  - Rotary Claw
  - Positive Displacement (Rotary Lobe)
  - Rotary Vane
  - Centrifugal Fan
- **Thermal overload protection**
- **Influent dilution air valve**
- **Two vacuum gauges**
- **Optional NEC code available** (Class 1, Div. 1, or Div. 2)
- **Non-explosive units are available**

OPERATION

The Geotech SVE system works by pulling air through soil that has been saturated with hydrocarbons or other volatile organic compounds, causing these compounds to volatilize. The vapors are then discharged to the atmosphere, through carbon polishing or vapor oxidation.

These systems are deployed with a moisture separator and mist eliminator filter to protect blower and end treatment from corrosion particulates and debris.

Every Geotech SVE system is factory assembled and fully tested for function, performance, and safety to meet the design conditions of each site application.

Regenerative Blower SVE inside optional hazmat enclosure

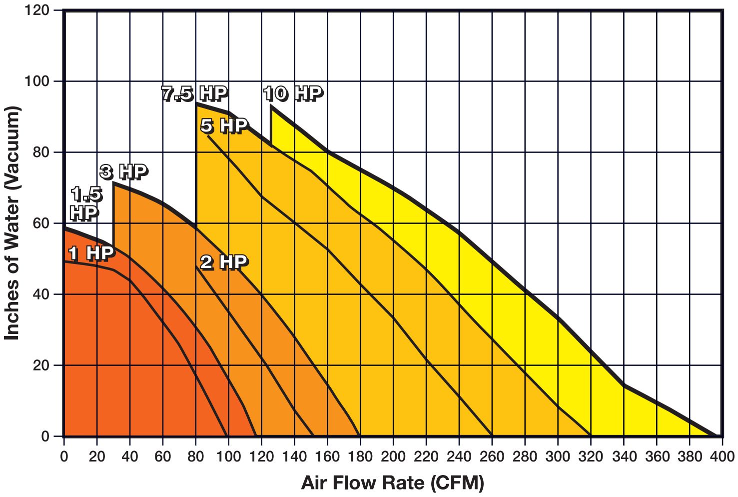
Regenerative Blower SVE

CALL GEOTECH TODAY (800) 833-7958

Geotech Environmental Equipment, Inc.
2650 East 40th Avenue • Denver, Colorado 80205
(303) 320-4764 • **(800) 833-7958** • FAX (303) 322-7242
email: sales@geotechenv.com website: www.geotechenv.com

Soil Vapor Extraction Systems

Geotech SVE



Regenerative Type Blower
Soil Vapor Extraction System
Selection Curve 1 through 10 HP

Note: Higher flow and vacuum versions are available.

Regenerative Blower SVE
with optional Geotech Environmental Control Module

SPECIFICATIONS

Applications:	Well point or trench type vapor barriers
Product Recovery:	Volatile Organic Compounds (VOCs)
Dimensions:	40" L x 48" W x 65" H (101.6 cm L x 121.9 cm W x 165.1 cm)
Options:	Geotech Environmental Control Module Telemetry package Influent or effluent silencer Effluent sample port Effluent temperature gauge Local CFM display Auto-Drain (this option features automatic water level control inside the moisture separator with an effluent transfer pump)

Power Requirements:

HP	Voltage	Phase	CFM/CMM	Inches H_2O Vacuum
1	115/230	1	0-95/0-2.7	50"
1.5	230	1	0-115/0-3.3	58"
2	230	1	80-145/2.3-4.1	55"
2	230	3	80-145/2.3-4.1	55"
3	230	1 or 3	30-185/.85-5.2	72"
5	230	3	85-280/2.4-7.9	82"
7.5	230	3	80-325/2.3-9.2	93"
10	230	3	125-380/3.5-10.8	93"

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email: sales@geotechenv.com website: www.geotechenv.com

geotech
Environmental Equipment, Inc.

RE: A 3 HP Soil Vapor Extraction System ™

As the premier supplier of environmental sampling, monitoring, remediation equipment and associated field supplies since 1978, Geotech Environmental Equipment is pleased to provide you with this quotation for equipment and supplies:

Geotech will supply a 3 HP ORS, XP Soil Vapor Extraction System with the following features:

- Ametek Rotron model EN656M5XL rated for Hazardous Location Class I, Group D, Class II Group F&G, Aluminum fan regenerative blower capable of Approx 100 ICFM (+/- 10%) - 50 inches W.C. Blower motor will be XP, 230 volt, 3HP, single phase with thermal overload protection.
- Explosion proof power disconnect on/off switch (NEMA 7 Enclosure)
- Manual dilution air valve
- Two vacuum gauges.
- Duotec Model H3A-1SL, Vacuum switch to protect the blower from overheating by detecting a blockage in the line. Rated for Hazardous locations, Class I Group B,C & D and Class II Group E,F& G
- Moisture Separator capable of removing vapor from an air flow of up to 350 SCFM with the following features:
  * Integral Mist Eliminator/Particulate Filter
  * 37 gallon capacity, steel canister with epoxy coated interior.
  * High efficiency cyclonic separation.
  * Inherent safe collection design.

* Outfitted with drain for convenient removal of fluids.
* W.E. Anderson, Flotect Model L-6, high liquid level switch system that will shut down the blower to protect the blower from flooding when the moisture separator is full. Rated for Hazardous location, Class I Group A, B, C & D, Class II Group E, F & G.

- Mounted and wired in a metal Haz Mat Station, with lockable, hinged lid & doors. Welded steel construction, 66 gallon sump meets EPA &n UFC requirements. Side vents and added Roof Vent for passive ventilation. Coated with a durable, corrosion and weather resistant finished. Four way "forklift able"

ENCLOSURE B –ANALYTICAL LABORATORY REPORTS

ANALYTICAL REPORT

May 15, 2019

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

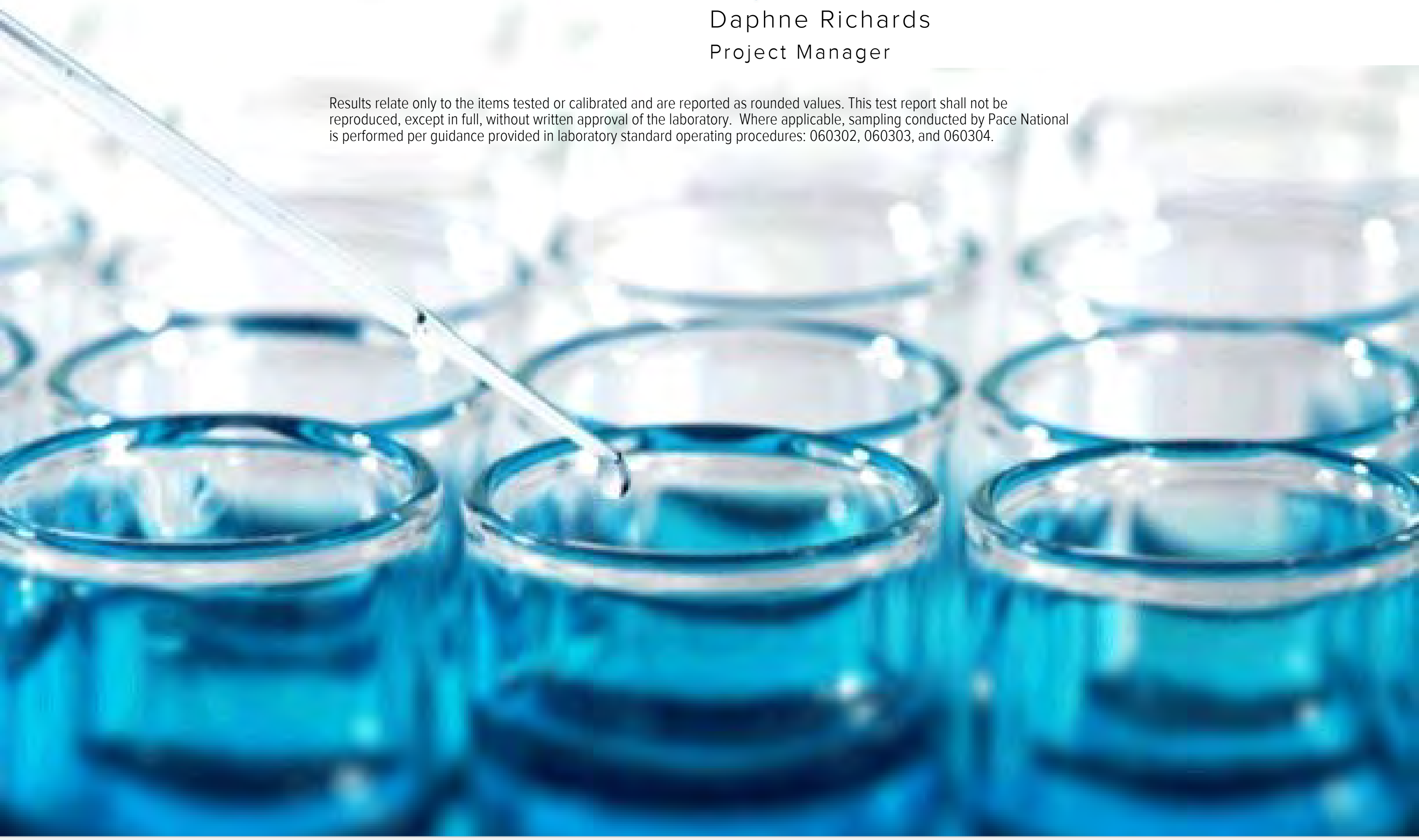
HilCorp-Farmington, NM

Sample Delivery Group:	L1095085
Samples Received:	05/03/2019
Project Number:	HILCORP SAN JUAN 28-
Description:	Hilcorp San Juan 28-6 #31
Site:	HILCORP SAN JUAN 28-6 #31
Report To:	Lindsay Dumas 382 Road 3100 Aztec, NM 87401

Entire Report Reviewed By: Daphne R Richards

Daphne Richards
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace National is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.



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Collected by	Collected date/time	Received date/time
Corwin Lameman	05/01/19 12:27	05/03/19 08:45

SB-25 @ 10FT L1095085-01 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC) by Method 8015/8021	WG1276442	1000	05/03/19 21:23	05/05/19 21:37	ACG	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1276358	1	05/05/19 17:35	05/06/19 01:43	KME	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1276358	5	05/05/19 17:35	05/06/19 08:58	KME	Mt. Juliet, TN

Collected by	Collected date/time	Received date/time
Corwin Lameman	05/01/19 12:39	05/03/19 08:45

SB-25 @ 20FT L1095085-02 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC) by Method 8015/8021	WG1276442	500	05/03/19 21:23	05/05/19 22:02	ACG	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1276358	1	05/05/19 17:35	05/06/19 02:00	KME	Mt. Juliet, TN

Collected by	Collected date/time	Received date/time
Corwin Lameman	05/01/19 12:53	05/03/19 08:45

SB-25 @ 30FT L1095085-03 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC) by Method 8015/8021	WG1276603	25	05/03/19 21:23	05/06/19 15:16	BMB	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1276358	1	05/05/19 17:35	05/06/19 02:14	KME	Mt. Juliet, TN

Collected by	Collected date/time	Received date/time
Corwin Lameman	05/01/19 13:01	05/03/19 08:45

SB-25 @ 35FT L1095085-04 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC) by Method 8015/8021	WG1276603	1	05/03/19 21:23	05/06/19 14:01	BMB	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1276358	1	05/05/19 17:35	05/06/19 02:30	KME	Mt. Juliet, TN

Collected by	Collected date/time	Received date/time
Corwin Lameman	04/30/19 15:08	05/03/19 08:45

SB-26 @ 10FT L1095085-05 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC) by Method 8015/8021	WG1276603	10000	05/03/19 21:23	05/06/19 15:40	BMB	Mt. Juliet, TN
Volatile Organic Compounds (GC) by Method 8021	WG1276442	500	05/03/19 21:23	05/05/19 23:13	ACG	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1276358	1	05/05/19 17:35	05/06/19 02:47	KME	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1276358	25	05/05/19 17:35	05/06/19 09:28	KME	Mt. Juliet, TN

Collected by	Collected date/time	Received date/time
Corwin Lameman	04/30/19 15:29	05/03/19 08:45

SB-26 @ 20FT L1095085-06 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC) by Method 8015/8021	WG1276442	1000	05/03/19 21:23	05/05/19 23:37	ACG	Mt. Juliet, TN
Volatile Organic Compounds (GC) by Method 8021	WG1276603	10000	05/03/19 21:23	05/06/19 16:04	BMB	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1276358	1	05/05/19 17:35	05/06/19 03:03	KME	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1276358	5	05/05/19 17:35	05/06/19 09:12	KME	Mt. Juliet, TN

Collected by	Collected date/time	Received date/time
Corwin Lameman	04/30/19 16:11	05/03/19 08:45

SB-26 @ 35FT L1095085-07 Solid

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC) by Method 8015/8021	WG1276442	1	05/03/19 21:23	05/05/19 20:26	ACG	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1276358	1	05/05/19 17:35	05/06/19 03:19	KME	Mt. Juliet, TN

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

SB-27 @ 15FT L1095085-08 Solid

Collected by	Collected date/time	Received date/time
Corwin Lameman	05/01/19 14:14	05/03/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC) by Method 8015/8021	WG1276603	250	05/03/19 21:23	05/06/19 16:27	BMB	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1276358	1	05/05/19 17:35	05/06/19 03:35	KME	Mt. Juliet, TN

SB-27 @ 30FT L1095085-09 Solid

Collected by	Collected date/time	Received date/time
Corwin Lameman	05/01/19 14:36	05/03/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC) by Method 8015/8021	WG1276603	25	05/03/19 21:23	05/06/19 16:51	BMB	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1276358	1	05/05/19 17:35	05/06/19 03:52	KME	Mt. Juliet, TN

SB-28 @ 10FT L1095085-10 Solid

Collected by	Collected date/time	Received date/time
Corwin Lameman	05/01/19 08:05	05/03/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC) by Method 8015/8021	WG1276442	500	05/03/19 21:23	05/06/19 00:49	ACG	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1276358	1	05/05/19 17:35	05/06/19 04:08	KME	Mt. Juliet, TN

SB-28 @ 30FT L1095085-11 Solid

Collected by	Collected date/time	Received date/time
Corwin Lameman	05/01/19 08:50	05/03/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC) by Method 8015/8021	WG1276442	1	05/03/19 21:23	05/05/19 20:50	ACG	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1276358	1	05/05/19 17:35	05/06/19 04:24	KME	Mt. Juliet, TN

SB-29 @ 10FT L1095085-12 Solid

Collected by	Collected date/time	Received date/time
Corwin Lameman	05/01/19 10:06	05/03/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC) by Method 8015/8021	WG1276442	200	05/03/19 21:23	05/06/19 01:13	ACG	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1276358	1	05/05/19 17:35	05/06/19 05:12	KME	Mt. Juliet, TN

SB-29 @ 20FT L1095085-13 Solid

Collected by	Collected date/time	Received date/time
Corwin Lameman	05/01/19 10:20	05/03/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC) by Method 8015/8021	WG1276603	1000	05/03/19 21:23	05/06/19 17:15	BMB	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1276358	1	05/05/19 17:35	05/06/19 05:27	KME	Mt. Juliet, TN

SB-29 @ 35FT L1095085-14 Solid

Collected by	Collected date/time	Received date/time
Corwin Lameman	05/01/19 10:45	05/03/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC) by Method 8015/8021	WG1276442	1	05/03/19 21:23	05/05/19 21:14	ACG	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1276358	1	05/05/19 17:35	05/06/19 05:44	KME	Mt. Juliet, TN

CASE NARRATIVE

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Daphne R Richards

Daphne Richards
Project Manager

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	19.2		0.500	1000	05/05/2019 21:37	WG1276442
Toluene	99.0		5.00	1000	05/05/2019 21:37	WG1276442
Ethylbenzene	21.6		0.500	1000	05/05/2019 21:37	WG1276442
Total Xylene	262		1.50	1000	05/05/2019 21:37	WG1276442
TPH (GC/FID) Low Fraction	6970		100	1000	05/05/2019 21:37	WG1276442
(S) a,a,a-Trifluorotoluene(FID)	*94.4*		*77.0-120*		*05/05/2019 21:37*	WG1276442
(S) a,a,a-Trifluorotoluene(PID)	*100*		*72.0-128*		*05/05/2019 21:37*	WG1276442

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	324		20.0	5	05/06/2019 08:58	WG1276358
C28-C40 Oil Range	ND		4.00	1	05/06/2019 01:43	WG1276358
(S) o-Terphenyl	*89.3*		*18.0-148*		*05/06/2019 08:58*	WG1276358
(S) o-Terphenyl	*70.7*		*18.0-148*		*05/06/2019 01:43*	WG1276358

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	2.43		0.250	500	05/05/2019 22:02	WG1276442
Toluene	28.3		2.50	500	05/05/2019 22:02	WG1276442
Ethylbenzene	9.77		0.250	500	05/05/2019 22:02	WG1276442
Total Xylene	110		0.750	500	05/05/2019 22:02	WG1276442
TPH (GC/FID) Low Fraction	2550		50.0	500	05/05/2019 22:02	WG1276442
(S) a,a,a-Trifluorotoluene(FID)	*96.3*		*77.0-120*		*05/05/2019 22:02*	WG1276442
(S) a,a,a-Trifluorotoluene(PID)	*101*		*72.0-128*		*05/05/2019 22:02*	WG1276442

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	293		4.00	1	05/06/2019 02:00	WG1276358
C28-C40 Oil Range	ND		4.00	1	05/06/2019 02:00	WG1276358
(S) o-Terphenyl	*43.8*		*18.0-148*		*05/06/2019 02:00*	WG1276358

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	ND		0.0125	25	05/06/2019 15:16	WG1276603
Toluene	ND		0.125	25	05/06/2019 15:16	WG1276603
Ethylbenzene	ND		0.0125	25	05/06/2019 15:16	WG1276603
Total Xylene	0.238		0.0375	25	05/06/2019 15:16	WG1276603
TPH (GC/FID) Low Fraction	8.75	J3	2.50	25	05/06/2019 15:16	WG1276603
(S) a,a,a-Trifluorotoluene(FID)	*101*		*77.0-120*		*05/06/2019 15:16*	WG1276603
(S) a,a,a-Trifluorotoluene(PID)	*102*		*72.0-128*		*05/06/2019 15:16*	WG1276603

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	28.4		4.00	1	05/06/2019 02:14	WG1276358
C28-C40 Oil Range	ND		4.00	1	05/06/2019 02:14	WG1276358
(S) o-Terphenyl	*73.2*		*18.0-148*		*05/06/2019 02:14*	WG1276358

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	0.000928		0.000500	1	05/06/2019 14:01	WG1276603
Toluene	ND		0.00500	1	05/06/2019 14:01	WG1276603
Ethylbenzene	0.0123		0.000500	1	05/06/2019 14:01	WG1276603
Total Xylene	0.0176		0.00150	1	05/06/2019 14:01	WG1276603
TPH (GC/FID) Low Fraction	1.49	J3	0.100	1	05/06/2019 14:01	WG1276603
(S) a,a,a-Trifluorotoluene(FID)	*102*		*77.0-120*		*05/06/2019 14:01*	WG1276603
(S) a,a,a-Trifluorotoluene(PID)	*106*		*72.0-128*		*05/06/2019 14:01*	WG1276603

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	ND		4.00	1	05/06/2019 02:30	WG1276358
C28-C40 Oil Range	ND		4.00	1	05/06/2019 02:30	WG1276358
(S) o-Terphenyl	*82.9*		*18.0-148*		*05/06/2019 02:30*	WG1276358

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	79.1		0.250	500	05/05/2019 23:13	WG1276442
Toluene	565		50.0	10000	05/06/2019 15:40	WG1276603
Ethylbenzene	68.4		0.250	500	05/05/2019 23:13	WG1276442
Total Xylene	869		15.0	10000	05/06/2019 15:40	WG1276603
TPH (GC/FID) Low Fraction	19900	J3	1000	10000	05/06/2019 15:40	WG1276603
(S) a,a,a-Trifluorotoluene(FID)	*88.5*		*77.0-120*		*05/05/2019 23:13*	WG1276442
(S) a,a,a-Trifluorotoluene(FID)	*95.9*		*77.0-120*		*05/06/2019 15:40*	WG1276603
(S) a,a,a-Trifluorotoluene(PID)	*98.3*		*72.0-128*		*05/05/2019 23:13*	WG1276442
(S) a,a,a-Trifluorotoluene(PID)	*102*		*72.0-128*		*05/06/2019 15:40*	WG1276603

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	1710		100	25	05/06/2019 09:28	WG1276358
C28-C40 Oil Range	9.82		4.00	1	05/06/2019 02:47	WG1276358
(S) o-Terphenyl	*89.0*	J7	*18.0-148*		*05/06/2019 09:28*	WG1276358
(S) o-Terphenyl	*68.3*		*18.0-148*		*05/06/2019 02:47*	WG1276358

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	48.1		0.500	1000	05/05/2019 23:37	WG1276442
Toluene	348		50.0	10000	05/06/2019 16:04	WG1276603
Ethylbenzene	30.0		0.500	1000	05/05/2019 23:37	WG1276442
Total Xylene	335		1.50	1000	05/05/2019 23:37	WG1276442
TPH (GC/FID) Low Fraction	8750		100	1000	05/05/2019 23:37	WG1276442
(S) a,a,a-Trifluorotoluene(FID)	*87.6*		*77.0-120*		*05/05/2019 23:37*	WG1276442
(S) a,a,a-Trifluorotoluene(FID)	*96.9*		*77.0-120*		*05/06/2019 16:04*	WG1276603
(S) a,a,a-Trifluorotoluene(PID)	*97.0*		*72.0-128*		*05/05/2019 23:37*	WG1276442
(S) a,a,a-Trifluorotoluene(PID)	*102*		*72.0-128*		*05/06/2019 16:04*	WG1276603

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	421		20.0	5	05/06/2019 09:12	WG1276358
C28-C40 Oil Range	4.08		4.00	1	05/06/2019 03:03	WG1276358
(S) o-Terphenyl	*63.9*		*18.0-148*		*05/06/2019 03:03*	WG1276358
(S) o-Terphenyl	*43.7*		*18.0-148*		*05/06/2019 09:12*	WG1276358

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	0.000725		0.000500	1	05/05/2019 20:26	WG1276442
Toluene	0.00528	B	0.00500	1	05/05/2019 20:26	WG1276442
Ethylbenzene	0.00910		0.000500	1	05/05/2019 20:26	WG1276442
Total Xylene	0.0150		0.00150	1	05/05/2019 20:26	WG1276442
TPH (GC/FID) Low Fraction	1.83		0.100	1	05/05/2019 20:26	WG1276442
(S) a,a,a-Trifluorotoluene(FID)	*103*		*77.0-120*		*05/05/2019 20:26*	WG1276442
(S) a,a,a-Trifluorotoluene(PID)	*108*		*72.0-128*		*05/05/2019 20:26*	WG1276442

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	ND		4.00	1	05/06/2019 03:19	WG1276358
C28-C40 Oil Range	ND		4.00	1	05/06/2019 03:19	WG1276358
(S) o-Terphenyl	*62.0*		*18.0-148*		*05/06/2019 03:19*	WG1276358

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	0.467		0.125	250	05/06/2019 16:27	WG1276603
Toluene	9.52		1.25	250	05/06/2019 16:27	WG1276603
Ethylbenzene	3.80		0.125	250	05/06/2019 16:27	WG1276603
Total Xylene	44.4		0.375	250	05/06/2019 16:27	WG1276603
TPH (GC/FID) Low Fraction	1250	J3	25.0	250	05/06/2019 16:27	WG1276603
(S) a,a,a-Trifluorotoluene(FID)	*96.0*		*77.0-120*		*05/06/2019 16:27*	WG1276603
(S) a,a,a-Trifluorotoluene(PID)	*99.4*		*72.0-128*		*05/06/2019 16:27*	WG1276603

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	249		4.00	1	05/06/2019 03:35	WG1276358
C28-C40 Oil Range	ND		4.00	1	05/06/2019 03:35	WG1276358
(S) o-Terphenyl	*64.6*		*18.0-148*		*05/06/2019 03:35*	WG1276358

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	ND		0.0125	25	05/06/2019 16:51	WG1276603
Toluene	ND		0.125	25	05/06/2019 16:51	WG1276603
Ethylbenzene	0.0731		0.0125	25	05/06/2019 16:51	WG1276603
Total Xylene	0.993		0.0375	25	05/06/2019 16:51	WG1276603
TPH (GC/FID) Low Fraction	71.6	J3	2.50	25	05/06/2019 16:51	WG1276603
(S) a,a,a-Trifluorotoluene(FID)	*99.4*		*77.0-120*		*05/06/2019 16:51*	WG1276603
(S) a,a,a-Trifluorotoluene(PID)	*100*		*72.0-128*		*05/06/2019 16:51*	WG1276603

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	23.9		4.00	1	05/06/2019 03:52	WG1276358
C28-C40 Oil Range	ND		4.00	1	05/06/2019 03:52	WG1276358
(S) o-Terphenyl	*58.8*		*18.0-148*		*05/06/2019 03:52*	WG1276358

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	0.905		0.250	500	05/06/2019 00:49	WG1276442
Toluene	ND		2.50	500	05/06/2019 00:49	WG1276442
Ethylbenzene	1.08		0.250	500	05/06/2019 00:49	WG1276442
Total Xylene	15.7		0.750	500	05/06/2019 00:49	WG1276442
TPH (GC/FID) Low Fraction	591		50.0	500	05/06/2019 00:49	WG1276442
(S) a,a,a-Trifluorotoluene(FID)	*98.0*		*77.0-120*		*05/06/2019 00:49*	WG1276442
(S) a,a,a-Trifluorotoluene(PID)	*103*		*72.0-128*		*05/06/2019 00:49*	WG1276442

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	61.1		4.00	1	05/06/2019 04:08	WG1276358
C28-C40 Oil Range	ND		4.00	1	05/06/2019 04:08	WG1276358
(S) o-Terphenyl	*33.8*		*18.0-148*		*05/06/2019 04:08*	WG1276358

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	0.000577		0.000500	1	05/05/2019 20:50	WG1276442
Toluene	ND		0.00500	1	05/05/2019 20:50	WG1276442
Ethylbenzene	0.00366		0.000500	1	05/05/2019 20:50	WG1276442
Total Xylene	0.00576		0.00150	1	05/05/2019 20:50	WG1276442
TPH (GC/FID) Low Fraction	0.437		0.100	1	05/05/2019 20:50	WG1276442
(S) a,a,a-Trifluorotoluene(FID)	*98.6*		*77.0-120*		*05/05/2019 20:50*	WG1276442
(S) a,a,a-Trifluorotoluene(PID)	*99.2*		*72.0-128*		*05/05/2019 20:50*	WG1276442

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	ND		4.00	1	05/06/2019 04:24	WG1276358
C28-C40 Oil Range	ND		4.00	1	05/06/2019 04:24	WG1276358
(S) o-Terphenyl	*63.4*		*18.0-148*		*05/06/2019 04:24*	WG1276358

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	3.25		0.100	200	05/06/2019 01:13	WG1276442
Toluene	12.0		1.00	200	05/06/2019 01:13	WG1276442
Ethylbenzene	1.65		0.100	200	05/06/2019 01:13	WG1276442
Total Xylene	28.7		0.300	200	05/06/2019 01:13	WG1276442
TPH (GC/FID) Low Fraction	1130		20.0	200	05/06/2019 01:13	WG1276442
(S) a,a,a-Trifluorotoluene(FID)	*94.8*		*77.0-120*		*05/06/2019 01:13*	WG1276442
(S) a,a,a-Trifluorotoluene(PID)	*100*		*72.0-128*		*05/06/2019 01:13*	WG1276442

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	17.4		4.00	1	05/06/2019 05:12	WG1276358
C28-C40 Oil Range	ND		4.00	1	05/06/2019 05:12	WG1276358
(S) o-Terphenyl	*27.8*		*18.0-148*		*05/06/2019 05:12*	WG1276358

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	0.623		0.500	1000	05/06/2019 17:15	WG1276603
Toluene	6.43		5.00	1000	05/06/2019 17:15	WG1276603
Ethylbenzene	1.99		0.500	1000	05/06/2019 17:15	WG1276603
Total Xylene	26.4		1.50	1000	05/06/2019 17:15	WG1276603
TPH (GC/FID) Low Fraction	601	J3	100	1000	05/06/2019 17:15	WG1276603
(S) a,a,a-Trifluorotoluene(FID)	*98.5*		*77.0-120*		*05/06/2019 17:15*	WG1276603
(S) a,a,a-Trifluorotoluene(PID)	*103*		*72.0-128*		*05/06/2019 17:15*	WG1276603

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	271		4.00	1	05/06/2019 05:27	WG1276358
C28-C40 Oil Range	ND		4.00	1	05/06/2019 05:27	WG1276358
(S) o-Terphenyl	*61.7*		*18.0-148*		*05/06/2019 05:27*	WG1276358

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	0.000700		0.000500	1	05/05/2019 21:14	WG1276442
Toluene	ND		0.00500	1	05/05/2019 21:14	WG1276442
Ethylbenzene	0.00315		0.000500	1	05/05/2019 21:14	WG1276442
Total Xylene	0.00461		0.00150	1	05/05/2019 21:14	WG1276442
TPH (GC/FID) Low Fraction	0.209		0.100	1	05/05/2019 21:14	WG1276442
(S) a,a,a-Trifluorotoluene(FID)	*98.4*		*77.0-120*		*05/05/2019 21:14*	WG1276442
(S) a,a,a-Trifluorotoluene(PID)	*100*		*72.0-128*		*05/05/2019 21:14*	WG1276442

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	ND		4.00	1	05/06/2019 05:44	WG1276358
C28-C40 Oil Range	ND		4.00	1	05/06/2019 05:44	WG1276358
(S) o-Terphenyl	*86.2*		*18.0-148*		*05/06/2019 05:44*	WG1276358

Method Blank (MB)

(MB) R3408416-5 05/05/19 16:07

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/kg		mg/kg	mg/kg
Benzene	U		0.000120	0.000500
Toluene	0.000537	J	0.000150	0.00500
Ethylbenzene	U		0.000110	0.000500
Total Xylene	U		0.000460	0.00150
TPH (GC/FID) Low Fraction	U		0.0217	0.100
(S) a,a,a-Trifluorotoluene(FID)	*98.5*			*77.0-120*
(S) a,a,a-Trifluorotoluene(PID)	*101*			*72.0-128*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3408416-1 05/05/19 14:07 • (LCSD) R3408416-2 05/05/19 14:31

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	%	%	%			%	%
Benzene	0.0500	0.0517	0.0456	103	91.1	76.0-121			12.6	20
Toluene	0.0500	0.0533	0.0469	107	93.8	80.0-120			12.9	20
Ethylbenzene	0.0500	0.0549	0.0485	110	96.9	80.0-124			12.5	20
Total Xylene	0.150	0.162	0.143	108	95.3	37.0-160			12.8	20
(S) a,a,a-Trifluorotoluene(FID)				*98.3*	*98.1*	*77.0-120*				
(S) a,a,a-Trifluorotoluene(PID)				*102*	*100*	*72.0-128*				

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3408416-3 05/05/19 14:55 • (LCSD) R3408416-4 05/05/19 15:19

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	%	%	%			%	%
TPH (GC/FID) Low Fraction	5.50	5.48	5.41	99.7	98.4	72.0-127			1.31	20
(S) a,a,a-Trifluorotoluene(FID)				*105*	*105*	*77.0-120*				
(S) a,a,a-Trifluorotoluene(PID)				*107*	*107*	*72.0-128*				

Method Blank (MB)

(MB) R3408632-5 05/06/19 11:01

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Benzene	U		0.000120	0.000500
Toluene	0.000346	J	0.000150	0.00500
Ethylbenzene	U		0.000110	0.000500
Total Xylene	U		0.000460	0.00150
TPH (GC/FID) Low Fraction	U		0.0217	0.100
(S) a,a,a-Trifluorotoluene(FID)	*99.2*			*77.0-120*
(S) a,a,a-Trifluorotoluene(PID)	*102*			*72.0-128*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3408632-1 05/06/19 08:46 • (LCSD) R3408632-2 05/06/19 09:10

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	0.0500	0.0456	0.0522	91.2	104	76.0-121			13.4	20
Toluene	0.0500	0.0474	0.0543	94.9	109	80.0-120			13.6	20
Ethylbenzene	0.0500	0.0487	0.0556	97.3	111	80.0-124			13.3	20
Total Xylene	0.150	0.144	0.165	95.9	110	37.0-160			13.5	20
(S) a,a,a-Trifluorotoluene(FID)				*99.3*	*98.7*	*77.0-120*				
(S) a,a,a-Trifluorotoluene(PID)				*103*	*102*	*72.0-128*				

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3408632-3 05/06/19 09:50 • (LCSD) R3408632-4 05/06/19 10:13

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	4.59	6.01	83.5	109	72.0-127		J3	26.8	20
(S) a,a,a-Trifluorotoluene(FID)				*104*	*106*	*77.0-120*				
(S) a,a,a-Trifluorotoluene(PID)				*107*	*108*	*72.0-128*				

Method Blank (MB)

(MB) R3408360-1 05/06/19 00:58

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
C10-C28 Diesel Range	U		1.61	4.00
C28-C40 Oil Range	U		0.274	4.00
(S) o-Terphenyl	*78.8*			*18.0-148*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3408360-2 05/06/19 01:11 • (LCSD) R3408360-3 05/06/19 01:27

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Extractable Petroleum Hydrocarbon	50.0	ND	ND	0.000	0.000	50.0-150	J4	J4	0.000	20
Misc. TPH (C10-C40)	50.0	ND	ND	0.000	0.000	50.0-150	J4	J4	0.000	20
C10-C28 Diesel Range	50.0	37.2	38.9	74.4	77.8	50.0-150			4.47	20
(S) o-Terphenyl				*99.5*	*105*	*18.0-148*				

L1095085-11 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1095085-11 05/06/19 04:24 • (MS) R3408360-4 05/06/19 04:40 • (MSD) R3408360-5 05/06/19 04:57

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
C10-C28 Diesel Range	47.3	ND	31.0	31.5	65.5	65.6	1	50.0-150			1.60	20
(S) o-Terphenyl					*76.3*	*79.2*		*18.0-148*				

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
B	The same analyte is found in the associated blank.
J	The identification of the analyte is acceptable; the reported value is an estimate.
J3	The associated batch QC was outside the established quality control range for precision.
J4	The associated batch QC was outside the established quality control range for accuracy.
J7	Surrogate recovery cannot be used for control limit evaluation due to dilution.

Pace National is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.
* Not all certifications held by the laboratory are applicable to the results reported in the attached report.
* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace National.

State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO00356
Kentucky [1,6]	90010	South Carolina	84004
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1,4]	2006
Louisiana [1]	LA180010	Texas	T104704245-18-15
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	TN00003
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	460132
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA

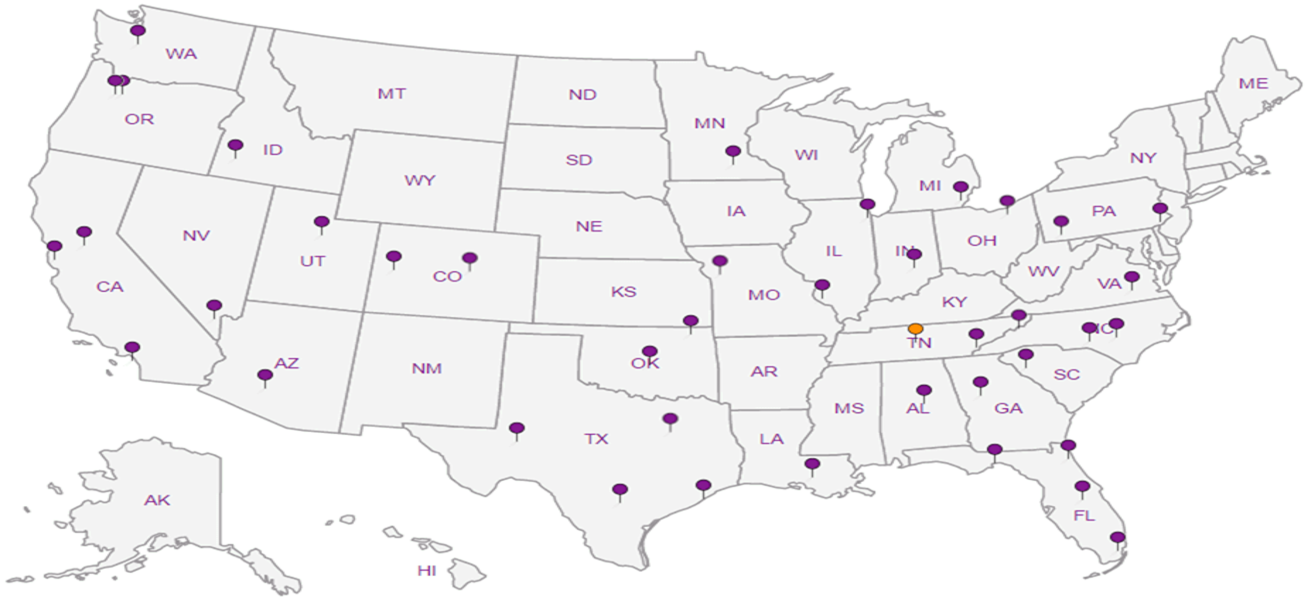
Third Party Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

Our Locations

Pace National has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. Pace National performs all testing at our central laboratory.



Billing Information:
Bill to Hilcorp - CALL LINDSAY DUMAS

Pres Chk

Analysis / Container / Preservative

Chain of Custody Page ___ of ___

ESC
L·A·B S·C·I·E·N·C·E·S
a subsidiary of

12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

Report to: **Lindsay Dumas**

Email To: **ldumas@hilcorp.com**

Project Description: **Hilcorp San Juan 28-6 #31**

City/State Collected: **New Mexico**

Phone: **832-839-4585**
Fax:

Client Project #

Lab Project #

Collected by (print): **Corwin Lameman**

Site/Facility ID #

P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
X Three Day

Quote #

Date Results Needed **May 7, 2019**

L # L1095085
G109
Ta

Acctnum:
Template:
Prelogin:
TSR:
PB:
Shipped Via:

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	BTEX - 8021	TPH (GRO/DRO/MRO) - 8015	Remarks	Sample # (lab only)
SB-25 @ 10 ft	Grab	SS	10	5/1/19	12:27	2	X	X		-01
SB-25 @ 20 ft	Grab	SS	20	5/1/19	12:39	1	X	X		-02
SB-25 @ 30 ft	Grab	SS	30	5/1/19	12:53	1	X	X		-03
SB-25 @ 35 ft	Grab	SS	35	5/1/19	13:01	1	X	X		-04
SB-26 @10 ft	Grab	SS	10	4/30/19	15:08	2	X	X		-05
SB-26 @ 20 ft	Grab	SS	20	4/30/19	15:29	2	X	X		-06
SB-26 @ 35 ft	Grab	SS	35	4/30/19	16:11	2	X	X		-07
SB-27 @ 15 ft	Comp	SS	15	5/1/19	14:14	1	X	X		-08
SB-27 @ 30 ft	Comp	SS	30	5/1/19	14:36	1	X	X		-09
										-

RAD SCREEN: <0.5 mR/hr

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other________

Remarks: SB-27 @ 15' had very small recovery
Email results to Elizabeth McNally - emcnally@animasenvironmental.com

pH ______ Temp ______
Flow ______ Other ______

Samples returned via:
__ UPS __ FedEx __ Courier __ ______

Tracking #

Sample Receipt Checklist
COC Seal Present/Intact: __NP __Y __N
COC Signed/Accurate: ✓Y __N
Bottles arrive intact: ✓Y __N
Correct bottles used: ✓Y __N
Sufficient volume sent: ✓Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: __Y __N

Relinquished by : (Signature)
Date: 5-2-19
Time: 16:00
Received by: (Signature)

Trip Blank Received: Yes / No
HCL / MeoH
TBR

Relinquished by : (Signature)
Date:
Time:
Received by: (Signature)

Temp: 1.2±0=1.2 °C IN A2
Bottles Received: 20

If preservation required by Login: Date/Time

Relinquished by : (Signature)
Date:
Time:
Received for lab by: (Signature) Mallik T.

Date: 5/3
Time: 8:45

Hold:

Condition: NCF / [✓ OK]

Chain of Custody Page ___ of ___

ESC
LAB SCIENCES
a subsidiary of Pace Analytical

12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

Billing Information:
Bill to Hilcorp - CALL LINDSAY DUMAS

Pres Chk

Report to: **Lindsay Dumas**

Email To: **ldumas@hilcorp.com**

Project Description: **Hilcorp San Juan 28-6 #31**

City/State Collected: **New Mexico**

Phone: **832-839-4585**

Fax:

Client Project #

Lab Project #

Collected by (print): **Corwin Lameman**

Site/Facility ID #

P.O. #

Collected by (signature):

Quote #

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
_X_ Three Day

Date Results Needed **May 7, 2019**

Immediately Packed on Ice N ___ Y _X_

L # L1095085

Table #

Acctnum:

Template:

Prelogin:

TSR:

PB:

Shipped Via:

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	BTEX - 8021	TPH (GRO/DRO/MRO) - 8015								Remarks	Sample # (lab only)
SB-28 @ 10 ft	Grab	SS	10	5/1/19	8:05	2	X	X									-10
SB-28 @ 30 ft	Grab	SS	30	5/1/19	8:50	1	X	X									-11
SB-29 @ 10 ft	Grab	SS	10	5/1/19	10:06	2	X	X									-12
SB-29 @ 20 ft	Grab	SS	20	5/1/19	10:20	1	X	X									-13
SB-29 @ 35 ft	Grab	SS	35	5/1/19	10:45	1	X	X									-14

RAD SCREEN: <0.5 mR/hr

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other________

Remarks:
Email results to Elizabeth McNally - emcnally@animasenvironmental.com

pH ______ Temp ______

Flow ______ Other ______

Samples returned via:
__ UPS __ FedEx __ Courier ___

Tracking #

Sample Receipt Checklist ✓
COC Seal Present/Intact: __NP __Y __N
COC Signed/Accurate: [✓ Y] __N
Bottles arrive intact: [✓ Y] __N
Correct bottles used: [✓ Y] __N
Sufficient volume sent: [✓ Y] __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: __Y __N

Relinquished by : (Signature)
Date: 5-2-19
Time: 16:00
Received by: (Signature)

Trip Blank Received: Yes / No
HCL / MeoH
TBR

Relinquished by : (Signature)
Date:
Time:
Received by: (Signature)

Temp: 1.2±0=1.2 [illegible] °C
Bottles Received: 20

If preservation required by Login: Date/Time

Relinquished by : (Signature)
Date:
Time:
Received for lab by: (Signature) Malik T.

Date: 5/3
Time: 8:45

Hold:

Condition: NCF / [✓ OK]

Analytical Report
Lab Order **2109E87**
Date Reported:

Hall Environmental Analysis Laboratory, Inc.

CLIENT: HILCORP ENERGY
Project: San Juan 28 6 31
Lab ID: 2109E87-001 **Matrix:** AIR

Client Sample ID: Influent Pilot Test
Collection Date: 9/20/2021 4:20:00 PM
Received Date: 9/25/2021 8:48:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **NSB**
Gasoline Range Organics (GRO)	250000	500	E	µg/L	100	9/27/2021 11:48:59 AM
Surr: BFB	288	37.3-213	S	%Rec	100	9/27/2021 11:48:59 AM
EPA METHOD 8260B: VOLATILES						Analyst: **CCM**
Benzene	720	10		µg/L	100	9/28/2021 2:47:00 PM
Toluene	1600	10	E	µg/L	100	9/28/2021 2:47:00 PM
Ethylbenzene	15	10		µg/L	100	9/28/2021 2:47:00 PM
Methyl tert-butyl ether (MTBE)	ND	10		µg/L	100	9/28/2021 2:47:00 PM
1,2,4-Trimethylbenzene	ND	10		µg/L	100	9/28/2021 2:47:00 PM
1,3,5-Trimethylbenzene	ND	10		µg/L	100	9/28/2021 2:47:00 PM
1,2-Dichloroethane (EDC)	19	10		µg/L	100	9/28/2021 2:47:00 PM
1,2-Dibromoethane (EDB)	ND	10		µg/L	100	9/28/2021 2:47:00 PM
Naphthalene	ND	20		µg/L	100	9/28/2021 2:47:00 PM
1-Methylnaphthalene	ND	40		µg/L	100	9/28/2021 2:47:00 PM
2-Methylnaphthalene	ND	40		µg/L	100	9/28/2021 2:47:00 PM
Acetone	1500	100		µg/L	100	9/28/2021 2:47:00 PM
Bromobenzene	ND	10		µg/L	100	9/28/2021 2:47:00 PM
Bromodichloromethane	ND	10		µg/L	100	9/28/2021 2:47:00 PM
Bromoform	ND	10		µg/L	100	9/28/2021 2:47:00 PM
Bromomethane	ND	20		µg/L	100	9/28/2021 2:47:00 PM
2-Butanone	ND	100		µg/L	100	9/28/2021 2:47:00 PM
Carbon disulfide	ND	100		µg/L	100	9/28/2021 2:47:00 PM
Carbon tetrachloride	ND	10		µg/L	100	9/28/2021 2:47:00 PM
Chlorobenzene	ND	10		µg/L	100	9/28/2021 2:47:00 PM
Chloroethane	ND	20		µg/L	100	9/28/2021 2:47:00 PM
Chloroform	ND	10		µg/L	100	9/28/2021 2:47:00 PM
Chloromethane	22	10		µg/L	100	9/28/2021 2:47:00 PM
2-Chlorotoluene	ND	10		µg/L	100	9/28/2021 2:47:00 PM
4-Chlorotoluene	ND	10		µg/L	100	9/28/2021 2:47:00 PM
cis-1,2-DCE	ND	10		µg/L	100	9/28/2021 2:47:00 PM
cis-1,3-Dichloropropene	ND	10		µg/L	100	9/28/2021 2:47:00 PM
1,2-Dibromo-3-chloropropane	ND	20		µg/L	100	9/28/2021 2:47:00 PM
Dibromochloromethane	ND	10		µg/L	100	9/28/2021 2:47:00 PM
Dibromomethane	ND	20		µg/L	100	9/28/2021 2:47:00 PM
1,2-Dichlorobenzene	ND	10		µg/L	100	9/28/2021 2:47:00 PM
1,3-Dichlorobenzene	ND	10		µg/L	100	9/28/2021 2:47:00 PM
1,4-Dichlorobenzene	ND	10		µg/L	100	9/28/2021 2:47:00 PM
Dichlorodifluoromethane	ND	10		µg/L	100	9/28/2021 2:47:00 PM
1,1-Dichloroethane	ND	10		µg/L	100	9/28/2021 2:47:00 PM
1,1-Dichloroethene	ND	10		µg/L	100	9/28/2021 2:47:00 PM

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
D	Sample Diluted Due to Matrix
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
PQL	Practical Quanitative Limit
S	% Recovery outside of range due to dilution or matrix
B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
P	Sample pH Not In Range
RL	Reporting Limit

CLIENT: HILCORP ENERGY
Project: San Juan 28 6 31
Lab ID: 2109E87-001 **Matrix:** AIR

Client Sample ID: Influent Pilot Test
Collection Date: 9/20/2021 4:20:00 PM
Received Date: 9/25/2021 8:48:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: **CCM**
1,2-Dichloropropane	110	10		µg/L	100	9/28/2021 2:47:00 PM
1,3-Dichloropropane	ND	10		µg/L	100	9/28/2021 2:47:00 PM
2,2-Dichloropropane	ND	10		µg/L	100	9/28/2021 2:47:00 PM
1,1-Dichloropropene	ND	10		µg/L	100	9/28/2021 2:47:00 PM
Hexachlorobutadiene	ND	10		µg/L	100	9/28/2021 2:47:00 PM
2-Hexanone	ND	100		µg/L	100	9/28/2021 2:47:00 PM
Isopropylbenzene	ND	10		µg/L	100	9/28/2021 2:47:00 PM
4-Isopropyltoluene	ND	10		µg/L	100	9/28/2021 2:47:00 PM
4-Methyl-2-pentanone	ND	100		µg/L	100	9/28/2021 2:47:00 PM
Methylene chloride	ND	30		µg/L	100	9/28/2021 2:47:00 PM
n-Butylbenzene	ND	30		µg/L	100	9/28/2021 2:47:00 PM
n-Propylbenzene	ND	10		µg/L	100	9/28/2021 2:47:00 PM
sec-Butylbenzene	ND	10		µg/L	100	9/28/2021 2:47:00 PM
Styrene	ND	10		µg/L	100	9/28/2021 2:47:00 PM
tert-Butylbenzene	ND	10		µg/L	100	9/28/2021 2:47:00 PM
1,1,1,2-Tetrachloroethane	ND	10		µg/L	100	9/28/2021 2:47:00 PM
1,1,2,2-Tetrachloroethane	ND	10		µg/L	100	9/28/2021 2:47:00 PM
Tetrachloroethene (PCE)	ND	10		µg/L	100	9/28/2021 2:47:00 PM
trans-1,2-DCE	ND	10		µg/L	100	9/28/2021 2:47:00 PM
trans-1,3-Dichloropropene	ND	10		µg/L	100	9/28/2021 2:47:00 PM
1,2,3-Trichlorobenzene	ND	10		µg/L	100	9/28/2021 2:47:00 PM
1,2,4-Trichlorobenzene	ND	10		µg/L	100	9/28/2021 2:47:00 PM
1,1,1-Trichloroethane	ND	10		µg/L	100	9/28/2021 2:47:00 PM
1,1,2-Trichloroethane	16	10		µg/L	100	9/28/2021 2:47:00 PM
Trichloroethene (TCE)	ND	10		µg/L	100	9/28/2021 2:47:00 PM
Trichlorofluoromethane	ND	10		µg/L	100	9/28/2021 2:47:00 PM
1,2,3-Trichloropropane	ND	20		µg/L	100	9/28/2021 2:47:00 PM
Vinyl chloride	ND	10		µg/L	100	9/28/2021 2:47:00 PM
Xylenes, Total	320	15		µg/L	100	9/28/2021 2:47:00 PM
Surr: Dibromofluoromethane	89.8	70-130		%Rec	100	9/28/2021 2:47:00 PM
Surr: 1,2-Dichloroethane-d4	77.9	70-130		%Rec	100	9/28/2021 2:47:00 PM
Surr: Toluene-d8	115	70-130		%Rec	100	9/28/2021 2:47:00 PM
Surr: 4-Bromofluorobenzene	104	70-130		%Rec	100	9/28/2021 2:47:00 PM

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of range due to dilution or matrix		

LABORATORY ANALYTICAL REPORT

Prepared by Gillette, WY Branch

Client: Hall Environmental
Project: Not Indicated
Lab ID: G21090430-001
Client Sample ID: 2109E87-001B; Influent Pilot Test

Report Date: 09/28/21
Collection Date: 09/20/21 16:20
DateReceived: 09/28/21
Matrix: Gas

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
NATURAL GAS CHROMATOGRAPHIC ANALYSIS REPORT							
Oxygen	17.870	Mol %		0.001		GPA 2261	09/28/21 14:22 / blb
Nitrogen	78.259	Mol %		0.001		GPA 2261	09/28/21 14:22 / blb
Carbon Dioxide	2.054	Mol %		0.001		GPA 2261	09/28/21 14:22 / blb
Hydrogen Sulfide	< 0.001	Mol %		0.001		GPA 2261	09/28/21 14:22 / blb
Methane	< 0.001	Mol %		0.001		GPA 2261	09/28/21 14:22 / blb
Ethane	< 0.001	Mol %		0.001		GPA 2261	09/28/21 14:22 / blb
Propane	< 0.001	Mol %		0.001		GPA 2261	09/28/21 14:22 / blb
Isobutane	0.004	Mol %		0.001		GPA 2261	09/28/21 14:22 / blb
n-Butane	0.022	Mol %		0.001		GPA 2261	09/28/21 14:22 / blb
Isopentane	0.107	Mol %		0.001		GPA 2261	09/28/21 14:22 / blb
n-Pentane	0.133	Mol %		0.001		GPA 2261	09/28/21 14:22 / blb
Hexanes plus	1.551	Mol %		0.001		GPA 2261	09/28/21 14:22 / blb
GPM @ STD COND/1000 CU.FT., MOISTURE FREE GAS							
GPM Ethane	< 0.0003	gal/MCF		0.0003		GPA 2261	09/28/21 14:22 / blb
GPM Propane	< 0.0003	gal/MCF		0.0003		GPA 2261	09/28/21 14:22 / blb
GPM Isobutane	0.0010	gal/MCF		0.0003		GPA 2261	09/28/21 14:22 / blb
GPM n-Butane	0.0070	gal/MCF		0.0003		GPA 2261	09/28/21 14:22 / blb
GPM Isopentane	0.0390	gal/MCF		0.0004		GPA 2261	09/28/21 14:22 / blb
GPM n-Pentane	0.0480	gal/MCF		0.0004		GPA 2261	09/28/21 14:22 / blb
GPM Hexanes plus	0.6750	gal/MCF		0.0004		GPA 2261	09/28/21 14:22 / blb
GPM Pentanes plus	0.7620	gal/MCF		0.0004		GPA 2261	09/28/21 14:22 / blb
GPM Total	0.7700	gal/MCF		0.0004		GPA 2261	09/28/21 14:22 / blb
CALCULATED PROPERTIES							
Calculation Pressure Base	14.730	psia				GPA 2261	09/28/21 14:22 / blb
Calculation Temperature Base	60	°F				GPA 2261	09/28/21 14:22 / blb
Compressibility Factor, Z	0.99900	unitless		0.00001		GPA 2261	09/28/21 14:22 / blb
Molecular Weight	30.16	unitless		0.01		GPA 2261	09/28/21 14:22 / blb
Pseudo-critical Pressure, psia	547	psia		1		GPA 2261	09/28/21 14:22 / blb
Pseudo-critical Temperature, deg R	256	deg R		1		GPA 2261	09/28/21 14:22 / blb
Specific Gravity (air=1.000)	1.045	unitless		0.0001		GPA 2261	09/28/21 14:22 / blb
Gross BTU per cu ft @ std cond, dry	90.28	BTU/cu ft		0.01		GPA 2261	09/28/21 14:22 / blb
Gross BTU per cu ft @ std cond, wet	88.71	BTU/cu ft		0.01		GPA 2261	09/28/21 14:22 / blb

HALL
ENVIRONMENTAL
ANALYSIS
LABORATORY

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: clients.hallenvironmental.com

October 05, 2021

Danny Burns
HILCORP ENERGY
PO Box 4700
Farmington, NM 87499
TEL: (505) 564-0733
FAX

RE: San Juan 28 6 31 OrderNo.: 2109H13

Dear Danny Burns:

Hall Environmental Analysis Laboratory received 1 sample(s) on 9/30/2021 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites. In order to properly interpret your results, it is imperative that you review this report in its entirety. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. When necessary, data qualifiers are provided on both the sample analysis report and the QC summary report, both sections should be reviewed. All samples are reported, as received, unless otherwise indicated. Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH and residual chlorine are qualified as being analyzed outside of the recommended holding time.

Please don't hesitate to contact HEAL for any additional information or clarifications.

ADHS Cert #AZ0682 -- NMED-DWB Cert #NM9425 -- NMED-Micro Cert #NM0901

Sincerely,

Andy

Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109

Analytical Report
Lab Order **2109H13**

Hall Environmental Analysis Laboratory, Inc.

Date Reported: **10/5/2021**

CLIENT: HILCORP ENERGY
Project: San Juan 28 6 31
Lab ID: 2109H13-001 **Matrix:** AIR

Client Sample ID: Influent A+B
Collection Date: 9/28/2021 4:00:00 PM
Received Date: 9/30/2021 7:10:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **NSB**
Gasoline Range Organics (GRO)	53000	500		µg/L	100	10/1/2021 10:03:13 AM
Surr: BFB	183	37.3-213		%Rec	100	10/1/2021 10:03:13 AM
EPA METHOD 8021B: VOLATILES						Analyst: **NSB**
Benzene	240	10		µg/L	100	10/1/2021 10:03:13 AM
Toluene	720	10		µg/L	100	10/1/2021 10:03:13 AM
Ethylbenzene	27	10		µg/L	100	10/1/2021 10:03:13 AM
Xylenes, Total	350	20		µg/L	100	10/1/2021 10:03:13 AM
Surr: 4-Bromofluorobenzene	95.6	70-130		%Rec	100	10/1/2021 10:03:13 AM

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of range due to dilution or matrix		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **2109H13**

05-Oct-21

Client: HILCORP ENERGY

Project: San Juan 28 6 31

Sample ID:	**2109H13-001ADUP**	SampType:	**DUP**	TestCode:	**EPA Method 8015D: Gasoline Range**
Client ID:	**Influent A+B**	Batch ID:	**G81717**	RunNo:	**81717**
Prep Date:		Analysis Date:	**10/1/2021**	SeqNo:	**2889360** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	48000	500						9.64	20	
Surr: BFB	380000		200000		189	37.3	213	0	0	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of range due to dilution or matrix		

QC SUMMARY REPORT

WO#: **2109H13**

Hall Environmental Analysis Laboratory, Inc.

05-Oct-21

Client: HILCORP ENERGY

Project: San Juan 28 6 31

Sample ID: **2109H13-001ADUP** SampType: **DUP** TestCode: **EPA Method 8021B: Volatiles**

Client ID: **Influent A+B** Batch ID: **B81717** RunNo: **81717**

Prep Date: Analysis Date: **10/1/2021** SeqNo: **2889363** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	210	10						12.5	20	
Toluene	650	10						11.0	20	
Ethylbenzene	27	10						1.42	20	
Xylenes, Total	340	20						1.75	20	
Surr: 4-Bromofluorobenzene	200		200.0		98.4	70	130	0	0	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of range due to dilution or matrix		

HALL ENVIRONMENTAL ANALYSIS LABORATORY

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: clients.hallenvironmental.com

Sample Log-In Check List

Client Name: HILCORP ENERGY　Work Order Number: 2109H13　RcptNo: 1

Received By: **Cheyenne Cason**　9/30/2021 7:10:00 AM

Completed By: **Sean Livingston**　9/30/2021 8:04:40 AM　S Livingston

Reviewed By: TMC　9/30/21

Chain of Custody

1. Is Chain of Custody complete?　Yes ☑　No ☐　Not Present ☐
2. How was the sample delivered?　Courier

Log In

3. Was an attempt made to cool the samples?　Yes ☐　No ☐　NA ☑
4. Were all samples received at a temperature of >0° C to 6.0°C　Yes ☐　No ☐　NA ☑
5. Sample(s) in proper container(s)?　Yes ☑　No ☐
6. Sufficient sample volume for indicated test(s)?　Yes ☑　No ☐
7. Are samples (except VOA and ONG) properly preserved?　Yes ☑　No ☐
8. Was preservative added to bottles?　Yes ☐　No ☑　NA ☐
9. Received at least 1 vial with headspace <1/4" for AQ VOA?　Yes ☐　No ☐　NA ☑
10. Were any sample containers received broken?　Yes ☐　No ☑
11. Does paperwork match bottle labels?　Yes ☑　No ☐
(Note discrepancies on chain of custody)
12. Are matrices correctly identified on Chain of Custody?　Yes ☑　No ☐
13. Is it clear what analyses were requested?　Yes ☑　No ☐
14. Were all holding times able to be met?　Yes ☑　No ☐
(If no, notify customer for authorization.)

~~# of preserved bottles checked for pH:~~
~~(<2 or >12 unless noted)~~
~~Adjusted?~~
~~Checked by:~~ JR 9/30/21

Special Handling (if applicable)

15. Was client notified of all discrepancies with this order?　Yes ☐　No ☐　NA ☑

Person Notified:　Date:
By Whom:　Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person
Regarding:
Client Instructions:

16. Additional remarks:

17. Cooler Information

Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	NA	Good				

Chain-of-Custody Record

Client: Hilcorp
Lindsay Dumas / Billy Ginn
Mailing Address:

Phone #:
email or Fax#:
QA/QC Package:
☐ Standard ☐ Level 4 (Full Validation)
Accreditation: ☐ Az Compliance
☐ NELAC ☐ Other
☐ EDD (Type)

Turn-Around Time:
☐ Standard ☒ Rush EOD 9-30-21
Project Name: San Juan 28-6 #31
Project #:
Project Manager: WSP-Danny Burns
Sampler: DB
On Ice: ☐ Yes ☒ No
# of Coolers: 1
Cooler Temp(including CF): NA (°C)

HALL ENVIRONMENTAL ANALYSIS LABORATORY

www.hallenvironmental.com
4901 Hawkins NE - Albuquerque, NM 87109
Tel. 505-345-3975 Fax 505-345-4107

Analysis Request

Date	Time	Matrix	Sample Name	Container Type and #	Preservative Type	HEAL No. 2109H13	BTEX / MTBE / TMB's (8021)	TPH:8015D(GRO / DRO / MRO)	8081 Pesticides/8082 PCB's	EDB (Method 504.1)	PAHs by 8310 or 8270SIMS	RCRA 8 Metals	Cl, F, Br, NO_3, NO_2, PO_4, SO_4	8260 (VOA)	8270 (Semi-VOA)	Total Coliform (Present/Absent)						
9-28	1600	Air	Influent A+B	1-Tedlar	—	001	X	X														

Date:	Time:	Relinquished by:	Received by:	Via:	Date	Time
9-29-21	1700				9/29/21	1700
9/29/21	1826			courier	9/30/21	0710

Remarks:
cc: stuart.hyde@wsp.com
devin.hencmann@wsp.com

If necessary, samples submitted to Hall Environmental may be subcontracted to other accredited laboratories. This serves as notice of this possibility. Any sub-contracted data will be clearly notated on the analytical report.

ENCLOSURE C – BORING LOGS AND SVE WELL CONSTRUCTION DIAGRAMS

* was in process of prepping a TPH sample when Kurt said that Lindsay said no TPH field, only OVM-PID. Confirmed looking @ email.

Facility or Pipeline Name: San Juan 28-6 #31

Date: 5-31-18

AES personnel: C. Lameman, S. Glasses

Buck Machine #_____			
Concentration	50 mg/kg	100 mg/kg	500 mg/kg
Calibration ABS Values			

Sample ID	Collection Date	Time of Sample Collection	Sample Location	Sample Depth (ft)	Composite	PID-OVM (ppm)	PID-OVM Time	Field TPH (mg/kg)	Field TPH Analysis Time	ABS	NOTES (i.e. Soil Type, Color, Odor, Staining)
SB-1	5-31-18	9:30	N. of prod. tank	1'	N	0.0	9:56	234 *	10:12		Sand w/ Clay, Brown, No Odor No Staining
		9:36		3'	N	5.4	9:57	–	–	–	S.A.A.
		9:41		5'	N	2.9	9:58	–	–	–	S.A.A.
		9:55		7'	N	0.0	10:16	–	–	–	Auger refusal. Clayey Sand Dk Brown, No Odor No Staining
SB-2		9:59	S. of prod. tank.	1'	N	0.0	10:17	–	–	–	Sand, Brown, No Staining, No Odor Coarse-Med., Moist
		10:05		3'	N	0.0	10:33	–	–	–	S.A.A.
		10:11		5'	N	0.0	10:49	–	–	–	S.A.A
		10:25		7'	N	0.0	10:50	–	–	–	Auger Refusal. Clayey Sand Dk. Brown, No Staining, No Odor
SB-3		10:30	W of prod. tank	1'	N	30.5	11:03	–	–	–	Sand, Brown, No Staining, Sl. Odor Coarse-Med, Moist
		10:36		3'	N	20.4	11:04	–	–	–	S.A.A.
		10:38		5'	N	12.5	11:05	–	–	–	Sand, Red-Brown, No Staining, Sl. Odor Fine-Med, Moist
		10:46		7.5'	N	0.0	11:06	–	–	–	Clayey Sand, Dk. Brown, No Staining No Odor, Auger Refusal, Moist
SB-4		10:58	E. of prod. tank	1'	N	2385	11:22	–	–	–	Sand, Brown, No Staining, V. Strong Odor, Coarse-Med, Moist
		11:01		3'	N	2009	11:23	–	–	–	S.A.A.
		11:08		5'	N	1996	11:24	–	–	–	Sand, Red-Brown, No Staining, V. Strong Odor, Fine-Md, Moist
		11:15		8.5'	N	2508	11:34	–	–	–	Clayey Sand, Dk. Brown, V. Strong Odor No Staining, Auger Refusal, Moist
SB-5		11:41	S of BGT	1'	N	13.6	11:55				Sand w/ some clay, Brown, No Odor No Staining, Md, Moist
		11:50		5'	N	4.1	12:09				Sand, Tan-Brown, No Odor, No Staining Md, Moist
		12:08		9'	N	956	12:24				Historic Contam. @ 8'. Brown Clayey Sand, Sl. Odor, Some Staining

Type of Sample collection?:

~~Depends~~ run from 0.0 from
Step out. N, W, S

Facility or Pipeline Name: Historic pull sample. for them to know. Characterize.

Date:

AES personnel:

Delineate old? let OCD know to be addressed.
Hilcorp to address the old.

Buck Machine #_____			
Concentration	50 mg/kg	100 mg/kg	500 mg/kg
Calibration ABS Values			

Sample ID	Collection Date	Time of Sample Collection	Sample Location	Sample Depth (ft)	Composite	PID-OVM (ppm)	PID-OVM Time	Field TPH (mg/kg)	Field TPH Analysis Time	ABS	NOTES (i.e. Soil Type, Color, Odor, Staining) Auger Refusal/ Degraded SS
SB-5	5-31-18	12:21	S of BGT	11.75'	N	2745	12:53	–	–	–	Light Brown, Discoloration, Strong odor, No Staining, moist, Historic
~~SB-6~~		12:00	~~N of BGT~~	7	N	0.0	12:52	–	–	-	
SB-6		13:02	N of BGT	1'	N	7.3	13:36	–	–	–	Sand, Brown, No Odor, No Staining Nd, Moist
		13:16		5'	N	0.0	13:37	–	-	–	S.A.A.
		13:22		7'	N	0.0	13:38	–	–	–	Clayey Sand, Dk. Brown, No Odor No Staining, Moist.
		13:34		9'	N	1,949	13:42	–	–	–	Brown, Sand, V. Strong odor, No Stain Moist, Historic
		13:46		11'	N	2,440	14:00	–	–	–	

Type of Sample collection?:

Alexandra 505-608-6061

Facility or Pipeline Name: San Juan 28-6 #31

Date: 6-27-18

AES personnel: C Lameman

Buck Machine # 2			
Concentration	50 mg/kg	100 mg/kg	500 mg/kg
Calibration ABS Values	0.091	0.141	0.725

Sample ID	Collection Date	Time of Sample Collection	Sample Location	Sample Depth (ft)	Composite	PID-OVM (ppm)	PID-OVM Time	Field TPH (mg/kg)	Field TPH Analysis Time	ABS	NOTES (i.e. Soil Type, Color, Odor, Staining)
SB-7	6-27-18	9:45	N of SB-4	5'	N	31.7	10:16	—	—	—	Red, Sand, No Odor, N. Stain, Dry
		9:51		10'	N	370.8	10:17	—	—	—	Sl. Gray, Sl. Odor, Shale or Clay
		9:59		15'	N	10,427	10:20	—	—	—	SS, Gray, Odor
		10:07		20'	N	81,824	10:25	—	—	—	SS, Gray, Odor
		10:19		25'	N	202.6	10:39	—	—	—	SS, Lt tan Gray, Odor (Lab)
		10:28		30'	N	—	—	—	—	—	No Recovery
		10:41		35	N	18.8	10:52	221	10:56	.167	SS, Lt. Gray, Sl. Odor, Dry (Lab Hold)
SB-8		1127	N of BGT	5'	N	3475	11:53	—	—	—	Red, Sand, Strg Odor, No Staining
		1135		10'	N	9642	11:59	—	—	—	Clayey Sand, Gray, Strong Odor
		12:13		15'	N	2196	12:22	—	—	—	SS, Weathered, Strg. Odor, SL Staining (Lab)
		12:24		25'	N	618.2	12:32	168.	12:40	0.128	SS, tan, Odor, No Staining (Lab Hold)
SB-9		13:09	N of BGT outside fence	10'	N	629.4	13:22	—	—	—	Clayey Sand, Odor, Sl. Gray (Lab)
		13:15		25	N	735.5	13:29	145	14:41	0.113	SS, tan, Odor, No Staining, Dry (Lab Hold)
SB-10		13:55	NE corner outside fence	10'	N	1938	14:13	—	—	—	Clayey Sand, Strg. Odor, Gray, Moist (Lab)
		14:11		25	N	615.1	14:14	—	—	—	Sl, tan, Odor, No Staining, Dry (Lab Hold)
SB-11		14:34	E of sep e edge of location	10'	N	35.2	14:55	—	—	—	Red Sand to Gray Clay Sand, Odor (Lab)
		14:51		25'	N	18.7	15:19	—	—	—	Lt tan, Sl Odor, No Stain, Dry (Lab Hold)
SB-12		15:17	S of Berm SE corner	10'	N	2482	15:34	2,000	15:45	1.444	Clay, Grey, Odor, Staining (Lab)
		15:30		25'	N	31.5	15:38	—	—	—	Lt tan, SS, Sl. Odor, No Stain, Dry (Lab Hold)

Type of Sample collection?:

Well or Lease Name: San Juan 28-6 #31

Date: 6-27-18

AES personnel: C. Lameman

Sample ID	Collection Date	Time of Sample Collection	Sample Location	OVM (ppm)	OVM Time	Field TPH (mg/kg)	Field TPH Analysis Time	ABS	NOTES
SB-13@10	6-27-18	16:02	S of BGT outside fence	2157	1620	—	—	—	Gray, Sand w/Clay, Odor, Moist (Lab)
.25'		16:17	⊥	360.9	16:22	—	—	—	SS, Tan-White, Dry, Sl. Odor, No Stain (Lab Hold)
SB-14@10'		16:41	Midway of SB-13 & 12	2173	16:59	—	—	—	
		17:15	⊥	51.0	17:23	—	—	—	
SB-15@10'		17:28'	E of Berm SE corner	1550	17:35	—	—	—	
		17:42'	⊥	205.6	17:49	—	—	—	

*Include Benzene readings in the notes section initially and transfer to Limitations if Benzene is a problem on the location.

SOIL BORING LOG

Animas Environmental Services
604 W. Piñon St., Farmington, NM 87401
Tel. (505) 564-2281 animasenvironmental.com

Soil Boring No: 16
Monitor Well No: —
Project:
Client: Hilcorp
Location: San Juan 28-6 Unit 31
Driller: GeoMat - Kelley Padilla / Fernando Enriquez
Drilling Method: Continuous Boring to Split Spoon - HSA
Depth to Water (ft): —
Time Recorded: 905
Date: 8-22-18
Latitude/Longitude: 36.62762, -107.47788
Datum:
Elevation:
Logged by: C. Lameman
Total Depth (ft): 25

Depth (ft)	Sample Interval	Sample Type (SPT, Grab, etc)	Sample Time	Blow Count (per 3x6" intervals)	**Soil Description** TYPE, density/consistency, color, grain size, moisture, other (i.e. odor, staining)	**USCS Symbol**	**OVM (ppm)**	**OVM Time**	**MW Schematic and Description**
0					Very ~~Soft~~ Loose, Red-Tan, ~~Poorly~~ Well ok Graded Sand, Dry	S~~P~~			
					Non plastic, noncohesive (0-4')				
					Very Loose, Tan, ~~Poorly~~ Well Graded Sand, Dry	SW			
5					non plastic, noncohesive (4-5')		7.3	9:55	
5			9:05		Loose, Tan, Well Graded Sand, Dry	SW			
					non plastic, non cohesive (5.-7.5')				
					Stiff, Brown, lean Clay with Sand, Moist	CL			
10			9:15		Medium plasticity, cohesive (7.5 - 10')		8.7	9:56	
10					Medium Dense, Red-Tan, well Graded Sand, Dry	SW			
					non plastic, non cohesive (10-11')				
					Dense, Tan, well Graded Sand, Dry, noplast., nonco.	SW			
					(11-12')				
12			9:30		Very Dense, Tan-Light Gray, SS, Strong odor	SS	60.8	9:57	
					UNABLE TO CONTINUE WITH CONTINOUS				
					BORINGS. SWITCHING TO SPLIT SPOON				
15			9:34		Very Dense, Tan, Sandstone, No Odor, Small Recov.	SS	5.7	10:02	
20			9:51		S.A.A.	SS	33.9	10:03	
25			NR		No Recovery, Sandstone,	SS	NR	NR	
					Total Depth 25'				

SOIL BORING LOG

Soil Boring No: 17

Monitor Well No: –

Animas Environmental Services

604 W. Piñon St., Farmington, NM 87401

Tel. (505) 564-2281 animasenvironmental.com

Project:	Date: 8-22-18
Client: Hilcorp	Latitude/Longitude: 36.62757, -107.47784
Location: San Juan 28-6 Unit #31	Datum:
Driller: Geo Mat - KP & FE	Elevation:
Drilling Method: Continuous to split Spoon - HSA	Logged by: C. Lameman
Depth to Water (ft): – Time Recorded: 1040	Total Depth (ft): 25

Depth (ft)	Sample Interval	Sample Type (SPT, Grab, etc)	Sample Time	Blow Count (per 3x6" intervals)	Soil Description TYPE, density/consistency, color, grain size, moisture, other (i.e. odor, staining)	USCS Symbol	OVM (ppm)	OVM Time	MW Schematic and Description
0					Loose, Brown, Poorly Graded Sand, Dry, nonplastic noncohesive (0-4')	SP			
5			10:47		Very Loose, Tan, Poorly Graded Sand, Dry, nonplastic noncohesive (4-5')	SP	1.7	11:38	
5					Loose, Tan-Red, Poorly Graded Sand, Dry, nonplast. noncohesive (5-8')	SP			
10			10:55		Stiff, Brown, Lean Clay with Sand, Moist Med. Plast., cohesive (8-10')	CL	4.5	11:39	
10					Very Dense, Tan, Well Graded Sand, Dry, nonplast. noncohesive. ~~Weathered SS~~	SW			
12			11:01		Very Dense, Tan, SS	SS	5.2	11:40	
					Unable to continue CONTINUOUS, SWITCH to SPLIT SPOON				
15			11:07		Weathered SS, Dry, Tan-White, Small Recov.	SS	0.7	11:41	
					[Rig Broken down @ 11:13]				
20			13:20		Very Dense, Tan-White, Sandstone, Dry	SS	18.0	13:34	
25			13:30		S.A.A., Very Small Recovery	SS	NR	NR	
					Total Depth - 25'				

SOIL BORING LOG

Animas Environmental Services
604 W. Piñon St., Farmington, NM 87401
Tel. (505) 564-2281 animasenvironmental.com

Soil Boring No: 18
Monitor Well No: —
Project:
Client: Hilcorp
Location: San Juan 28-6 Unit #31
Driller: GeoMat: KP & FE
Drilling Method: Continuous to Split Spoon
Depth to Water (ft): — Time Recorded: 13:49
Date: 8-22-18
Latitude/Longitude: 36.62748, -107.47796
Datum:
Elevation:
Logged by: C. Lameman
Total Depth (ft): 25'

Depth (ft)	Sample Interval	Sample Type (SPT, Grab, etc)	Sample Time	Blow Count (per 3x6" intervals)	**Soil Description** TYPE, density/consistency, color, grain size, moisture, other (i.e. odor, staining)	USCS Symbol	OVM (ppm)	OVM Time	MW Schematic and Description
0					Loose, Brown, Poorly graded Sand, Dry, nonplast.	SP			
					non cohesive (0-5')				
5			13:58				6.3	14:39	
5					Loose, Brown, Poorly graded Sand, Dry, nonplast.	SP			
					non cohesive (5-7')				
					Stiff, Brown, Lean clay w/ Sand, Moist, Med. Plast.	CL			
10			14:04		cohesive (8-10')		~~4.5~~ 1.9	14:40	
10					Stiff, Brown, Lean clay w/ Sand, Moist, Med. Plast	CL			
					cohesive (10-10.5)				
					Very Dense, Tan, Well Graded Sand, Dry, nonplast.	SW			
					noncohesive (10-12')				
12'					Very Dense, SS, Tan	SS			
					Unable to continue CONTINOUS, Switch to				
					SPLIT SPOON				
15'			14:12		Weathered SS, Dry, Tan, Very Dense, odor	SS	14.0	14:41	
20			14:27		Very Dense, Tan-White, Sandstone, Dry, odor	SS	6.1	14:42	
25'			14:36		Very Dense, Tan-White, Sandstone, Dry, No Odor	SS	9.3	14:50	
					Total Depth - 25'				

SOIL BORING LOG

Animas Environmental Services
604 W. Piñon St., Farmington, NM 87401
Tel. (505) 564-2281 animasenvironmental.com

Soil Boring No: 23
Monitor Well No: –
Project:
Date: 8-22-18
Client: Hilcorp
Latitude/Longitude: 36.62770, -107.47807
Location: San Juan 28-6 Unit #31
Datum:
Driller: GeoMat - KP & FE
Elevation:
Drilling Method: Continuous to Split Spoon - HSA
Logged by: C. Lameman
Depth to Water (ft): –
Time Recorded: 15:04
Total Depth (ft): 30

Depth (ft)	Sample Interval	Sample Type (SPT, Grab, etc)	Sample Time	Blow Count (per 3x6" intervals)	**Soil Description** TYPE, density/consistency, color, grain size, moisture, other (i.e. odor, staining)	USCS Symbol	OVM (ppm)	OVM Time	MW Schematic and Description
0					Loose, Red-Tan, Poorly Graded Sand, Moist, nonplst	SP			
					non cohesive				
5			15:15				9.0	15:39	
5					Loose, Tan, Poorly Graded Sand, Dry, non-plast.	SP			
					non cohesive (5-6.5')				
					Loose, Brown, Poorly Graded Sand, Dry, non.plast	SP			
					non.cohesive (6-9')				
10			15:20		Stiff, Brown, lean clay w/ sand, Moist, med.plast., cohesive. (9-10)	CL	9.2	15:39	
10									
					Very Dense, SS, Grey, Strong odor	SS			
14									
					Unable to continue CONTINOUS, Switch to				
					SPLITSPOON				
15			15:30		Very Dense, SS, Grey, Strong odor	SS	1,100	15:41	
20			15:38		Very Dense, SS, Tan-White, Strong Odor	SS	538.4	15:49	
25'			15:47		S.A.A.		1,484	16:05	
30			16:09		Very Dense, Tan, SS, Strong odor	SS	325.5	16:12	
					Total Depth - 30'				

SOIL BORING LOG

Animas Environmental Services
604 W. Piñon St., Farmington, NM 87401
Tel. (505) 564-2281 animasenvironmental.com

Soil Boring No: SB-19
Monitor Well No: BV-3
Project:
Date: 10-2-18
Client: Hilcorp
Latitude/Longitude: 36.62755, -107.47797
Location: San Juan 28-6 Unit #31
Datum:
Driller: Geo Mat - Keeley Padilla & Fernando Enriquez
Elevation:
Drilling Method: Continuous to split spoon - HSA
Logged by: C. Lameman
Depth to Water (ft): —
Time Recorded: 10:58
Total Depth (ft): 30' Backfill to 25'

Depth (ft)	Sample Interval	Sample Type (SPT, Grab, etc)	Sample Time	Blow Count (per 3x6" intervals)	Soil Description TYPE, density/consistency, color, grain size, moisture, other (i.e. odor, staining)	USCS Symbol	OVM (ppm)	OVM Time	MW Schematic and Description
0					Very Loose, Brown, Poorly Graded Sand, Dry	SP			 ←10' PVC Well +3' Stick up →
					Nonplasticity, non cohesive (1-3')				
			11:06		Stiff, Brown, Lean clay with Sand, Moist, odor	CL	340	11:36	
5					High Plasticity, cohesive (3-5')				
5					Stiff, Brown, Lean clay with Sand, Moist,	CL			
					High Plasticity, cohesive, odor (5-8')				
			11:13		Soft, Gray, Lean clay with Sand, Moist	CL	2,255	11:37	
10					High Plasticity, cohesive, Strong odor (8-10')				
10					S.A.A (10-10.25')	CL			↑ 15' Screen ↓
			11:20		Loose, Tan, Poorly Graded Sand, Dry,	SP	1,465	11:38	
					Non-Plast, non-cohesive, Strong odor, Light Gray (10.25				
					(10.25 - 15')				
15									
					UNABLE TO CONTINUE WITH CONTINOUS				
					BORING. SWITCHED TO SPLIT SPOON-1				
20			11:31		Dense, Tan, Sandstone, Dry, Slight odor	SS	35.0	11:48	
					Small Recovery				
25			11:47		Very Dense, Tan-White, Dry, No Odor	SS	59.2	11:53	
					No Staining				
30'			11:59		S.A.A.	SS	43.7	12:05	
					Total Depth @ 30'. Backfilled to 25'				
					to set Bottom of well @ 25'.				
					17' Sand Pack, 8' Bentonite				

SOIL BORING LOG

Animas Environmental Services
604 W. Piñon St., Farmington, NM 87401
Tel. (505) 564-2281 animasenvironmental.com

Soil Boring No: SB-22
Monitor Well No: ~~BV~~
Project:
Date: 10-2-18
Client: Hilcorp
Latitude/Longitude: 36.67749, -107.47801
Location: San Juan 29-6 Unit #31
Datum:
Driller: GeoMat - Kelley Padilla and Frenando Enriquez
Elevation:
Drilling Method: Continous Boring to Split spoon - HSA
Logged by: C. Lameman
Depth to Water (ft): —
Time Recorded: 9:20
Total Depth (ft): 30 ft

Depth (ft)	Sample Interval	Sample Type (SPT, Grab, etc)	Sample Time	Blow Count (per 3x6" intervals)	**Soil Description** TYPE, density/consistency, color, grain size, moisture, other (i.e. odor, staining)	USCS Symbol	OVM (ppm)	OVM Time	MW Schematic and Description
0					Very Loose, Brown, Poorly Graded Sand, Dry	SP			
					Non plastic, non cohesive (1-5')				
5			9:35				0.0	10:34	
5					Very Loose, Brown, Poorly Graded Sand, Dry	SP			
					Non plastic, non cohesive (5-6')				
					Stiff, Brown, lean clay with Sand, Dry	CL			
10			9:41		High Plasticity, cohesive (6-10')		0.0	10:35	
10					Dense, Tan-Gray, Well Graded Sand, Dry	SW			
					non-plasticity, non-cohesive (10-11.5')				
			9:48		Very Dense, Tan, Sandstone, Strong odor	SS	17.2	10:35	
115					(11-11.5')				
					UNABLE TO CONTINUE WITH CONTINOUS				
					BORINGS. SWITCHED TO SPLIT SPOON				
15			9:56		Very Dense, Tan, Sandstone, Dry, Slight odor	SS	9.2	10:36	
20			10:10		Ver S.A.A.	SS	1.4	10:36	
25			10:27		Very Dense, tan-Pink, Sandstone, Dry, No Odor	SS	25.9	10:37	
					Total Depth @ 25'				

SOIL BORING LOG

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Soil Boring No: SB-20
Monitor Well No: BV-2
Project:
Client: Hilcorp
Location: San Juan 28-6 Unit #31
Driller: Geo Mat - Kelley Padilla & Fernando Enriquez
Drilling Method: Continuous to Split Spoon - HSA
Depth to Water (ft): —
Time Recorded: 11:44
Date: 10-8-18
Latitude/Longitude: 36.62760, -107.47790
Datum:
Elevation:
Logged by: C.Lameman
Total Depth (ft): 30' Backfilled to 25'

Depth (ft)	Sample Interval	Sample Type (SPT, Grab, etc)	Sample Time	Blow Count (per 3x6" intervals)	**Soil Description** TYPE, density/consistency, color, grain size, moisture, other (i.e. odor, staining)	**USCS Symbol**	**OVM (ppm)**	**OVM Time**	**MW Schematic and Description**
0					Very Loose, Red-Tan, Poorly Graded Sand, Moist, Nonplastic, noncohesive (0-5')	SP			+3' Stick Up
5			11:55		S.A.A	SP	5.6	12:36	
5					S.A.A (5-6.5')	SP			10' Blank PVC
					Stiff, Brown, Lean Clay w/ Sand, Moist, Med-Plast, Cohesive (6.5-10')	CL	3,050	12:37	
10			11:59		Dense, Tan-Gray, Weathered Sandstone, Strong odor, Dry (10-11.5')	SS	~~3,460~~	~~12:38~~	
					UNABLE TO CONTINUE W/ CONTINOUS BORING. SWITCHED TO SPLIT SPOON				15' Screen
15'			12:06		Very Dense, Tan, Sandstone, Dry, Strong odor Small Recovery	SS	3,460	12:38	
20			12:15		Very Dense, Tan, Sandstone, Dry, odor, small Recovery	SS	312	12:39	
25			12:24		S.A.A.	SS	186	12:41	
30			12:33		S.A.A.	SS	135	12:43	
					Total Depth @ 30'. Backfilled to 25' to set bottom of well @ 25' 17' Sand Pack, 8' Bentonite				

SOIL BORING LOG

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Soil Boring No: SB-21
Monitor Well No: BV-1
Project:
Client: Hilcorp
Location: San Juan 28-6 Unit #31
Driller: GeoMat - Kelley Padilla & Fernando Enriquez
Drilling Method: Continous to Split Spoon - HSA
Depth to Water (ft): —
Time Recorded: 10:00
Date: 10-8-18
Latitude/Longitude: 36.62768, -107.47802
Datum:
Elevation:
Logged by: C. Lameman
Total Depth (ft): 30' Backfilled to 25'

Depth (ft)	Sample Interval	Sample Type (SPT, Grab, etc)	Sample Time	Blow Count (per 3x6" intervals)	**Soil Description** TYPE, density/consistency, color, grain size, moisture, other (i.e. odor, staining)	**USCS Symbol**	**OVM (ppm)**	**OVM Time**	**MW Schematic and Description**
0					Very Loose, Red-Brown, Poorly Graded Sand, Moist Non-plastic, non-cohesive, (0-0.5')	SP			3' Stick up
5			10:18		Stiff, Brown, Lean Clay w/ Sand, Moist, High Plast, Cohesive, (0.5 to 5')	CL	4.1	10:48	
5					Loose, Brown, Poorly Graded Sand, Moist Non-plast non-cohesive, Strong odor (5-7.5')	SP			10' Blank PVC
10			10:23		Dense, Brown, Poorly Graded Sand w/ Clay, Moist, Med-Plast, noncohesive, V. Strong Odor, Gray (7.5-10')	SP-SC	2,365	10:49	
10					S.A.A. (10-14')	SP-SC			15' Screen
15			10:28		Dense, Tan, Weathered Sandstone, V. Strong, Dry Odor (14-15')	SS	955	10:50	
					UNABLE TO CONTINUE WITH CONTINOUS BORING. SWITCHED TO SPLIT SPOON				
20			10:36		Dense, Tan, Weathered Sandstone, Strong odor, Dry	SS	2,763	10:51	
25			10:47		S.A.A.	SS	777	10:52	
30			11:07		Very Dense, Tan, Sandstone, Dry, Strong odor	SS	505	11:15	
					Total Depth @ 30'. Backfilled to 25' to set Bottom of Well @ 25'.				
					17' Sand Pack; 8' Bentonite				

SOIL BORING LOG

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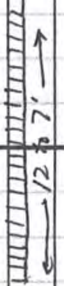
Soil Boring No: SB-4R
Monitor Well No: SVE-4
Project:
Client: Hilcorp
Location: San Juan 28-6 Unit #31
Driller: Louis Trujillo Earth Worx
Drilling Method: Geo Probe Push Rig
Depth to Water (ft): — Time Recorded: 1100 - 1130
Date: 12-5-18 .62759 .47811
Latitude/Longitude: 36.~~62758~~, -107~~47807~~
Datum:
Elevation:
Logged by: C.Lameman
Total Depth (ft): 12'

Depth (ft)	Sample Interval	Sample Type (SPT, Grab, etc)	Sample Time	Blow Count (per 3x6" intervals)	**Soil Description** TYPE, density/consistency, color, grain size, moisture, other (i.e. odor, staining)	**USCS Symbol**	**OVM (ppm)**	**OVM Time**	MW Schematic and Description
0					Brown, Medium, High Plasticity, Fine Grain,				
					w/ Sand, Moist, Cohesive, No Odor (0-4')	CL			
	3-4'	Grab	11:21		S.A.A (4-5')	CL	32.0	1133	
5									
5					Brown, Loose, Fine Grained, Moist, Sl. odor.				
					(5-6.5')	SW			
*	7-8'	Grab	11:19		Brown, Medium, Fine Grained & High Plast., Moist		3,232	1134	
8					Cohesive, Strong Odor. (6.5-8')	CL			
8									
					S.A.A. (8-10.5				
*	11-12'	Grab	11:16		Dense, Tan Light Gray Staining, Medium Grain	SS	3,044	11:35	
12					Dry, Strong odor (10.5-12')				
					Auger Refusal @ 12' on Sandstone				
					Total Depth @ 12'				
					Install well				
					2" screen @ 12 to 7'				
					Sand Pack @ 12 to 6'				
					Bentonite @ 6' to surface				

SOIL BORING LOG

Animas Environmental Services
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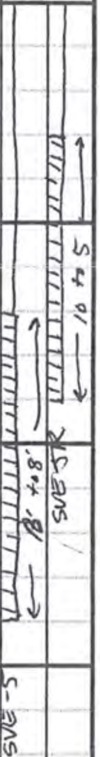
Soil Boring No: SB-5R
Monitor Well No: SVE-5 & SVE-5R
Project:
Client: Hilcorp
Location: San Juan 28-6 Unit #31
Driller: Louis Trujillo w/ Earth Worx
Drilling Method: GeoProbe Push Rig
Depth to Water (ft): —
Time Recorded: 1000 - 1057
Date: 12-5-18
Latitude/Longitude: 36.62758, -107.47867
Datum:
Elevation:
Logged by: C. Lameman
Total Depth (ft): 13' and 10'

Depth (ft)	Sample Interval	Sample Type (SPT, Grab, etc)	Sample Time	Blow Count (per 3x6" intervals)	**Soil Description** TYPE, density/consistency, color, grain size, moisture, other (i.e. odor, staining)	**USCS Symbol**	**OVM (ppm)**	**OVM Time**	MW Schematic and Description
0 7.5		4 Grab	10:34		Brown, Soft, Fine, Med. Plastic., Moist, High Plasticity. (0-5') Clayey Sand Brown, Loose, Fine Sand, Moist, Non Plast (5-7.5')	CL SW	1.7	10:41	
7.5 10.75		7.5-8.5 Grab	10:32		Brown, Stiff, High Plasticity, Moist, Cohesive, Blk Staining (7.5'-8.5') odor Brown, Stiff, High Plasticity, Moist, Cohesive (8.5-10.75') odor	CL CL	4.4	10:40	
10.75 13		12-13' Grab	10:19		Tan, Dense, Slight Grey, Medium Grained, Dry, Non Plastic, noncohesive, SS (10.75-13') Auger Refusal. Stop Geoprobe. Install	SS	2,799	10:39	
					well. Total Depth = 13' onto SS Well Construction				
					2" screen @ ~~15~~ 13' to 8' Sand Pack @ 13' to 7' Bentonite @ 7' to surface.				
					Additional 2" screen installed as SVE. 2" screen @ 10' to 5' Sand Pack @ 10 to 4' Bentonite @ 4 to surface				



SOIL BORING LOG

Animas Environmental Services
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Soil Boring No: SB-6R
Monitor Well No: SVE-6

Project:
Client: Hilcorp
Location: San Juan 28-6 Unit 31
Driller: Louis Trujillo Earth Worx
Drilling Method: Geoprobe Push Rig
Depth to Water (ft): — Time Recorded: 1230 -

Date: 12-5-18
Latitude/Longitude: 36.62763, -107.47810
Datum:
Elevation:
Logged by: C. Lameman
Total Depth (ft): 12'

Depth (ft)	Sample Interval	Sample Type (SPT, Grab, etc)	Sample Time	Blow Count (per 3x6" intervals)	Soil Description TYPE, density/consistency, color, grain size, moisture, other (i.e. odor, staining)	USCS Symbol	OVM (ppm)	OVM Time	MW Schematic and Description
0					Surface. Gravel				
					~~St.~~ Very Soft, Brown, Fine Grained Sand, High Plast.,				
					Moist, High Plast, Cohesive, (0-4) No Odor	CL			
4.5	4	Grab	12:51		S.A.A. (4-4.5')	CL	3.2	12:55	
4.5					Loose, Brown, Fine Grained, Moist, Non Plast.,				
					non cohesive, No Odor (4.5-5.5')	SW			
					Stiff, Brown, Fine Grained Sand, High Plast,				
* 8	7-8	Grab	12:50		Moist, Cohesive (5.5-8')	CL	188	12:56	
8									
					S.A.A (8-11') strong odor				
					Dense, Tan light Gray, Medium Grained, Dry				
* 12	11-12'	Grab	12:46		non cohesive, strong odor (11-12')	SS	4,247	12:59	12' to 7'
					Total Depth @ 12' on Sandstone				
					Auger Refusal				
					Install Well				
					2" screen @ 12' to 7'				
					Sand Pack @ 12' to 6'				
					Bentonite @ 6' to surface.				

SOIL BORING LOG

Animas Environmental Services
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Soil Boring No: SB-7R
Monitor Well No: SVE-7
Project:
Client: Hilcorp
Location: San Juan 28-6 #31
Driller: Laz Trujillo w/ Earth Worx
Drilling Method: GeoProbe Push Rig
Depth to Water (ft): —
Time Recorded: 1135 - 11:58
Date: 12-5-18
Latitude/Longitude: 36.62761, -107.47812
Datum:
Elevation:
Logged by: C. Lameman
Total Depth (ft): 12'

Depth (ft)	Sample Interval	Sample Type (SPT, Grab, etc)	Sample Time	Blow Count (per 3x6" intervals)	Soil Description TYPE, density/consistency, color, grain size, moisture, other (i.e. odor, staining)	USCS Symbol	OVM (ppm)	OVM Time	MW Schematic and Description
0					Medium, Brown, Fine Grain Sand, High Plast,				
	3-4	Grab	11:36		Moist, Cohesive, No odor (0-4)	CL	8.1	11:53	
					S.A.A. (4-5')				
5'						CL			
5					Loose, Fine Grain, Moist, Non Plastic,				
					Non cohesive, Dry, No Odor (5-5.5')	SW			
					Brown, Medium, High Plasticity, Moist,				
8	8'	Grab	11:40		Cohesive, No Odor (5.5-8')	CL	1.3	11:54	
8									
					S.A.A. @ 10' Slight Gray staining odor	CL			12' to 7'
					(8-11)				
11					Dense, Tan Light Gray, Medium Grain,	SS			
11'					Dry, non plastic, non cohesive, ~~Strong~~ Slight odor				
12	11-12'	Grab	11:45		(11-12')		282.1	11:55	
					Total Depth @ 12' on Sandstone				
					Auger Refusal				
					Install well				
					2" Screen @ 12' to 7'				
					Sand pack @ 12' to 6'				
					Bentonite @ 6' to surface				

SOIL BORING LOG

Animas Environmental Services
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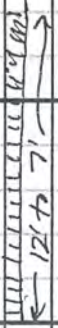
Soil Boring No: SB-8R
Monitor Well No: SVE-8
Project:
Client: Hilcorp
Location: San Juan 28 6 Unit 31
Driller: Louis Trujillo Earth Worx
Drilling Method: GeoProbe Push Rig
Depth to Water (ft): —
Time Recorded: 12:56 - 13:27

Date: 12-5-18
Latitude/Longitude: 36.62765, -107.47806
Datum:
Elevation:
Logged by: C. Lameman
Total Depth (ft): 12'

	Depth (ft)	**Sample Interval**	**Sample Type** (SPT, Grab, etc)	**Sample Time**	**Blow Count** (per 3x6" intervals)	**Soil Description** TYPE, density/consistency, color, grain size, moisture, other (i.e. odor, staining)	**USCS Symbol**	**OVM (ppm)**	**OVM Time**	**MW Schematic and Description**
	0					Medium-Soft, Brown, High Plasticity, Moist,				
						Cohesive, Fine Grained Sand, No Odor (0-4)	CL			
*		4'	Grab	13:05		S.A.A. (4-5') Staining, Odor	CL	509	13:25	
	5									
	5					$·Loose, Tan, Medium Grained, Moist, non-plast.				
						non cohesive, Strong Odor (5-6')	SW			
						Stiff, Brown, Fine Grained Sand, High Plasticity,				
	9	7-8	Grab	13:22		Moist, Strong Odor, Cohesive (6-9')	CL	394	13:26	
	9									
						S.A.A. Gray staining, Strong Odor (9-11)	CL			
						Dense, Medium Grained, Gray, Dry, Strong				
*	12	11-12	Grab	13:18		Odor, Non Plastic, Non Cohesive (11-12')	SS	2,969	13:27	 12' to 7'
						Total Depth 12' on Sandstone				
						Auger Refusal				
						Install Well				
						2" screen @ 12' to 7'				
						Sand pack @ 12' to 6'				
						Bentonite @ 6' to surface				

Page1 of 2

August 3, 2015

SOIL BORING LOG: SB-24 SVE-9

Facility or Pipeline Name: Hilcorp SJ 28-6 Unit 31

Date: 12-5-18

AES personnel: C. Lameman

Buck Machine #____			
Concentration	50 mg/kg	100 mg/kg	500 mg/kg
Calibration ABS Values			

Sample ID	Collection Date	Time of Sample Collection	Sample Location	Sample Depth (ft)	Composite	PID-OVM (ppm)	PID-OVM Time	Field TPH (mg/kg)	Field TPH Analysis Time	ABS	NOTES (i.e. Soil Type, Color, Odor, Staining)
~~PA~~ SB-24	12-5-18										Brown, Medium, Fine Grained Sand, High Plasticity, Moist
											Cohesive, Strong Odor @ 4' (0-4')
		13:50		3-4 ~~13:50~~		324	13:52				Tan, Very Stiff, High Plasticity, Moist, Gray Staining
											Cohesive, Strong Odor (4-6')
											Tan, Loose, Medium Grained, Non Plasticity, Moist,
*		13:48		7-8 ~~13:48~~		4,750	13:53				non cohesive, Strong odor, Gray Staining (6-8')
											Tan, Very Stiff, High Plasticity Moist, Gray Staining.
											Cohesive, Extremely Strong Odor @ 9-11.5' (8-11.5')
											Dense, Tan Gray Staining, Medium Grained, non cohesive
											Dry, V. Strong Odor (11.5-12')
*		13:46		11-12'		4,594	13:54				Total Depth @ 12' on Sandstone. Auger Refusal
											1" Well Install
											1" screen @ 12' to 7'
											Sand pack @12' to 6'; Bentonite @ 6' to Surface

Type of Sample collection?:

Soil Boring Log: SVE-1R

Facility or Pipeline Name: San Juan 28-6 #31

Date: 12-5-18

AES personnel: C. Lameman

Buck Machine #			
Concentration	50 mg/kg	100 mg/kg	500 mg/kg
Calibration ABS Values			

Sample ID	Collection Date	Time of Sample Collection	Sample Location	Sample Depth (ft)	Composite	PID-OVM (ppm)	PID-OVM Time	Field TPH (mg/kg)	Field TPH Analysis Time	ABS	NOTES (i.e. Soil Type, Color, Odor, Staining)
SVE-1R	12-5-18	NS	NS	NS	N	NA	NA	No BoRING. LoGS.			
								Total Depth installed @ 12' Deep			
								1" Well			
								1" screen @ 12' to 7'			
								Sand Pack @ 12' to 6'			
								Bentonite @ 6' to Surface			
								NO LABS			

Type of Sample collection?:

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LOG OF: SVE-1

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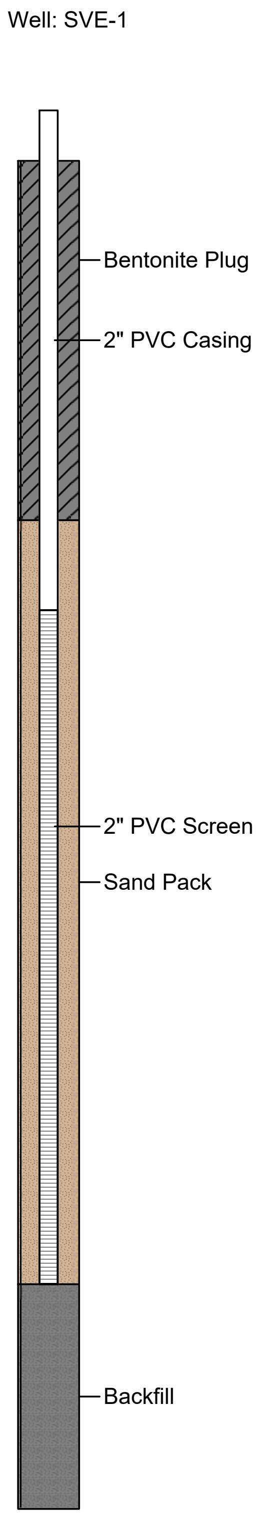
HILCORP ENERGY
SAN JUAN 28-6 UNIT #31
API: 30-039-07290
INCIDENT NO. NVK 1816655680
SW1/4 SW1/4, SEC. 28, T28N, R6W

Date Started : 10/8/2018
Date Completed : 10/8/2018
Hole Diameter : 7.25 in.
Drilling Method : CME 75 HSA
Sampling Method : CONTINOUS/SPLIT-SPOON

Latitude : N36.62768
Longitude : W107.47802
GPS By : C. Lameman
Logged By : C. Lameman

Depth in Feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	PID (ppm)
0		SP		Very Loose, Red-Brown, Poorly Graded Sand, Moist, Non-Plasticity, Non-Cohesive	
2 4		SP-SC		Stiff, Brown, Lean Clay with Sand, Moist, High-Plasticity, Non-Cohesive	
6		SP		Loose, Brown, Poorly Graded Sand, Moist, Non-Plasticity, Non-Cohesive, Strong Odor	4.1
8 10 12		SP-SC		Dense, Brown, Poorly Graded Sand with Clay, Moist, Medium-Plasticity, Non-Cohesive, Very Strong Odor, Gray	2,365
14 16 18		SS		Dense, Tan, Weathered Sandstone, Dry, Very Strong Odor UNABLE TO CONTINUE WITH CONTINOUS BORING. SWITCHED TO SPLIT SPOON AT 15 FEET.	955
20 22 24 26 28 30		SS		Dense, Tan, Weathered Sandstone, Dry, Strong Odor Very Dense, Tan, Sandstone, Dry, Strong Odor @ 30'	2,763 777 505



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LOG OF: SVE-2

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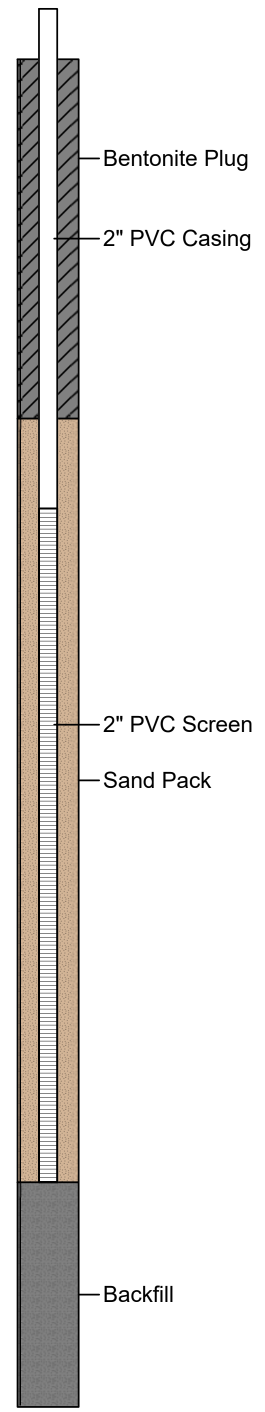
HILCORP ENERGY
SAN JUAN 28-6 UNIT #31
API: 30-039-07290
INCIDENT NO. NVK 1816655680
SW1/4 SW1/4, SEC. 28, T28N, R6W

Date Started : 10/8/2018
Date Completed : 10/8/2018
Hole Diameter : 7.25 in.
Drilling Method : CME 75 HSA
Sampling Method : CONTINOUS/SPLIT-SPOON

Latitude : N36.62760
Longitude : W107.47790
GPS By : C. Lameman
Logged By : C. Lameman

Depth in Feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	PID (ppm)
0		SP		Very Loose, Red-Tan, Poorly Graded Sand, Moist, Non-Plasticity, Non-Cohesive	5.6
		SP-SC		Stiff, Brown, Lean Clay with Sand, Moist, Medium-Plasticity, Cohesive	3,050
10		SS		Dense, Tan-Gray, Weathered Sandstone, Dry, Strong Odor UNABLE TO CONTINUE WITH CONTINOUS BORING. SWITCHED TO SPLIT SPOON AT 11.5 FEET.	3,460
		SS		Very Dense, Tan, Sandstone, Dry, Strong Odor, Poor Recovery	312
20		SS		Very Dense, Tan, Sandstone, Dry, Odor, Poor Recovery	186 135
30					

Well: SVE-2



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LOG OF: SVE-3

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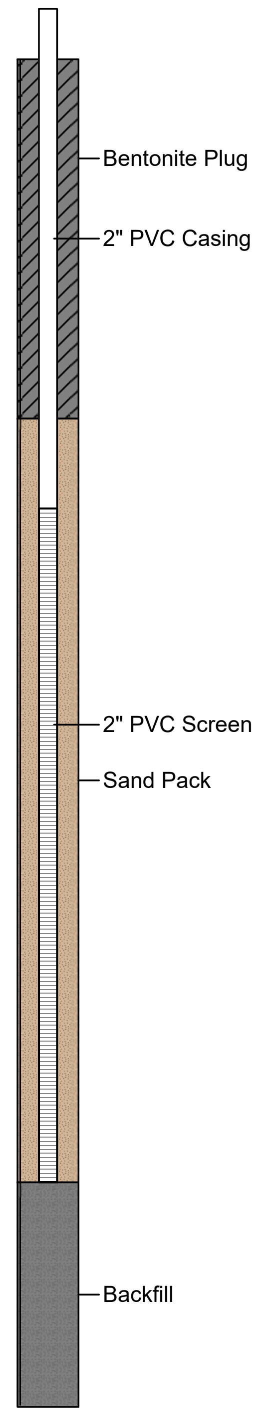
HILCORP ENERGY
SAN JUAN 28-6 UNIT #31
API: 30-039-07290
INCIDENT NO. NVK 1816655680
SW1/4 SW1/4, SEC. 28, T28N, R6W

Date Started	: 10/2/2018	Latitude	: N36.62755
Date Completed	: 10/2/2018	Longitude	: W107.47797
Hole Diameter	: 7.25 in.	GPS By	: C. Lameman
Drilling Method	: CME 75 HSA	Logged By	: C. Lameman
Sampling Method	: CONTINOUS/SPLIT-SPOON		

Depth in Feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	PID (ppm)
0 2		SP		Very Loose, Brown, Poorly Graded Sand, Dry, Non-Plasticity, Non-Cohesive	
4 6 8		SP-SC		Stiff, Brown, Lean Clay with Sand, Moist, Odor, High-Plasticity, Cohesive, Odor	5.6
10		SP-SC		Soft, Gray, Lean Clay with Sand, Moist, High-Plasticity, Cohesive, Strong Odor	3,050
12 14		SP		Loose, Tan, Poorly Graded Sand, Dry, Non-Plasticity, Non-Cohesive, Strong Odor, Light Gray UNABLE TO CONTINUE WITH CONTINOUS BORING. SWITCHED TO SPLIT-SPOON AT 15 FEET.	3,460
16 18 20 22 24		SS		Dense, Tan, Sandstone, Dry, Slight Odor	312 186
26 28 30		SS		Very Dense, Tan-White, Sandstone, Dry, No Odor	135

Well: SVE-3



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LOG OF: SVE-4

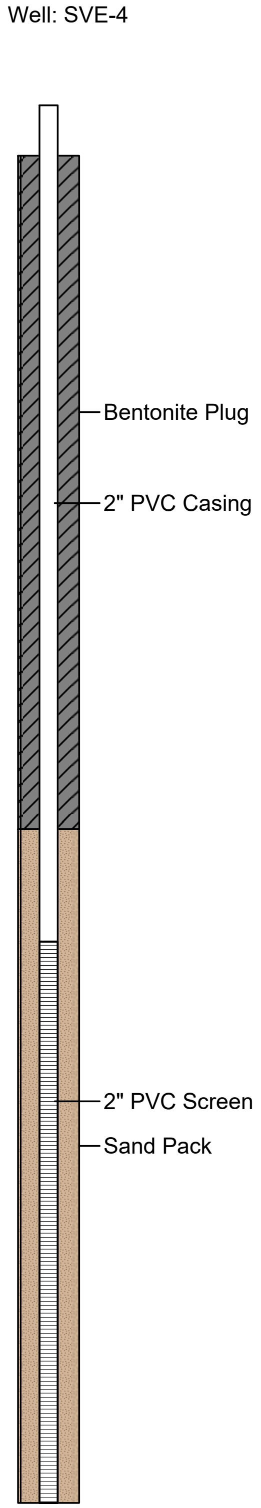
(Page 1 of 1)

HILCORP ENERGY
SAN JUAN 28-6 UNIT #31
API: 30-039-07290
INCIDENT NO. NVK 1816655680
SW1/4 SW1/4, SEC. 28, T28N, R6W

Date Started : 12/5/2018
Date Completed : 12/5/2018
Hole Diameter : 4 in.
Drilling Method : GEOPROBE
Sampling Method : PUSH RIG/SPLIT-SPOON

Latitude : N36.62764
Longitude : W107.47800
GPS By : C. Lameman
Logged By : C. Lameman

Depth in Feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	PID (ppm)
0 2		SC	▨	Clayey Sand, Very Soft, Brown, Fine Grained, High Plasticity, Moist, Cohesive, No Odor, No Staining	324
4		SC	▨	Clayey Sand, Very Soft, Brown, Fine Grained, High Plasticity, Moist, Cohesive, Strong Odor, Staining	
6		SC	▨	Clayey Sand, Stiff, Brown, Fine Grained, High Plasticity, Moist, Cohesive, Strong Odor, Gray Staining	4,750
8 10		SC	▨	Clayey Sand, Stiff, Brown, Fine Grained, High Plasticity, Moist, Cohesive, Strong Odor, Gray Staining	
12		SS	▤	Weather Sandstone, Dense, Tan-Light Gray, Medium Grained, Dry, Strong Odor, Slight Staining Hard Sandstone at 12 feet, Auger Refusal	4,594



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LOG OF: SVE-5

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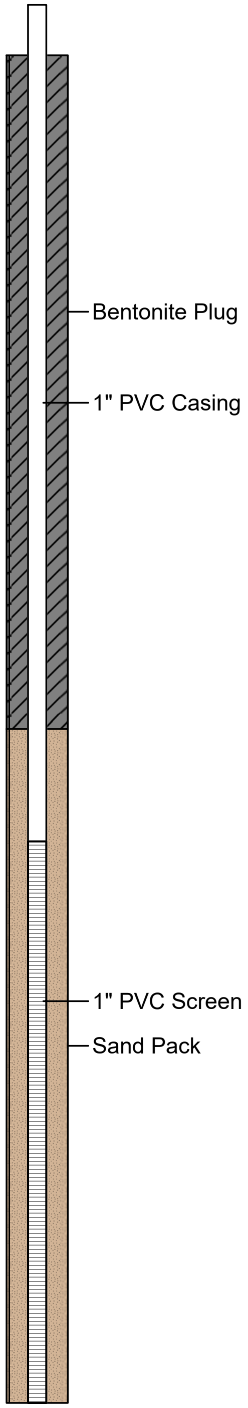
HILCORP ENERGY
SAN JUAN 28-6 UNIT #31
API: 30-039-07290
INCIDENT NO. NVK 1816655680
SW1/4 SW1/4, SEC. 28, T28N, R6W

Date Started	: 12/5/2018	Latitude	: N36.62767
Date Completed	: 12/5/2018	Longitude	: W107.47802
Hole Diameter	: 4 in.	GPS By	: C. Lameman
Drilling Method	: GEOPROBE	Logged By	: C. Lameman
Sampling Method	: PUSH RIG/SPLIT-SPOON		

Depth in Feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	PID (ppm)
0				NO BORING LOG RECORDED - WELL INSTALLATION ONLY. Hard Sandstone at 12 feet, Auger refusal.	
2					
4					324
6					
8					4,750
10					
					4,594
12					

Well: SVE-5



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LOG OF: SVE-6

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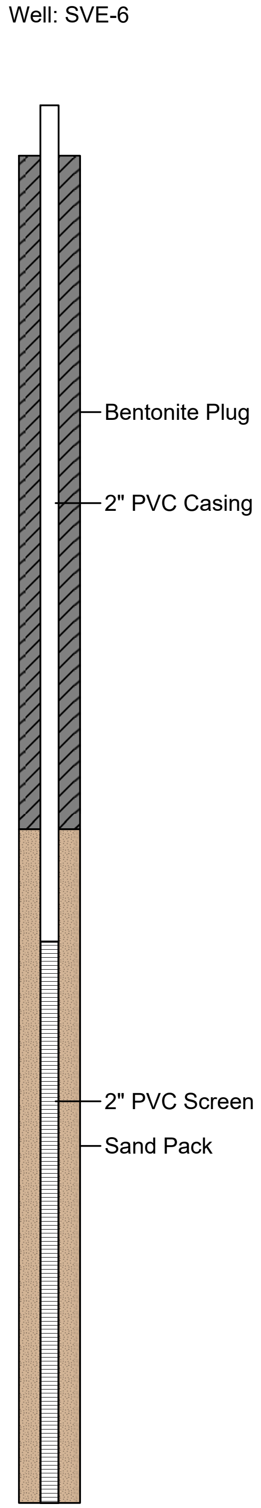
HILCORP ENERGY
SAN JUAN 28-6 UNIT #31
API: 30-039-07290
INCIDENT NO. NVK 1816655680
SW1/4 SW1/4, SEC. 28, T28N, R6W

Date Started	: 12/5/2018	Latitude	: N36.62759
Date Completed	: 12/5/2018	Longitude	: W107.47811
Hole Diameter	: 4 in.	GPS By	: C. Lameman
Drilling Method	: GEOPROBE	Logged By	: C. Lameman
Sampling Method	: PUSH RIG/SPLIT-SPOON		

Depth in Feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	PID (ppm)
0 2 4		SC	▨	Clay With Sand, Brown, High Plasticity, Fine Grain, Moist, Cohesive, No Odor, No Staining	32.0
6		SC	▨	Clay With Sand, Brown, High Plasticity, Fine Grain, Moist, Cohesive, Slight Odor, No Staining	
8 10		SC	▨	Clay With Sand, Brown, High Plasticity, Fine Grain, Moist, Cohesive, Strong Odor, No Staining	3,232
12		SS	▤	Sandstone, Dense, Tan-Light Gray, Medium Grained, Dry, Strong Odor, No Staining	3,044



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LOG OF: SVE-7D

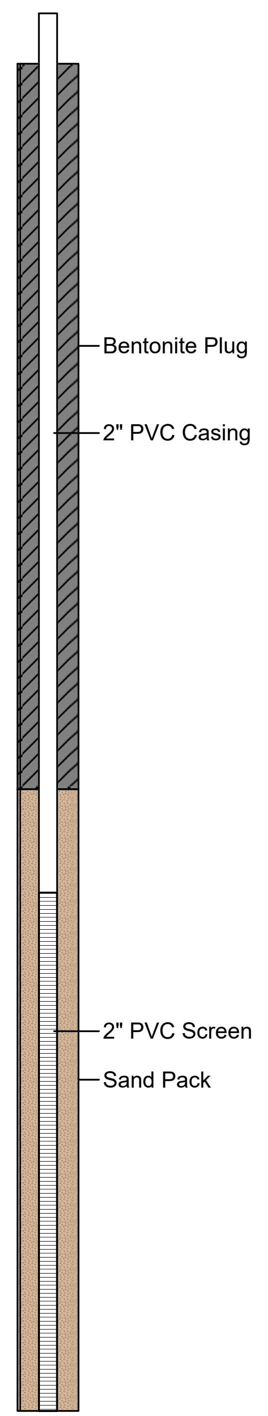
(Page 1 of 1)

HILCORP ENERGY
SAN JUAN 28-6 UNIT #31
API: 30-039-07290
INCIDENT NO. NVK 1816655680
SW1/4 SW1/4, SEC. 28, T28N, R6W

Date Started	: 12/5/2018	Latitude	: N36.62758
Date Completed	: 12/5/2018	Longitude	: W107.47807
Hole Diameter	: 4 in.	GPS By	: C. Lameman
Drilling Method	: GEOPROBE	Logged By	: C. Lameman
Sampling Method	: PUSH RIG/SPLIT-SPOON		

Depth in Feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	PID (ppm)
0		SC	▨	Clayey Sand, Soft, Brown, Fine Grained, High Plasticity, Moist, Conhesive, No Odor, No Staining	1.7
5		SW	░	Sand, Loose, Brown, Fine Grained, Moist, No Odor, No Staining	
		CL	▨	Clay, Stiff, Brown, High Plasticity, Moist, Cohesive, Black Staining, Odor	4.4
		SC	▨	Clayey Sand, Brown, Stif, Fine Grained, High Plasticity, Cohesive, Odor, Staining	
		SS	▤	Weatherd Sandstone, Dense, Slight Gray, Medium Grained, Dry, Strong Odor, Slight Staining Hard Sandstone at 13 feet, Auger Refusal	2,799
13					

Well: SVE-7D



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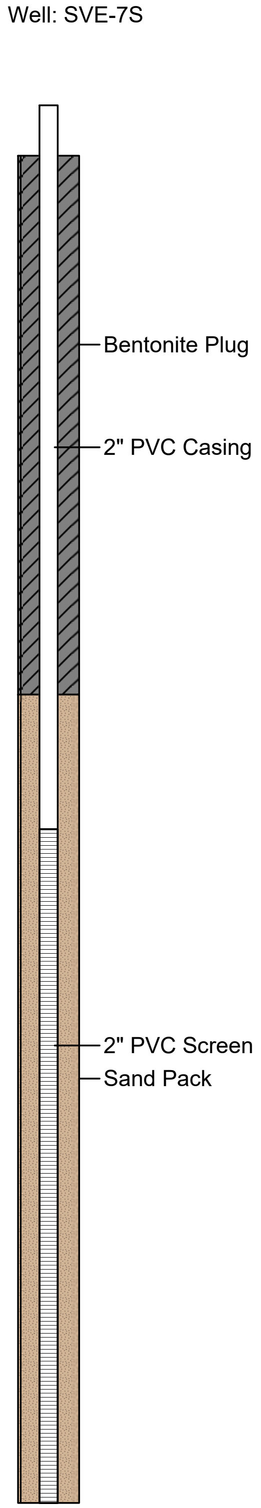
LOG OF: SVE-7S

(Page 1 of 1)

HILCORP ENERGY
SAN JUAN 28-6 UNIT #31
API: 30-039-07290
INCIDENT NO. NVK 1816655680
SW1/4 SW1/4, SEC. 28, T28N, R6W

Date Started : 12/5/2018
Date Completed : 12/5/2018
Hole Diameter : 4 in.
Drilling Method : GEOPROBE
Sampling Method : PUSH RIG/SPLIT-SPOON
Latitude : N36.62758
Longitude : W107.47807
GPS By : C. Lameman
Logged By : C. Lameman

Depth in Feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	PID (ppm)
0		SC	▨	Clayey Sand, Soft, Brown, Fine Grained, High Plasticity, Moist, Conhesive, No Odor, No Staining (Additional shallow well installed near SB-5R/SVE-7D. Not in the same boring hole.)	
5		SW	░	Sand, Loose, Brown, Fine Grained, Moist, No Odor, No Staining	
		CL	▨	Clay, Stiff, Brown, High Plasticity, Moist, Cohesive, Black Staining, Odor	
		SC	▨	Clayey Sand, Brown, Stif, Fine Grained, High Plasticity, Cohesive, Odor, Staining	
10					



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LOG OF: SVE-8

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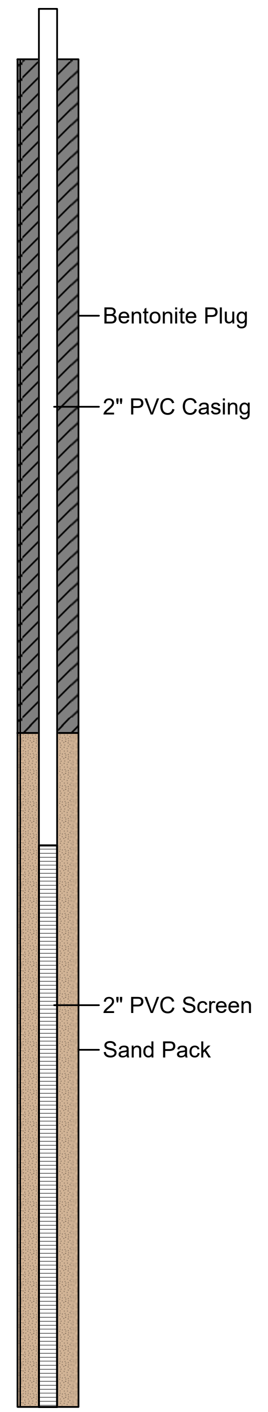
HILCORP ENERGY
SAN JUAN 28-6 UNIT #31
API: 30-039-07290
INCIDENT NO. NVK 1816655680
SW1/4 SW1/4, SEC. 28, T28N, R6W

Date Started	: 12/5/2018	Latitude	: N36.62763
Date Completed	: 12/5/2018	Longitude	: W107.47810
Hole Diameter	: 4 in.	GPS By	: C. Lameman
Drilling Method	: GEOPROBE	Logged By	: C. Lameman
Sampling Method	: PUSH RIG/SPLIT-SPOON		

Depth in Feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	PID (ppm)
0			∴	Gravel on Surface	
2 4		SC	▨	Clayey Sand, Very Soft, Brown, Fine Grained, High Plasticity, Moist, Cohesive, No Odor, No Staining	3.2
		SW	░	Sand, Loose, Brown, Fine Grained, Moist, No Odor, No Staining	
6 8 10		SC	▨	Clayey Sand, Stiff, Brown, Fine Grained, High Plasticity, Moist, Cohesive, Strong Odor, No Staining	188
12		SS	≡	Weather Sandstone, Dense, Tan-Light Gray, Medium Grained, Dry, Strong Odor, Slight Staining Hard Sandstone at 12 feet, Auger Refusal	4,247

Well: SVE-8



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LOG OF: SVE-9

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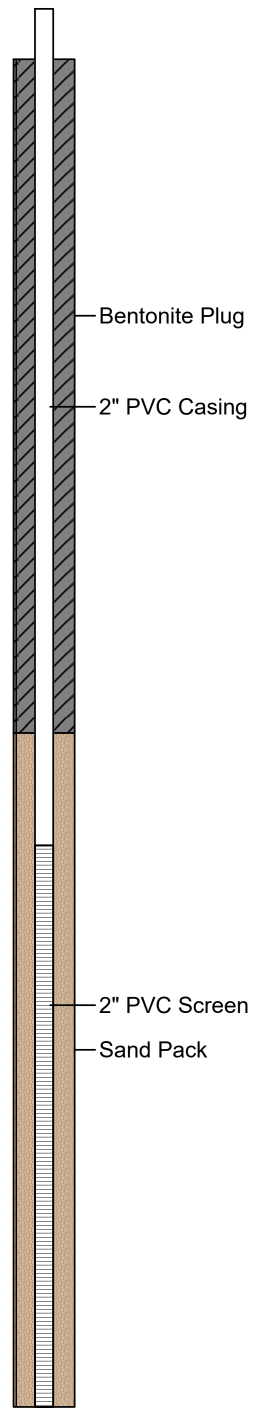
HILCORP ENERGY
SAN JUAN 28-6 UNIT #31
API: 30-039-07290
INCIDENT NO. NVK 1816655680
SW1/4 SW1/4, SEC. 28, T28N, R6W

Date Started : 12/5/2018
Date Completed : 12/5/2018
Hole Diameter : 4 in.
Drilling Method : GEOPROBE
Sampling Method : PUSH RIG/SPLIT-SPOON
Latitude : N36.62761
Longitude : W107.47812
GPS By : C. Lameman
Logged By : C. Lameman

Depth in Feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	PID (ppm)
0 2 4		SC	▨	Clayey Sand, Very Soft, Brown, Fine Grained, High Plasticity, Moist, Cohesive, No Odor, No Staining	8.1
		SW		Sand, Loose, Brown, Fine Grained, Moist, No Odor, No Staining	
6 8 10		SC	▨	Clayey Sand, Stiff, Brown, Fine Grained, High Plasticity, Moist, Cohesive, Strong Odor, No Staining	1.3
12		SS		Weather Sandstone, Dense, Tan-Light Gray, Medium Grained, Dry, Strong Odor, Slight Staining Hard Sandstone at 12 feet, Auger Refusal	282.1

Well: SVE-9



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LOG OF: SVE-10

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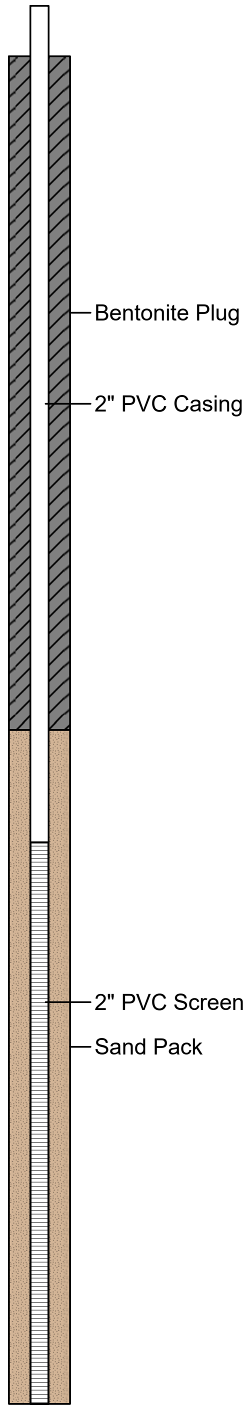
HILCORP ENERGY
SAN JUAN 28-6 UNIT #31
API: 30-039-07290
INCIDENT NO. NVK 1816655680
SW1/4 SW1/4, SEC. 28, T28N, R6W

Date Started	: 12/5/2018	Latitude	: N36.62765
Date Completed	: 12/5/2018	Longitude	: W107.47806
Hole Diameter	: 4 in.	GPS By	: C. Lameman
Drilling Method	: GEOPROBE	Logged By	: C. Lameman
Sampling Method	: PUSH RIG/SPLIT-SPOON		

Depth in Feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	PID (ppm)
0 2		SC	▨	Clayey Sand, Very Soft, Brown, Fine Grained, High Plasticity, Moist, Cohesive, No Odor, No Staining	
4		SC	▨	Clayey Sand, Very Soft, Brown, Fine Grained, High Plasticity, Moist, Cohesive, Odor, Staining	509
		SW	░	Sand, Loose, Brown, Fine Grained, Moist, No Odor, No Staining	
6 8		SC	▨	Clayey Sand, Stiff, Brown, Fine Grained, High Plasticity, Moist, Cohesive, Strong Odor, No Staining	394
10		SC	▨	Clayey Sand, Stiff, Brown, Fine Grained, High Plasticity, Moist, Cohesive, Strong Odor, Gray Staining	
12		SS	▤	Weather Sandstone, Dense, Tan-Light Gray, Medium Grained, Dry, Strong Odor, Slight Staining Hard Sandstone at 12 feet, Auger Refusal	2,969

Well: SVE-10



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LOG OF: SVE-11S and SVE-11D

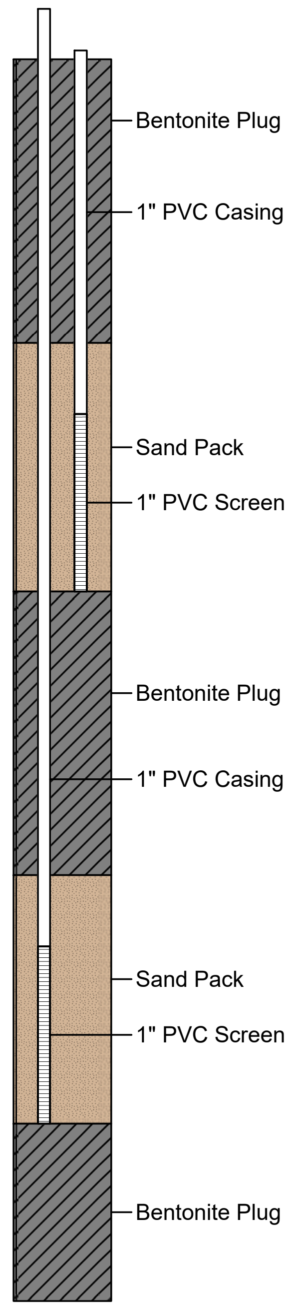
(Page 1 of 1)

HILCORP ENERGY
SAN JUAN 28-6 UNIT #31
API: 30-039-07290
INCIDENT NO. NVK 1816655680
SW1/4 SW1/4, SEC. 28, T28N, R6W

Date Started	: 5/1/2019	Latitude	: N36.62760
Date Completed	: 5/1/2019	Longitude	: W107.47803
Hole Diameter	: 7.25 in.	GPS By	: C. Lameman
Drilling Method	: CME H.S.A.	Logged By	: C. Lameman
Sampling Method	: SPLIT-SPOON		

Depth in Feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Blow Count	PID (ppm)
0		SC		Clayey Sand, Soft, Brown, Fine Grained, High Plasticity, Moist, No Odor, No Staining		
		SW		Sand, Loose, Brown, Fine Grained, Moist, Strong Odor, Staining		
5		SC		Clayey Sand, Sodt, Brown, Medium Plasticity, Moist, Strong Odor, Staining	4, 9, 11	86.4
10		SS		Weathered Sandstone, Loose, Light Gray, Fine Grained, Dry, Strong Odor	4, 6, 10	2,703
15		SS		Sandstone, Very Dense, Gray, Fine to Medium Grained, Dry, Strong Odor	1/50	2,067
20		SS		Sandstone, Very Dense, Light Gray, Fine Grained, Dry, Strong Odor, No Staining	1/50	3,127
25		SS		Sandstone, Very Dense, Tan, Fine Grained, Dry, Strong Odor, No Staining	1/50	3,210
30		SS		Sandstone, Very Dense, Tan-Slight Green, Fine Grained, Dry, Strong Odor, No Staining	1/50	3,326
35		SS		Sandstone, Very Dense, Tan-White, Fine Grained, Dry, Strong Odor, No Staining. Auger Refusal and Small Recovery. TOTAL DEPTH 35 FEET.	1/50	213.3

Well1: SVE-11S
Well2: SVE-11D



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LOG OF: SVE-12S and SVE-12D

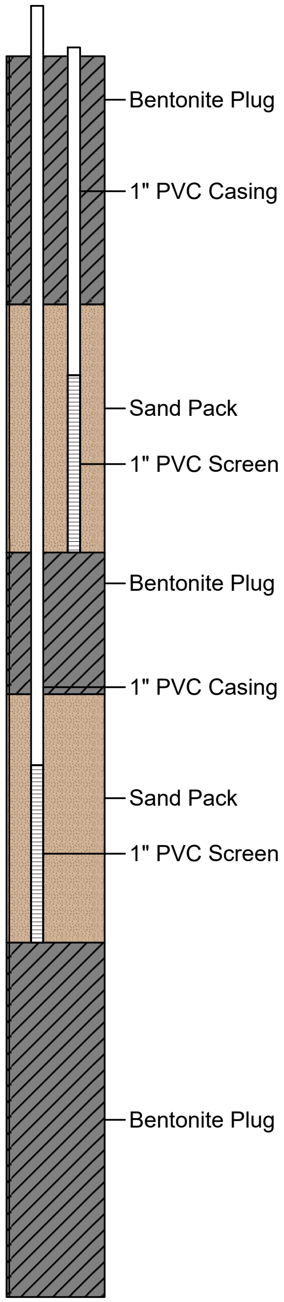
(Page 1 of 1)

HILCORP ENERGY
SAN JUAN 28-6 UNIT #31
API: 30-039-07290
INCIDENT NO. NVK 1816655680
SW1/4 SW1/4, SEC. 28, T28N, R6W

Date Started	: 4/30/2019	Latitude	: N36.62762
Date Completed	: 4/30/2019	Longitude	: W107.47802
Hole Diameter	: 7.25 in.	GPS By	: C. Lameman
Drilling Method	: CME H.S.A.	Logged By	: C. Lameman
Sampling Method	: CONTINOUS		

Depth in Feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Blow Count	PID (ppm)
0		GW		Backfill - Below Grade Tank and Cribbing Removed. Sand and Gravel, Moist. Slight Odor, Some Staining. 0-5 feet hand augered.		
5		SW		Sand, Loose, Brown, Fine Grained, Moist, Strong Odor, Gray Staining	Cont.	0.0
10		SC		Clayey Sand, Soft, Gray, Fine Grained, Medium Plasticity, Moist, Strong Odor, Staining		2,403
		SH		Shale, Gray, Loose, Strong Odor, Staining, Moist		
		SS		Weathered Sandstone, Loose, Gray, Fine Grained, Dry, Strong Odor		
15		SS		Sandstone, Very Dense, Tan, Fine to Medium Grained, Dry, Strong Odor		1,991
20		SS		Sandstone, Very Dense, Tan, Fine Grained, Dry, Strong Odor, No Staining		2,585
25		SS		Sandstone, Very Dense, Tan, Fine Grained, Dry, Strong Odor, No Staining		2,558
30		SS		Sandstone, Very Dense, Tan-White, Fine Grained, Dry, Odor, No Staining		338
35		SS		Sandstone, Very Dense, Tan-White, Fine Grained, Dry, Odor, No Staining. Auger Refusal and Small Recovery. TOTAL DEPTH 35 FEET.		272

Well1: SVE-12S
Well2: SVE-12D



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LOG OF: SVE-13S and SVE-13D

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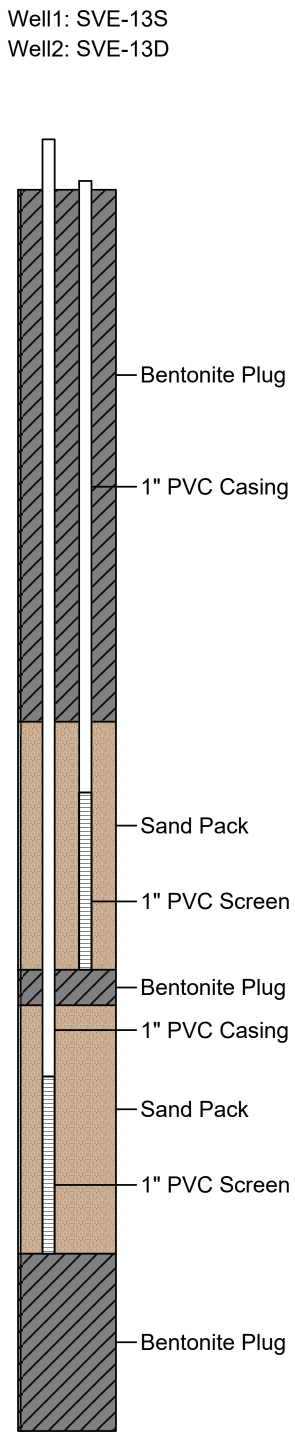
HILCORP ENERGY
SAN JUAN 28-6 UNIT #31
API: 30-039-07290
INCIDENT NO. NVK 1816655680
SW1/4 SW1/4, SEC. 28, T28N, R6W

Date Started	: 5/1/2019	Latitude	: N36.62763
Date Completed	: 5/1/2019	Longitude	: W107.47798
Hole Diameter	: 7.25 in.	GPS By	: C. Lameman
Drilling Method	: CME H.S.A.	Logged By	: C. Lameman
Sampling Method	: SPLIT SPOON		

Depth in Feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Blow Count	PID (ppm)
0		SC		Clayey Sand, Loose, Brown, Fine Grained, High Plasticity, Moist, No Odor, No Staining. 0 to 5 feet hand augered on 4/30/2019.		
5		SW		Sand, Loose, Brown, Fine Grained, Moist, Strong Odor, Gray Staining	NA	6.5
		SC		Clayey Sand, Soft, Brown, Fine Grained, Low Plasticity, Moist, Strong Odor, No Staining		
10		SS		Weathered Sandstone, Loose, Light Gray, Fine Grained, Dry, Strong Odor	3, 4, 12	2,581
15		SS		Sandstone, Very Dense, Tan-Gray, Fine to Medium Grained, Dry, Strong Odor	1/55	3,061
20		SS		Sandstone, Very Dense, Tan, Fine Grained, Dry, Strong Odor, No Staining, Small Recovery	1/55	2,033
25		SS		Sandstone, Very Dense, Tan-White, Fine Grained, Dry, Strong Odor, No Staining, Small Recovery	1/55	2,151
30		SS		Sandstone, Very Dense, Tan-White, Fine Grained, Dry, Odor, No Staining	1/55	2,382
35		SS		Sandstone, Very Dense, Tan-White, Fine Grained, Dry, Odor, No Staining. Auger Refusal and Little to No Recovery. TOTAL DEPTH 35 FEET.	1/55	24.8



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LOG OF: SVE-14S and SVE-14D

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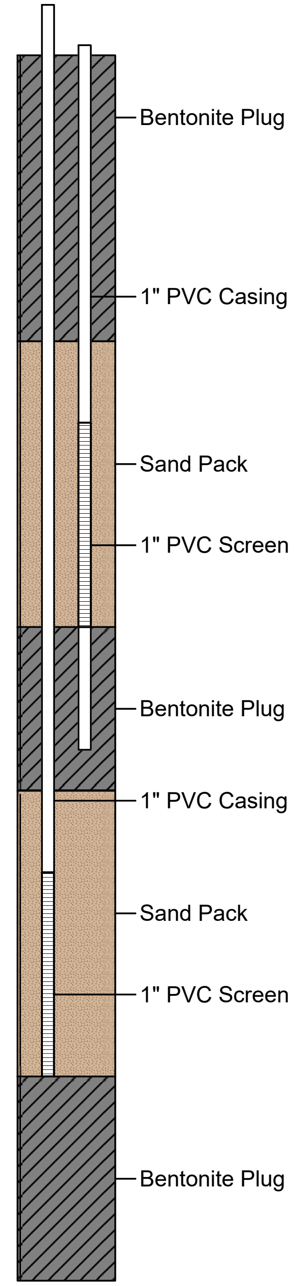
HILCORP ENERGY
SAN JUAN 28-6 UNIT #31
API: 30-039-07290
INCIDENT NO. NVK 1816655680
SW1/4 SW1/4, SEC. 28, T28N, R6W

Date Started : 5/1/2019
Date Completed : 5/1/2019
Hole Diameter : 7.25 in.
Drilling Method : CME H.S.A.
Sampling Method : SPLIT SPOON

Latitude : N36.62766
Longitude : W107.47796
GPS By : C. Lameman
Logged By : C. Lameman

Depth in Feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Blow Count	PID (ppm)
0		SC		Clayey Sand, Loose, Brown, Fine Grained, High Plasticity, Moist, No Odor, No Staining. 0 to 5 feet hand augered on 4/30/2019.		
5		SW		Sand, Loose, Brown, Fine Grained, Moist, Strong Odor, Gray Staining	NA	0.0
		SC		Clayey Sand, Soft, Brown, Fine Grained, Low Plasticity, Moist, Strong Odor, Gray Staining		
10					5, 7, 9	683.9
15		SS		Weathered Sandstone, Loose, Light Gray, Fine Grained, Dry, Strong Odor, Slight Staining	1/55	23.3
20		SS		Sandstone, Very Dense, Tan-White, Fine Grained, Dry, Strong Odor, No Staining	1/55	69.2
25		SS		Sandstone, Very Dense, Tan-White, Fine Grained, Dry, Slight Odor, No Staining	1/55	89.0
30		SS		Sandstone, Very Dense, Tan, Fine Grained, Dry, Slight Odor, No Staining TOTAL DEPTH 30 FEET.	1/55	25.6

Well1: SVE-14S
Well2: SVE-14D



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LOG OF: SVE-15

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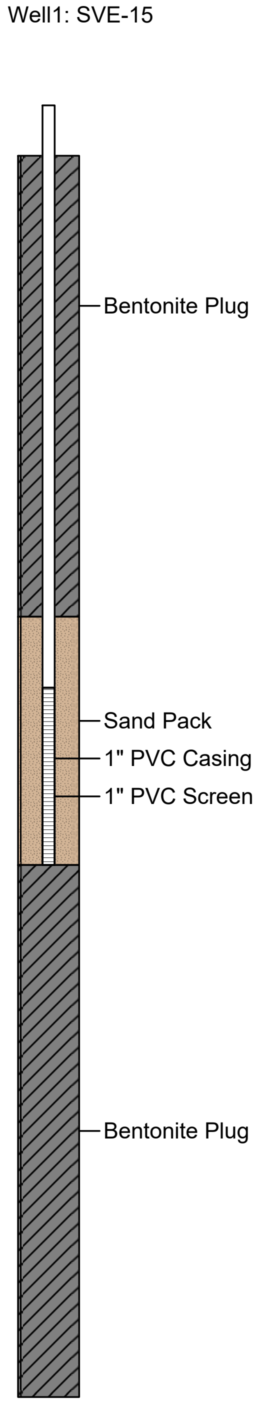
HILCORP ENERGY
SAN JUAN 28-6 UNIT #31
API: 30-039-07290
INCIDENT NO. NVK 1816655680
SW1/4 SW1/4, SEC. 28, T28N, R6W

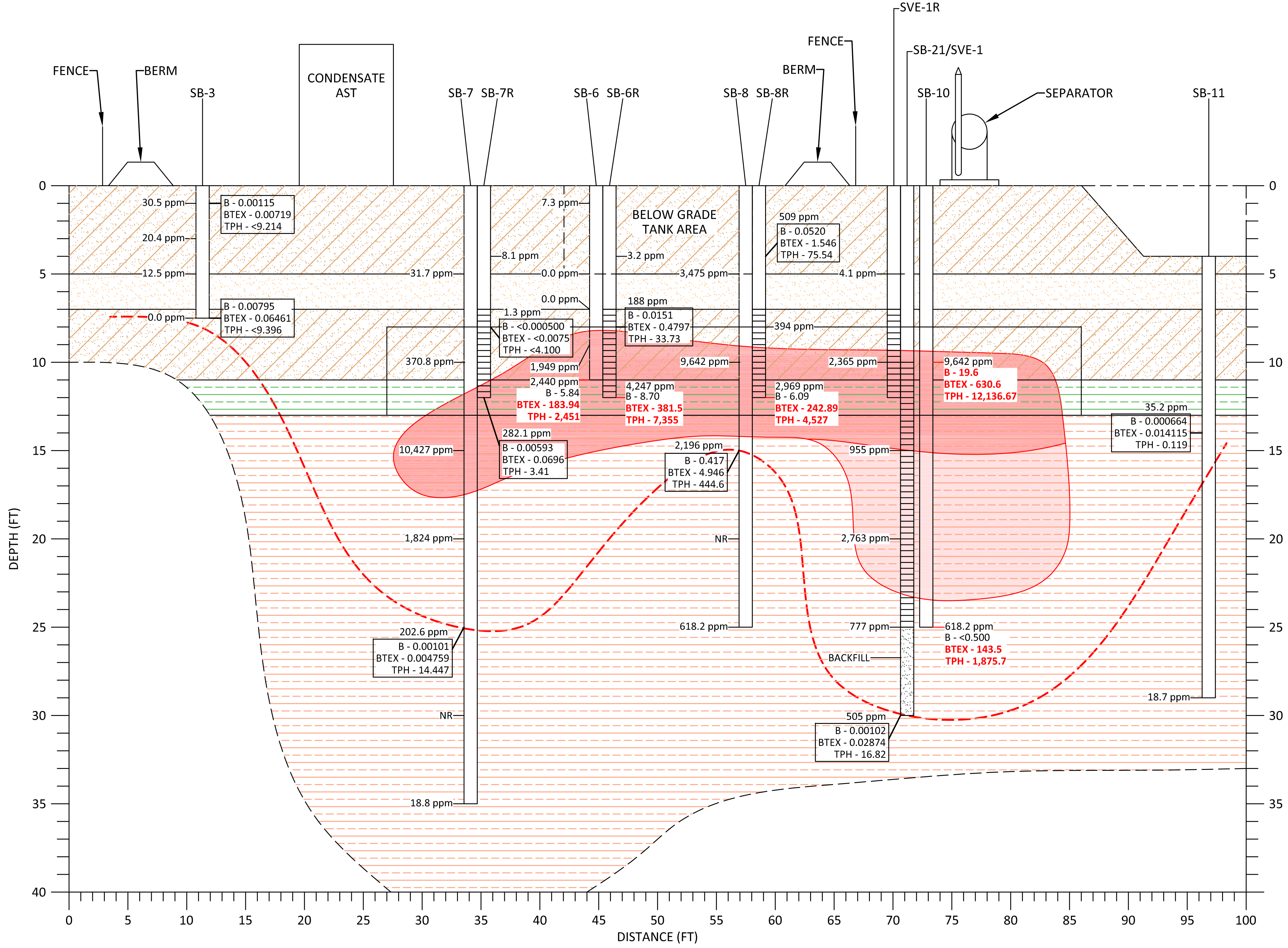
Date Started : 5/1/2019
Date Completed : 5/1/2019
Hole Diameter : 7.25 in.
Drilling Method : CME H.S.A.
Sampling Method : SPLIT SPOON

Latitude : N36.62758
Longitude : W107.47807
GPS By : C. Lameman
Logged By : C. Lameman

Depth in Feet	Surf. Elev.	USCS	GRAPHIC	DESCRIPTION	Blow Count	PID (ppm)
0			▨	Clayey Sand, Loose, Brown, Fine Grained, High Plasticity, Moist, No Odor, No Staining.		
5		SC	▨		5, 7, 9	2.6
10		SC	▨	Clayey Sand, Soft, Brown, Fine Grained, Low Plasticity, Moist, Strong Odor, Gray Staining	5, 4, 9	2,967
		SH		Shale, Soft, Gray, Dry, Strong Odor, Staining		
			▤	Weathered Sandstone, Loose, Light Gray, Fine Grained, Dry, Strong Odor, Slight Staining		
15		SS	▤		32, 55	2,870
20		SS	▤	Sandstone, Very Dense, Tan, Fine Grained, Dry, Strong Odor, No Staining	1/55	2,776
25		SS	▤	Sandstone, Very Dense, Tan, Fine Grained, Dry, Strong Odor, No Staining	1/55	195.9
30		SS	▤	Sandstone, Very Dense, Tan-White, Fine Grained, Dry, Slight Odor, No Staining	1/55	229.9
35		SS	▤	Sandstone, Very Dense, Tan-White, Fine Grained, Dry, Slight Odor, No Staining TOTAL DEPTH 35 FEET.	1/55	47.4



ENCLOSURE D – ANIMAS ENVIRONMENTAL SERVICES CROSS SECTIONS



NOT TO SCALE

LEGEND

- ▨ SAND
- ▨ CLAYEY SAND
- ▤ SANDSTONE (WEATHERED)
- ▤ SANDSTONE (HARD)
- 🟥 INTERPOLATED AREA OF PETROLEUM HYDROCARBON IMPACTS
- - - - VERTICAL DELINEATION - LABORATORY CONCENTRATIONS BELOW ACTION LEVELS

NOTE: FOR VISUAL CLARITY SVE WELLS ARE SHOWN ADJACENT TO ORIGINAL BORINGS IN CROSS-SECTION ONLY.

NOTE: ALL LABORATORY ANALYTICAL RESULTS REPORTED IN mg/kg.

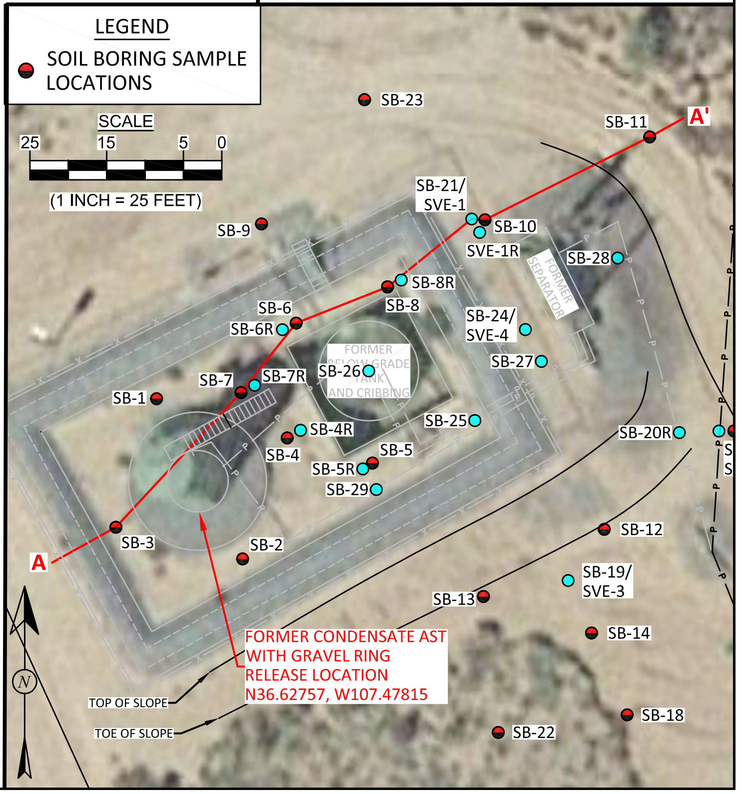
FIGURE 4A

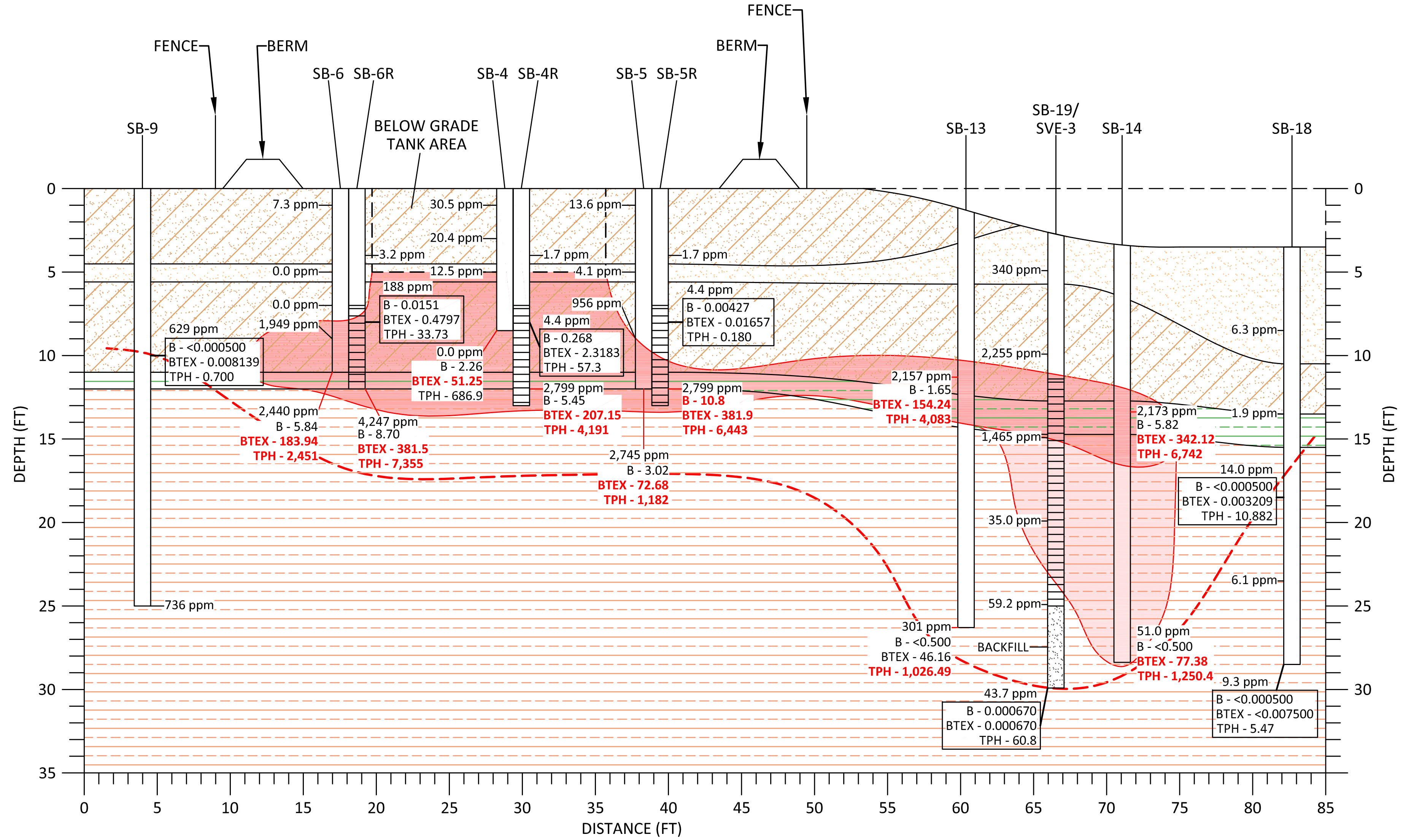
GEOLOGICAL CROSS SECTION A - A'

HILCORP ENERGY
SAN JUAN 28-6 UNIT #31
API:30-039-07290
INCIDENT NO. NVF 1816655680
SW¼ SW¼, SECTION 28, T28N, R6W
RIO ARRIBA COUNTY, NEW MEXICO
N36.62780, W107.47811

animas environmental services
Farmington, NM • Durango, CO
animasenvironmental.com

DRAWN BY: C. Lameman	**DATE DRAWN:** August 21, 2018
REVISIONS BY: C. Lameman	**DATE REVISED:** May 15, 2019
CHECKED BY: E. McNally	**DATE CHECKED:** May 15, 2019
APPROVED BY: E. McNally	**DATE APPROVED:** May 15, 2019





LEGEND

▨	SAND
▨	CLAYEY SAND
▤	SANDSTONE (WEATHERED)
▤	SANDSTONE (HARD)
🟥	INTERPOLATED AREA OF PETROLEUM HYDROCARBON IMPACTS
- - -	VERTICAL DELINEATION - LABORATORY CONCENTRATIONS BELOW ACTION LEVELS

NOTE: FOR VISUAL CLARITY SVE WELLS ARE SHOWN ADJACENT TO ORIGINAL BORINGS IN CROSS-SECTION ONLY.

NOTE: ALL LABORATORY ANALYTICAL RESULTS REPORTED IN mg/kg.

FIGURE 4B

GEOLOGICAL CROSS SECTION
B - B'

HILCORP ENERGY
SAN JUAN 28-6 UNIT #31
API:30-039-07290
INCIDENT NO. NVF 1816655680
SW¼ SW¼, SECTION 28, T28N, R6W
RIO ARRIBA COUNTY, NEW MEXICO
N36.62780, W107.47811

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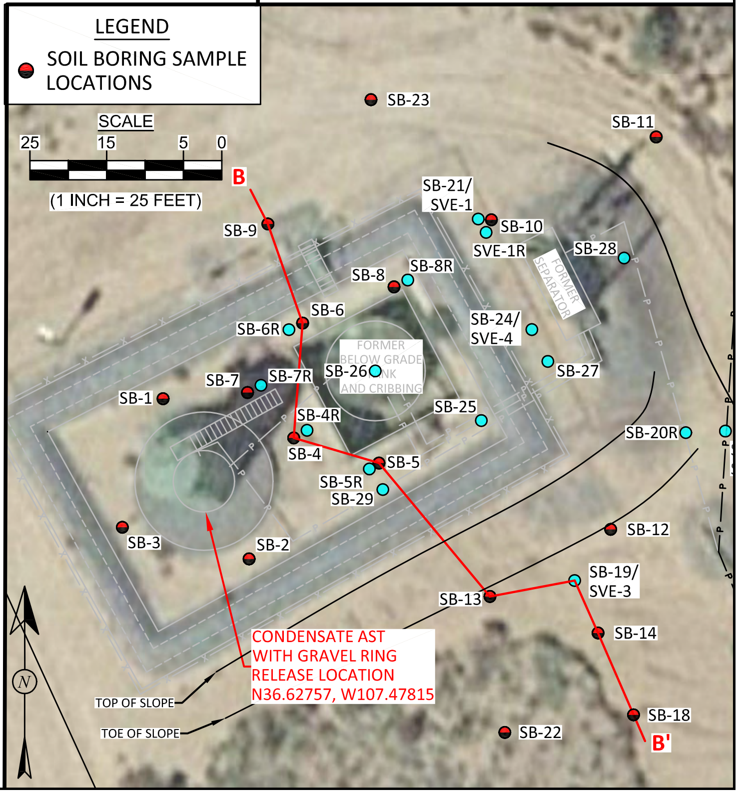

NOT TO SCALE

FIGURE 4C

GEOLOGICAL CROSS SECTION
C - C'

HILCORP ENERGY
SAN JUAN 28-6 UNIT #31
API:30-039-07290
INCIDENT NO. NVF 1816655680
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RIO ARRIBA COUNTY, NEW MEXICO
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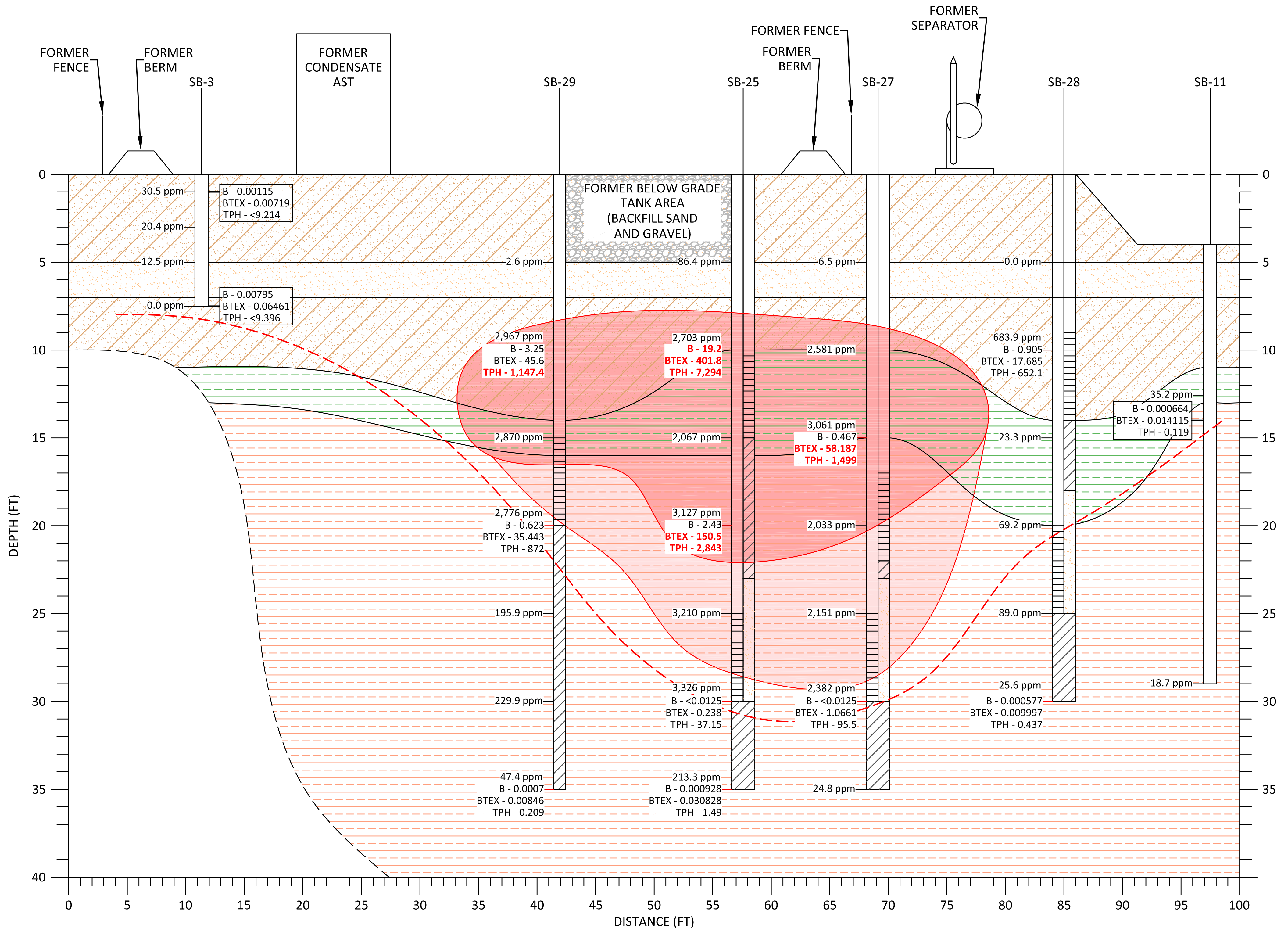
C. Lameman	May 15, 2019
REVISIONS BY:	**DATE REVISED:**
C. Lameman	May 15, 2019
CHECKED BY:	**DATE CHECKED:**
E. McNally	May 15, 2019
APPROVED BY:	**DATE APPROVED:**
E. McNally	May 15, 2019



LEGEND

- ▨ SAND
- ▨ CLAYEY SAND
- 🟩 SANDSTONE (WEATHERED)
- ▨ SANDSTONE (HARD)
- 🟥 INTERPOLATED AREA OF PETROLEUM HYDROCARBON IMPACTS
- - - VERTICAL DELINEATION - LABORATORY CONCENTRATIONS BELOW ACTION LEVELS

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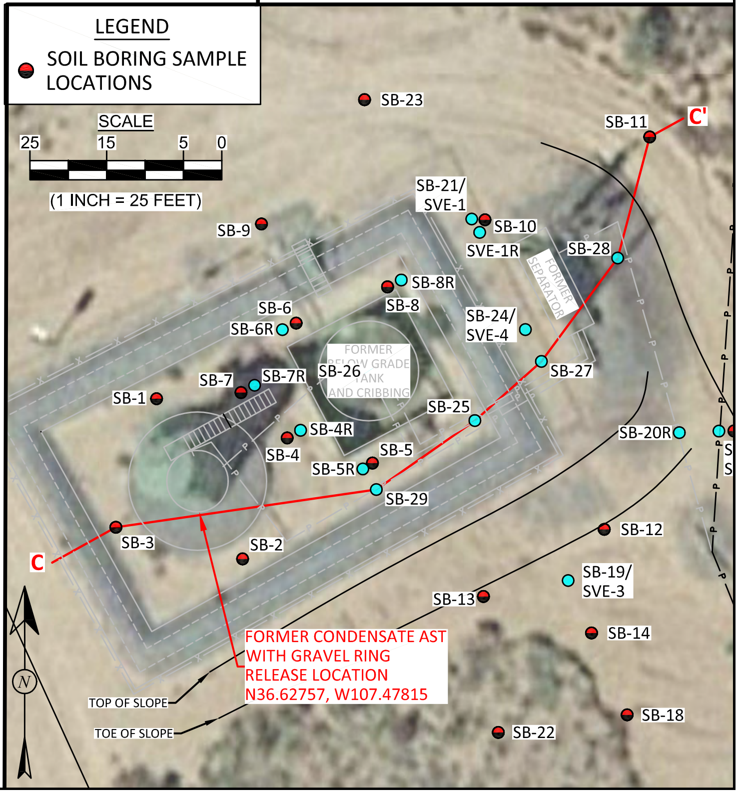
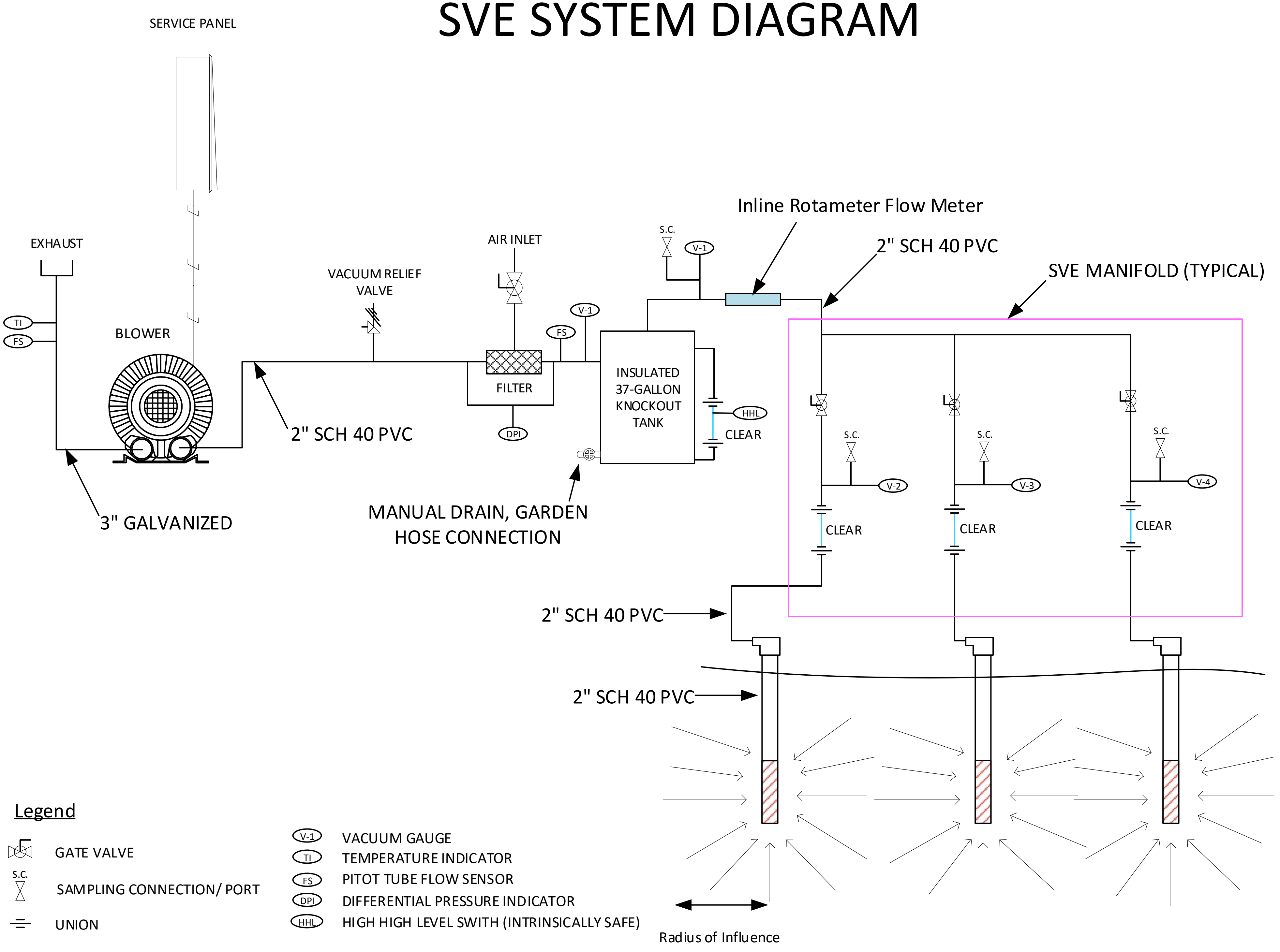
NOTE: ALL LABORATORY ANALYTICAL RESULTS REPORTED IN mg/kg.



NOT TO SCALE

ENCLOSURE E – SVE SYSTEM DIAGRAM, SVE SYSTEM BROCHURE, AND GENERATOR MANUAL

SVE SYSTEM DIAGRAM



GO TO GEOTECH

Soil Vapor Extraction Systems

geotech

Geotech SVE

The Geotech Soil Vapor Extraction system is designed to remove hazardous vapors from the subsurface by drawing air through contaminated soil, and volatilizing adsorbed phase pollutants. Geotech SVE systems are ideal for well point or trench type vapor barriers.

FEATURES

- **Compact, durable design**
- **Skid Mounted with moisture separator drum/mist eliminator**
  - 37 gallon (140 liters) liquid holding capacity
  - Hi Water level switch
  - Hi Vacuum switch
- **Continuous reliable operation**
- **Many blower types are available to meet your requirements:**
  - Regenerative
  - Rotary Claw
  - Positive Displacement (Rotary Lobe)
  - Rotary Vane
  - Centrifugal Fan
- **Thermal overload protection**
- **Influent dilution air valve**
- **Two vacuum gauges**
- **Optional NEC code available** (Class 1, Div. 1, or Div. 2)
- **Non-explosive units are available**

OPERATION

The Geotech SVE system works by pulling air through soil that has been saturated with hydrocarbons or other volatile organic compounds, causing these compounds to volatilize. The vapors are then discharged to the atmosphere, through carbon polishing or vapor oxidation.

These systems are deployed with a moisture separator and mist eliminator filter to protect blower and end treatment from corrosion particulates and debris.

Every Geotech SVE system is factory assembled and fully tested for function, performance, and safety to meet the design conditions of each site application.

Regenerative Blower SVE inside optional hazmat enclosure

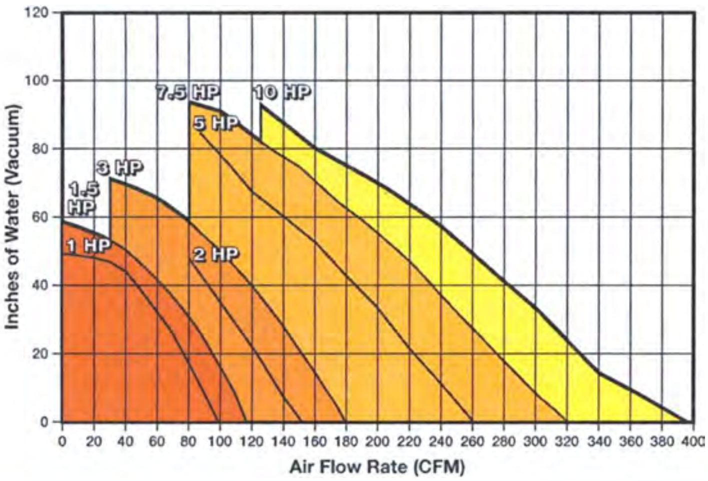
Regenerative Blower SVE

CALL GEOTECH TODAY (800) 833-7958

Geotech Environmental Equipment, Inc.
2650 East 40th Avenue • Denver, Colorado 80205
(303) 320-4764 • **(800) 833-7958** • FAX (303) 322-7242
email: sales@geotechenv.com website: www.geotechenv.com

Soil Vapor Extraction Systems

Geotech SVE



Regenerative Type Blower
Soil Vapor Extraction System
Selection Curve 1 through 10 HP

Note: Higher flow and vacuum versions are available.

Regenerative Blower SVE
with optional Geotech Environmental Control Module

SPECIFICATIONS

Applications:	Well point or trench type vapor barriers
Product Recovery:	Volatile Organic Compounds (VOCs)
Dimensions:	40" L x 48" W x 65" H (101.6 cm L x 121.9 cm W x 165.1 cm)
Options:	Geotech Environmental Control Module Telemetry package Influent or effluent silencer Effluent sample port Effluent temperature gauge Local CFM display Auto-Drain (this option features automatic water level control inside the moisture separator with an effluent transfer pump)

Power Requirements:

HP	Voltage	Phase	CFM/CMM	Inches H_2O Vacuum
1	115/230	1	0-95/0-2.7	50"
1.5	230	1	0-115/0-3.3	58"
2	230	1	80-145/2.3-4.1	55"
2	230	3	80-145/2.3-4.1	55"
3	230	1 or 3	30-185/.85-5.2	72"
5	230	3	85-280/2.4-7.9	82"
7.5	230	3	80-325/2.3-9.2	93"
10	230	3	125-380/3.5-10.8	93"

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geotech

Environmental Equipment, Inc.

RE: A 3 HP Soil Vapor Extraction System ™

As the premier supplier of environmental sampling, monitoring, remediation equipment and associated field supplies since 1978, Geotech Environmental Equipment is pleased to provide you with this quotation for equipment and supplies:

Geotech will supply a 3 HP ORS, XP Soil Vapor Extraction System with the following features:

- Ametek Rotron model EN656M5XL rated for Hazardous Location Class I, Group D, Class II Group F&G, Aluminum fan regenerative blower capable of Approx 100 ICFM (+/- 10%) - 50 inches W.C. Blower motor will be XP, 230 volt, 3HP, single phase with thermal overload protection.
- Explosion proof power disconnect on/off switch (NEMA 7 Enclosure)
- Manual dilution air valve
- Two vacuum gauges.
- Duotec Model H3A-1SL, Vacuum switch to protect the blower from overheating by detecting a blockage in the line. Rated for Hazardous locations, Class I Group B,C & D and Class II Group E,F& G
- Moisture Separator capable of removing vapor from an air flow of up to 350

  SCFM with the following features:

  * Integral Mist Eliminator/Particulate Filter

  * 37 gallon capacity, steel canister with epoxy coated interior.

  * High efficiency cyclonic separation.

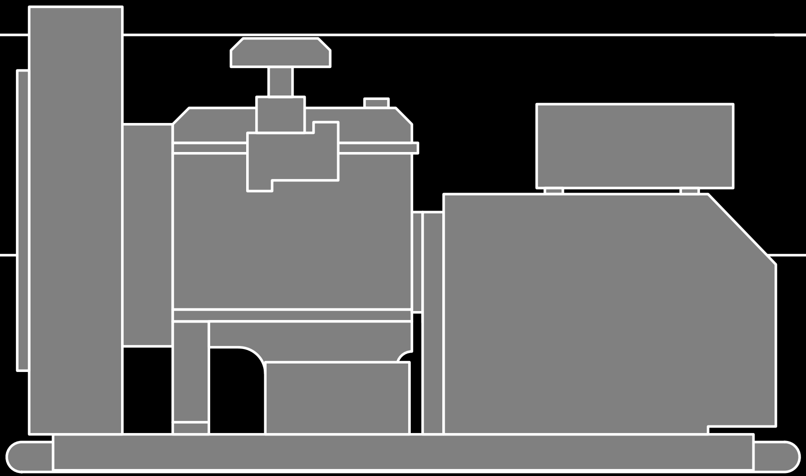
  * Inherent safe collection design.

* Outfitted with drain for convenient removal of fluids.
* W.E. Anderson, Flotect Model L-6, high liquid level switch system that will shut down the blower to protect the blower from flooding when the moisture separator is full. Rated for Hazardous location, Class I Group A, B, C & D, Class II Group E, F & G.

- Mounted and wired in a metal Haz Mat Station, with lockable, hinged lid & doors. Welded steel construction, 66 gallon sump meets EPA &n UFC requirements. Side vents and added Roof Vent for passive ventilation. Coated with a durable, corrosion and weather resistant finished. Four way "forklift able"

Installation Manual

20 ES
GENERATOR SET



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Safety Precautions

Before operating the generator set, read the Operator's Manual and become familiar with it and the equipment. **Safe and efficient operation can be achieved only if the equipment is properly operated and maintained.** Many accidents are caused by failure to follow fundamental rules and precautions.

The following symbols, found throughout this manual, alert you to potentially dangerous conditions to the operator, service personnel, or the equipment.

⚠ DANGER ***This symbol warns of immediate hazards which will result in severe personal injury or death.***

⚠ WARNING ***This symbol refers to a hazard or unsafe practice which can result in severe personal injury or death.***

⚠ CAUTION ***This symbol refers to a hazard or unsafe practice which can result in personal injury or product or property damage.***

FUEL AND FUMES ARE FLAMMABLE

Fire, explosion, and personal injury or death can result from improper practices.

- DO NOT fill fuel tanks while engine is running, unless tanks are outside the engine compartment. Fuel contact with hot engine or exhaust is a potential fire hazard.
- DO NOT permit any flame, cigarette, pilot light, spark, arcing equipment, or other ignition source near the generator set or fuel tank.
- Fuel lines must be adequately secured and free of leaks. Fuel connection at the engine should be made with an approved flexible line. Do not use copper piping on flexible lines as copper will become brittle if continuously vibrated or repeatedly bent.
- Be sure all fuel supplies have a positive shutoff valve.
- Be sure battery area has been well-ventilated prior to servicing near it. Lead-acid batteries emit a highly explosive hydrogen gas that can be ignited by arcing, sparking, smoking, etc..

EXHAUST GASES ARE DEADLY

- Provide an adequate exhaust system to properly expel discharged gases away from enclosed or sheltered areas and areas where individuals are likely to congregate. Visually and audibly inspect the exhaust daily for leaks per the maintenance schedule. Ensure that exhaust manifolds are secured and not warped. Do not use exhaust gases to heat a compartment.
- Be sure the unit is well ventilated.
- Engine exhaust and some of its constituents are known to the state of California to cause cancer, birth defects, and other reproductive harm.

MOVING PARTS CAN CAUSE SEVERE PERSONAL INJURY OR DEATH

- Keep your hands, clothing, and jewelry away from moving parts.
- Before starting work on the generator set, disconnect battery charger from its AC source, then disconnect starting batteries, negative (-) cable first. This will prevent accidental starting.
- Make sure that fasteners on the generator set are secure. Tighten supports and clamps, keep guards in position over fans, drive belts, etc.
- Do not wear loose clothing or jewelry in the vicinity of moving parts, or while working on electrical equipment. Loose clothing and jewelry can become caught in moving parts. Jewelry can short out electrical contacts and cause shock or burning.
- If adjustment must be made while the unit is running, use extreme caution around hot manifolds, moving parts, etc.

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ELECTRICAL SHOCK CAN CAUSE SEVERE PERSONAL INJURY OR DEATH

- Remove electric power before removing protective shields or touching electrical equipment. Use rubber insulative mats placed on dry wood platforms over floors that are metal or concrete when around electrical equipment. Do not wear damp clothing (particularly wet shoes) or allow skin surface to be damp when handling electrical equipment.
- Use extreme caution when working on electrical components. High voltages can cause injury or death. DO NOT tamper with interlocks.
- Follow all applicable state and local electrical codes. Have all electrical installations performed by a qualified licensed electrician. Tag and lock open switches to avoid accidental closure.
- DO NOT CONNECT GENERATOR SET DIRECTLY TO ANY BUILDING ELECTRICAL SYSTEM. Hazardous voltages can flow from the generator set into the utility line. This creates a potential for electrocution or property damage. Connect only through an approved isolation switch or an approved paralleling device.

HIGH VOLTAGE GENERATOR SETS

(1.9kV to 15kV)

- High voltage acts differently than low voltage. Special equipment and training is required to work on or around high voltage equipment. Operation and maintenance must be done only by persons trained and qualified to work on such devices. Improper use or procedures will result in severe personal injury or death.
- Do not work on energized equipment. Unauthorized personnel must not be permitted near energized equipment. Due to the nature of high voltage electrical equipment, induced voltage remains even after the equipment is disconnected from the power source. Plan the time for maintenance with authorized personnel so that the equipment can be de-energized and safely grounded.

GENERAL SAFETY PRECAUTIONS

- Coolants under pressure have a higher boiling point than water. DO NOT open a radiator or heat exchanger pressure cap while the engine is running. Allow the generator set to cool and bleed the system pressure first.
- Benzene and lead, found in some gasoline, have been identified by some state and federal agencies as causing cancer or reproductive toxicity. When checking, draining or adding gasoline, take care not to ingest, breathe the fumes, or contact gasoline.
- Used engine oils have been identified by some state or federal agencies as causing cancer or reproductive toxicity. When checking or changing engine oil, take care not to ingest, breathe the fumes, or contact used oil.
- Provide appropriate fire extinguishers and install them in convenient locations. Consult the local fire department for the correct type of extinguisher to use. Do not use foam on electrical fires. Use extinguishers rated ABC by NFPA.
- Make sure that rags are not left on or near the engine.
- Remove all unnecessary grease and oil from the unit. Accumulated grease and oil can cause overheating and engine damage which present a potential fire hazard.
- Keep the generator set and the surrounding area clean and free from obstructions. Remove any debris from the set and keep the floor clean and dry.
- Do not work on this equipment when mentally or physically fatigued, or after consuming any alcohol or drug that makes the operation of equipment unsafe.
- Substances in exhaust gases have been identified by some state or federal agencies as causing cancer or reproductive toxicity. Take care not to breath or ingest or come into contact with exhaust gases.

KEEP THIS MANUAL NEAR THE GENSET FOR EASY REFERENCE

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1. Introduction

ABOUT THIS MANUAL

This manual provides installation instructions for the ES generator set. This includes the following information:

Mounting Recommendations - Provides instructions for fastening generator set to base and space requirements for normal operation and service.

Mechanical Connections - Shows location of connection points for fuel, exhaust, ventilation, and cooling.

Electrical Connections – Shows location of electrical connection points for the control, generator, and starting system.

Prestart – Provides checklist of items or procedures needed to prepare generator set for operation.

Initial Startup – Describes test complete system to confirm proper installation, satisfactory performance, and proper operation. Refer to Operators Manual for troubleshooting information.

Installation Checklist - Provides reference checks upon completion of installation.

This manual DOES NOT provide application information for selecting a generator set or designing the complete installation. If it is necessary to design the various integrated systems (fuel, exhaust, cooling, etc.), review standard installation practices, or specify system materials, additional information is required. For engineering data specific to the generator set, refer to the specification and product data sheets. For application information, refer to Application Manual T-030, ”Liquid Cooled Generator Sets”, available from Onan.

INSTALLATION OVERVIEW

These installation recommendations apply to typical installations with standard model generator sets. Whenever possible, these recommendations also cover factory designed options or modifications. However, because of the many variables in any installation, it is not possible to provide specific recommendations for every situation. If there are any questions not answered by this manual, contact your nearest Cummins/Onan dealer or distributor for assistance.

Application and Installation

A standby power system must be carefully planned and correctly installed for proper operation. This involves two essential elements: application and installation.

Application (as it applies to generator set installations) refers to the design of the complete standby power system that usually includes power distribution equipment, transfer switches, ventilation equipment, mounting pads, and cooling, exhaust, and fuel systems. Each component must be correctly designed so the complete system will function as intended. Application and design is an engineering function generally done by specifying engineers or other trained specialists. Specifying engineers are responsible for the design of the complete standby system and for selecting the materials and products required.

Installation refers to the actual set-up and assembly of the standby power system. The installers set up and connect the various components of the system as specified in the system design plan. The complexity of the standby system normally requires the special skills of qualified electricians, plumbers, sheetmetal workers, etc. to complete the various segments of the installation. This is necessary so all components are assembled using standard methods and practices.

Safety Considerations

The generator set has been carefully designed to provide safe and efficient service when properly installed and operated. However, the overall safety and reliability of the complete system is dependent on many factors outside the control of the generator set manufacturer. To avoid possible safety hazards, make all mechanical and electrical connections to the generator set exactly as specified in this manual. All systems external to the generator (fuel, exhaust, electrical, etc.) must comply with all applicable codes. Make certain all required inspections and tests have been completed and all code requirements have been satisfied before certifying the installation is complete and ready for service.

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2. Specifications

ENGINE	Onan Modified Ford, 4-cylinder, LRG-423

FUEL

Fuel	Natural gas, Propane, Unleaded Gasoline, or a combination of two fuels
Natural Gas Consumption at Full Load	
60 Hz	301 cfh (8.5 m/h)
50 Hz	250 cfh (7.1 m/h)
Propane (Vapor) Consumption at Full Load	
60 Hz	103 cfh (2.9 m/h)
50 Hz	85 cfh (2.4 m/h)
Gasoline Consumption at Full Load	
60 Hz	2.7 US gph (10.2 L/h)
50 Hz	2.5 US gph (9.5 L/h)
Maximum Natural Gas or LPG Supply Pressure	12 inches (305 mm) Water Column
Natural Gas Supply Connection	3/4 inch NPT
Propane Vapor Supply Connection	3/4 inch NPT
LPG Liquid Supply Connection	1/4 inch NPT
Maximum Gasoline Fuel Pump Lift	3 feet (0.9 m)
Gasoline Supply Hose I. D.	5/16 inch

BATTERY

Required Battery Voltage	12 VDC
Recommended Battery Rating - Cold Cranking Amps	660

OIL AND COOLANT CAPACITY

Engine Oil Capacity (Includes Filter)	4.5 U.S. quarts (4.0 L)
Engine Coolant Capacity	11.5 U.S. quarts (11.0 L)

TUNE-UP SPECS

Spark Plug Gap	0.032 to 0.036 inches (0.8 to 0.9 mm)

IMPORTANT!

DEPENDING ON YOUR LOCATION AND INTENDED USE, FEDERAL, STATE OR LOCAL LAWS AND REGULATIONS MAY REQUIRE YOU TO OBTAIN AN AIR QUALITY EMISSIONS PERMIT BEFORE BEGINNING INSTALLATION OF YOUR GENERATOR SET. BE SURE TO CONSULT LOCAL POLLUTION CONTROL OR AIR QUALITY AUTHORITIES BEFORE COMPLETING YOUR CONSTRUCTION PLANS.

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3. Mounting the Generator Set

GENERAL

Most generator set installations must be engineered so the generator set will function properly under the expected load conditions. Use these instructions as a general guide only. Follow the instructions of the consulting engineer when locating or installing any components. The complete installation must comply with all local and state building codes, fire ordinances, and other applicable regulations.

Requirements to be considered prior to installation:

- Level mounting surface
- Adequate cooling air
- Adequate fresh induction air
- Discharge of circulated air
- Discharge of exhaust gases
- Electrical connections
- Accessibility for operation and servicing
- Noise levels
- Vibration isolation

LOCATION

Generator set location is decided mainly by related systems such as ventilation, wiring, fuel, and exhaust. The set should be located as near as possible to the main power fuse box.

Provide a location away from extreme ambient temperatures and protect the generator set from adverse weather conditions. An optional housing is available for outside operation.

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MOUNTING

Generator sets are mounted on a steel skid that provides proper support. The engine-generator assembly is isolated from the skid frame by rubber mounts that provide adequate vibration isolation for normal installations. For critical installations, install vibration isolators between the skid base and foundation.

Mount the genset on a substantial and level base such as a concrete pad.

Use 3/4-inch diameter, anchored mounting bolts to secure the generator set skid to the floor to prevent movement. Secure the skid using a flat washer and a hex nut for each bolt (Figure 3-1).

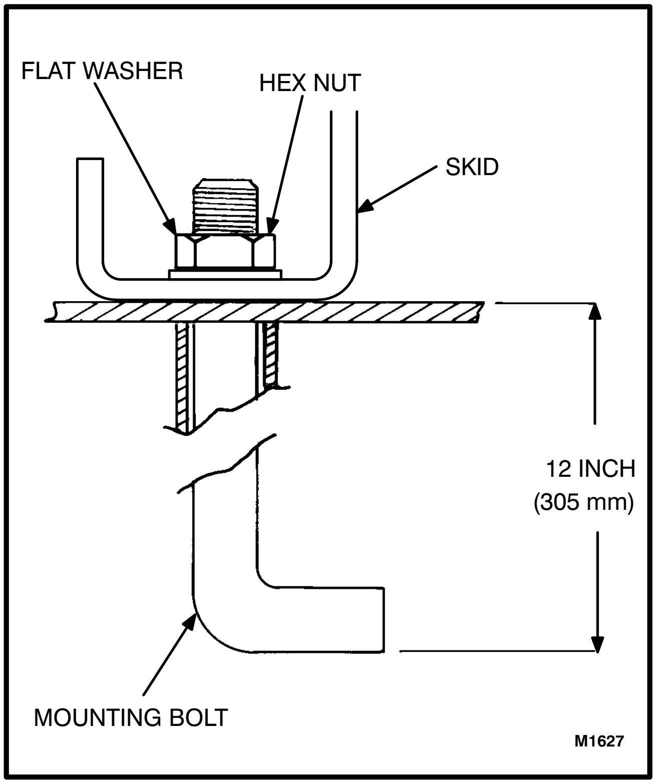

FIGURE 3-1. BOLT DIAGRAM

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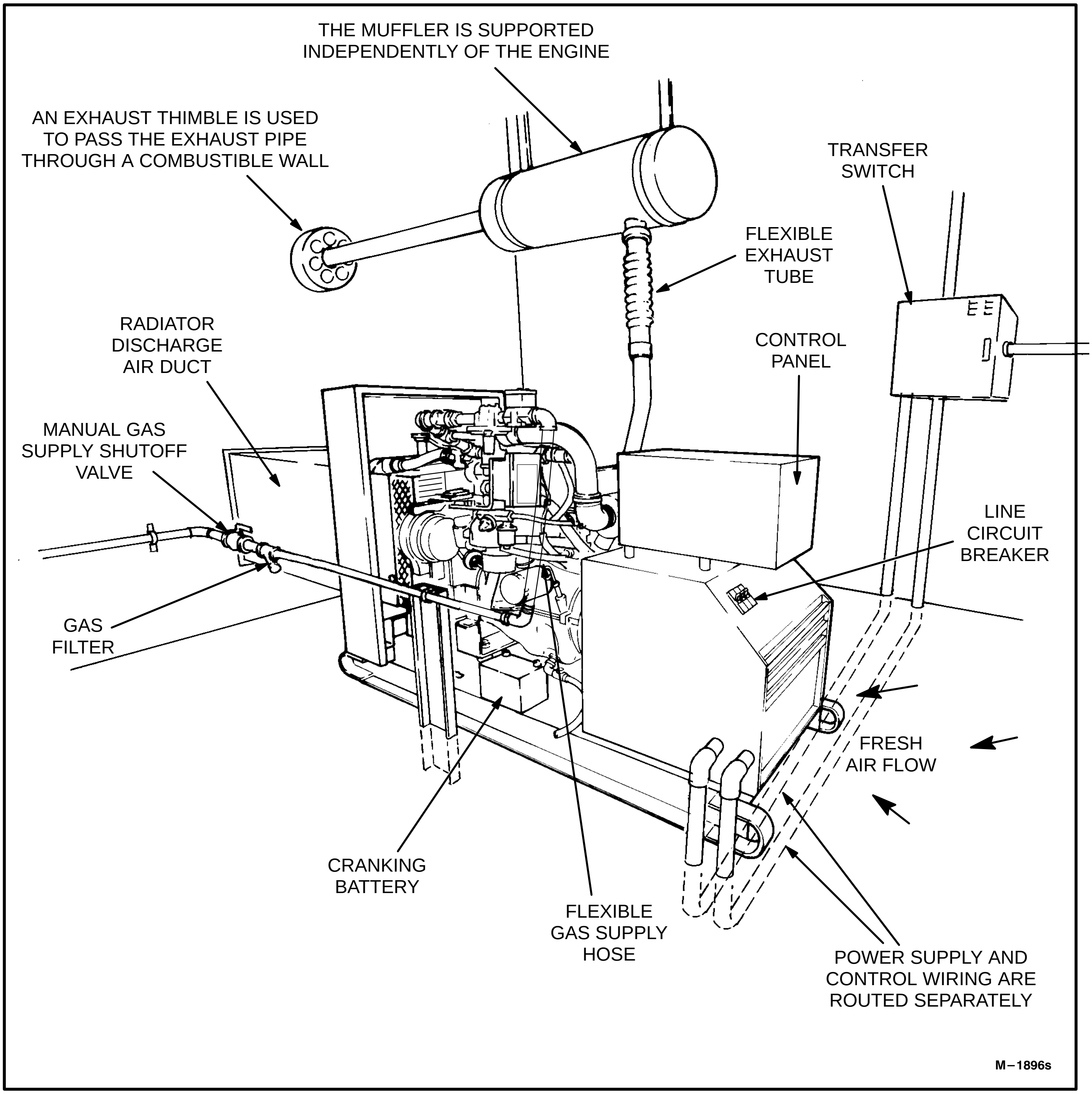

FIGURE 3-2. TYPICAL INSTALLATION

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ACCESS TO SET

Plan for access to the genset for servicing and provide adequate lighting around the unit. For convenience in general servicing such as the radiator, fan belt and changing the crankcase oil, the surface of the mounting base should be at least 6 inches (152 mm) above the floor.

VIBRATION ISOLATORS

Installation and Adjustment Procedure

1. Place the vibration isolators (Figure 3-3) on the genset support structure. The isolators should be shimmed or grouted to ensure that all of the isolator bases are within 0.25 inch (6 mm) elevation of each other. The surface that the isolator bases rest on must also be flat.
2. Loosen the side snubber lock nuts so that the top plate of the isolator is free to move vertically and horizontally. Be sure that the top plate is correctly aligned with the base and springs.
3. Place the genset onto the isolators while aligning the skid's mounting with the threaded isolator hole. The top plates will move down and approach the base of the isolator as load is applied.
4. Once the genset is in position, the isolators may require adjusting so that the set is level. The isolators are adjusted by inserting the leveling bolt through the skid and into the isolator (the leveling bolt's locking nut should be threaded up towards the bolt head).

   The leveling bolt will adjust the clearance between the top plate and the isolator base. A nominal clearance of 0.25 inch (6 mm) or greater is desired. This will provide sufficient clearance for the rocking that occurs during startup and shutdown. If the 0.25 inch (6 mm) clearance is not present, turn the leveling bolt until the desired clearance is achieved.
5. The genset may not be level yet; therefore, adjust the leveling bolts until the set is level and sufficient clearance still remains. Once all isolators have been set, lock the leveling bolt in place with the lock nut.
6. The snubber nuts may remain loose and therefore provide better isolation between the genset and support structure.

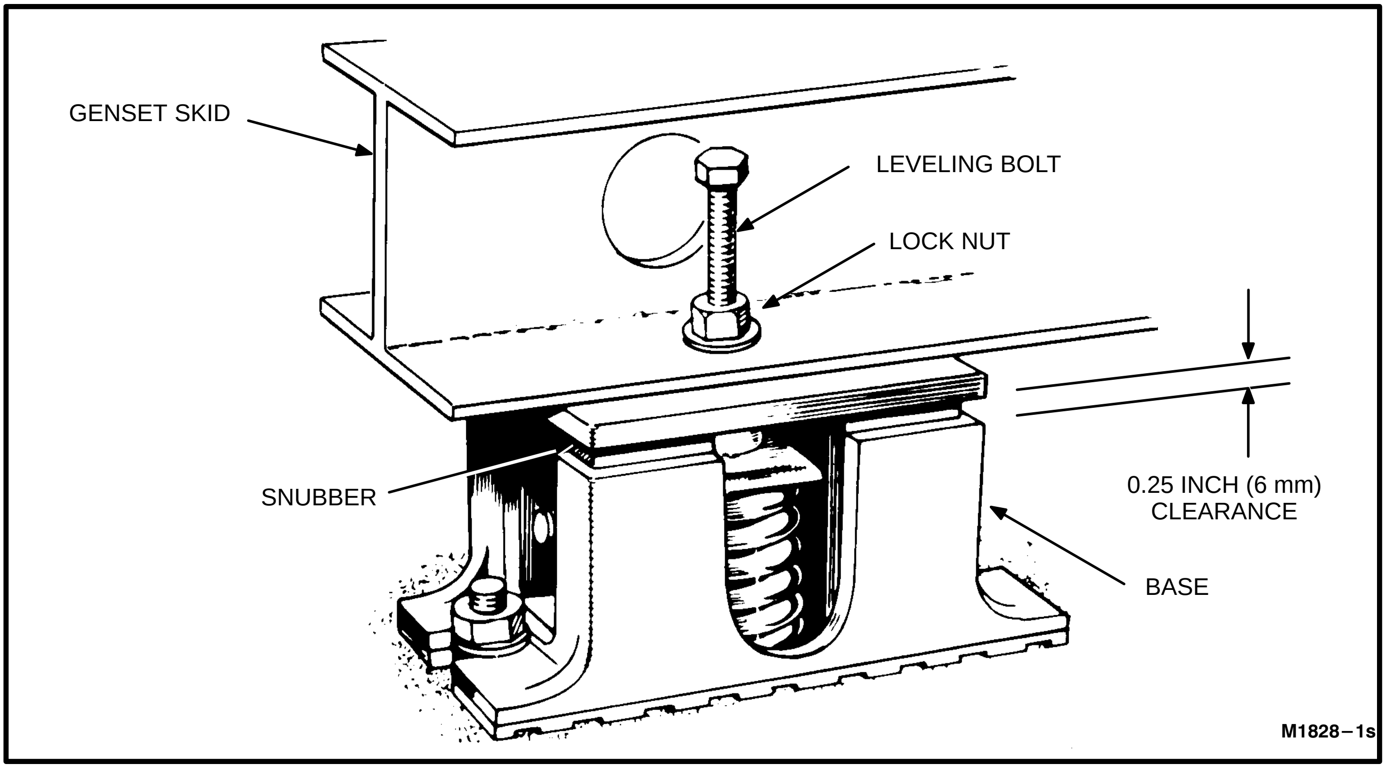

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FIGURE 3-3. VIBRATION ISOLATORS

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4. Mechanical Connections

GENERAL

The generator set mechanical system installation includes connecting the fuel, exhaust, ventilation and cooling systems. Before starting any type of fuel installation, all pertinent state and local codes must be complied with and the installation must be inspected before the unit is put in service.

FUEL SYSTEM

Sets can be equipped to operate on gasoline only, LPG (propane), gasoline/natural gas, gasoline/LPG and LPG/natural gas combinations. Figures 4-1 and 4-2 illustrate the fuel system components for various generator set configurations. A fuel selector switch may be provided for fuel changeover. (The position of the switch determines which fuel valve will open when the set is operated.)

The following items should be considered when installing a fuel supply system:

- Install an approved flexible fuel line at the fuel inlet to allow the set to rock on its mounts. Do not use copper tubing as a flexible fuel line - it will crack and spill gasoline.
- The highest fuel level in the fuel tank must be lower than the inlet of the fuel pump to prevent spillage of fuel if a leak occurs (because of a faulty connection, ruptured pump diaphragm, etc.).
- Provide a separate fuel line for each set served by the same fuel tank to prevent either set from being starved for fuel.
- Install a manual fuel shut-off valve at the outlet of an above-ground fuel tank to facilitate service.
- For a combination gas/gasoline set, provide a manual shut-off valve in each fuel line. Plug unused fuel inlet. The air/fuel ratio will be upset if both fuels are available at the same time or if air enters an unused fuel inlet, resulting in poor performance.
- Do not use galvanized piping, fittings or tanks. The zinc coating reacts with elements in the fuel, resulting in contamination of the fuel.

Gasoline Fuel

⚠WARNING ***Fuel presents the hazard of fire or explosion which can result in severe personal injury or death. Do not smoke or allow any flame, spark, pilot light, arc–producing equipment, or switch, or other ignition sources around fuel or fuel components, or in the installation area or areas with shared ventilation. Keep a type ABC fire extinguisher nearby.***

The gasoline-carbureted fuel system delivers a mixture of fuel and air to the combustion chamber. The system draws fuel from a tank, delivers it through a filter and fuel pump, to the carburetor float chamber. Air passing through the carburetor venturi draws fuel from the the float chamber.

See *Specifications* section for gasoline inlet size. Fuel lift should not exceed 3 feet (0.9 m). The recommendations in Onan publication T030, the Application Manual for *Liquid-Cooled Generator Sets*, should be followed in regard to fuel supply system pipe sizes and manual shutoff valves.

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Natural Gas/LPG Vapor/LPG Liquid Fuel System

⚠WARNING ***Natural gas and LPG vapor are highly flammable. LPG vapor is heavier than air. Do not bleed lines so fumes can collect in low areas. Do not smoke or allow any flame, spark, arcing switch or equipment, pilot light, or other source of ignition around fuel lines.***

A combination gasoline-gaseous fuel carburetor or straight gaseous fuel carburetors are available for use with gaseous fuels. A gaseous fuel system uses a fuel regulator to control the flow of gas from the lines to the carburetor. At the carburetor, the gaseous fuel is mixed with the incoming air.

Gaseous-fuel supply system design, materials, components, fabrication, assembly, installation, testing, inspection, operation and maintenance must comply with the applicable codes. See MFPA Standards No. 37, No. 54 and No. 58.

See *Specifications* section for natural gas/LPG fuel inlet size. The recommendations in Onan publication T030, the Application Manual for *Liquid-Cooled Generator Sets*, should be followed in regard to fuel supply system pipe sizes,manual shutoff valves, fuel filters and gas pressure regulators.

Gas Pressure: The fuel regulators in each line provide constant gas pressure at the gas mixer under varying load conditions (approximately 5 inches WC for natural gas and –1.5 inches WC for LPG). There is a pressure test port on the supply side of the gas mixer for measuring fuel inlet pressure.

The maximum permissible fuel supply pressure is 20 inches WC (water column) and the minimum is 10 inches WC. This applies to LPG as well as to natural gas. The minimum pressure refers to supply pressure under rated load (maximum gas flow). There is a pressure test port on the supply side of each fuel regulator for measuring fuel supply pressure.

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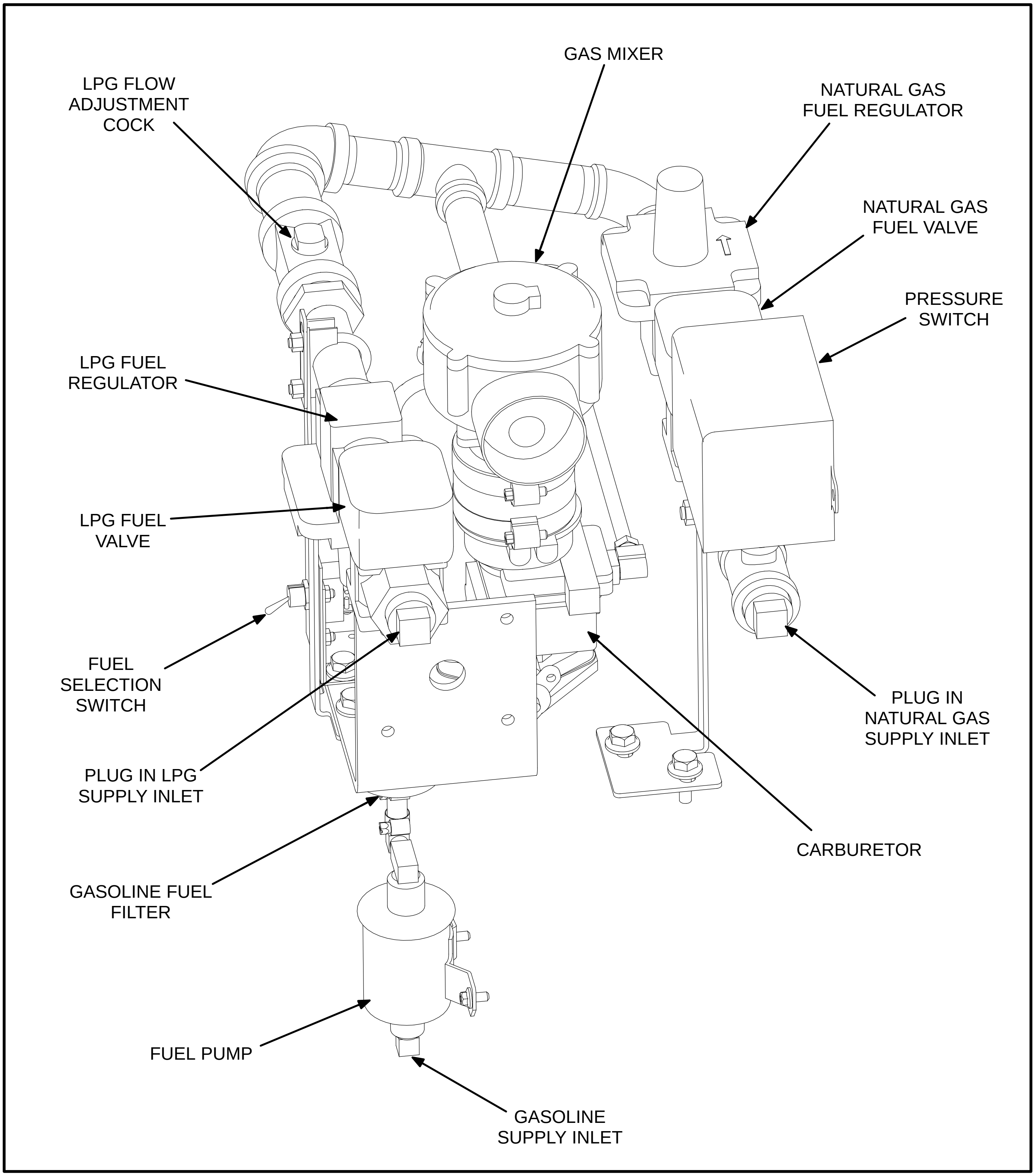

FIGURE 4-1. GASOLINE/NATURAL GAS/LPG VAPOR FUEL SYSTEM

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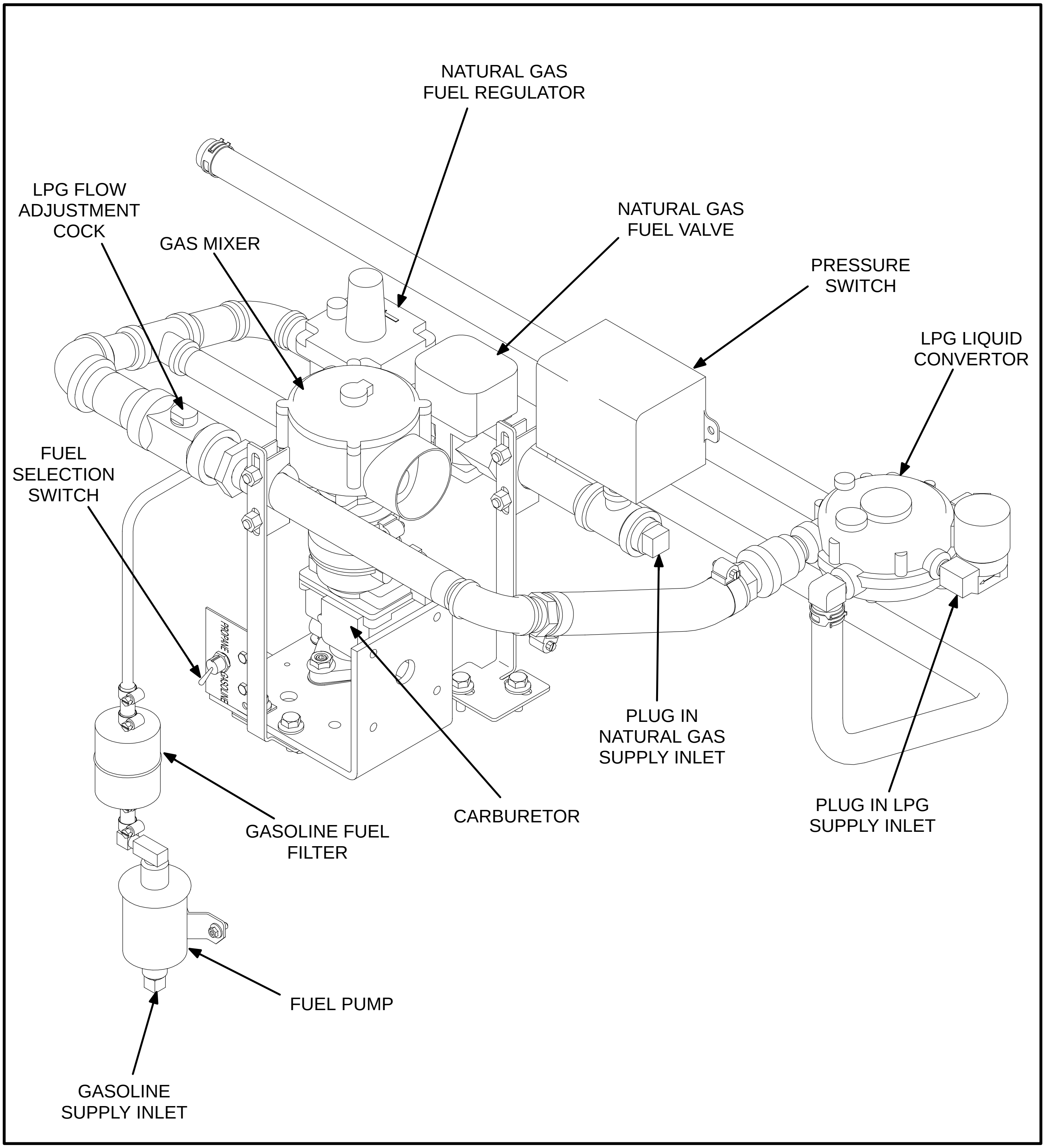

FIGURE 4-2. GASOLINE/NATURAL GAS/LPG LIQUID FUEL SYSTEM

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EXHAUST SYSTEM

Pipe exhaust gases to the outside of any enclosure. Locate the exhaust outlets away from any air inlets to avoid gases re-entering the enclosure. Exhaust installations are subject to various detrimental conditions such as extreme heat, infrequent operation and light loads. Regularly inspect the exhaust system both visually and audibly to see that the entire system remains fume tight and safe for operation.

⚠WARNING ***Inhalation of exhaust gases can result in severe personal injury or death. Use extreme care during installation to provide a tight exhaust system. Terminate exhaust pipe away from enclosed areas, windows, doors and vents.***

Use an approved thimble (Figure 4-3) where exhaust pipes pass through wall or partitions. Refer to NFPA 37, Section 6-3. ”Stationary Combustion Engines and Gas Turbines” for accepted design practices. Build according to the code requirements in effect at the installation site.

⚠WARNING ***Inhalation of exhaust gases can result in severe personal injury or death. Do not use exhaust heat to warm a room, compartment or storage area.***

Rain caps are available for the discharge end of vertical exhaust pipes. The rain cap clamps onto the end of the pipe and opens due to exhaust discharge force from the generator set. When the generator set is stopped, the rain cap automatically closes, protecting the exhaust system from rain, snow, etc. Check the rain cap periodically for proper operation (cap is not stuck closed).

Use a section of flexible exhaust pipe between the engine and remainder of exhaust system. Support exhaust system to eliminate weight applied to engine exhaust outlet elbow/turbocharger connection.

⚠CAUTION ***Weight applied to the engine manifold can result in turbocharger damage. Support the muffler and exhaust piping so no weight or stress is applied to engine exhaust elbow.***

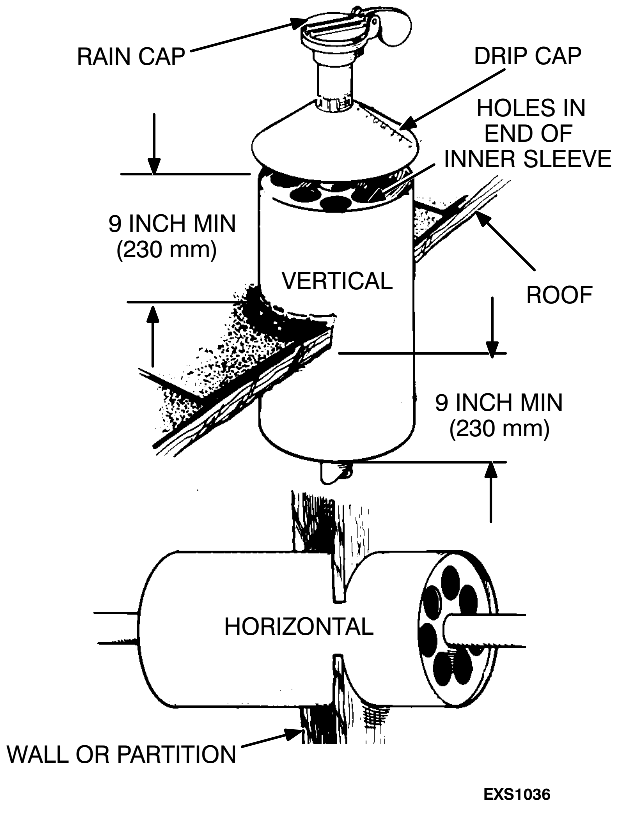

FIGURE 4-3. MOUNTING EXHAUST THIMBLE

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Avoid sharp bends by using sweeping, long radius elbows and provide adequate support for muffler and tailpipe. Pitch a horizontal run of exhaust pipe DOWNWARD to allow any moisture condensation to drain away from the engine. If an exhaust pipe must be turned upward, install a condensation trap at the point where the rise begins (Figure 4-4).

Shield or insulate exhaust lines if there is danger of personal contact. Allow at least 12 inches (305 mm) of clearance if the pipes pass close to a combustible wall or partition.

⚠WARNING ***Exhaust pipes are very hot and they can cause severe personal injury or death from direct contact or from fire hazard. Shield or insulate exhaust pipes if there is danger of personal contact or when routed through walls or near other combustible materials.***

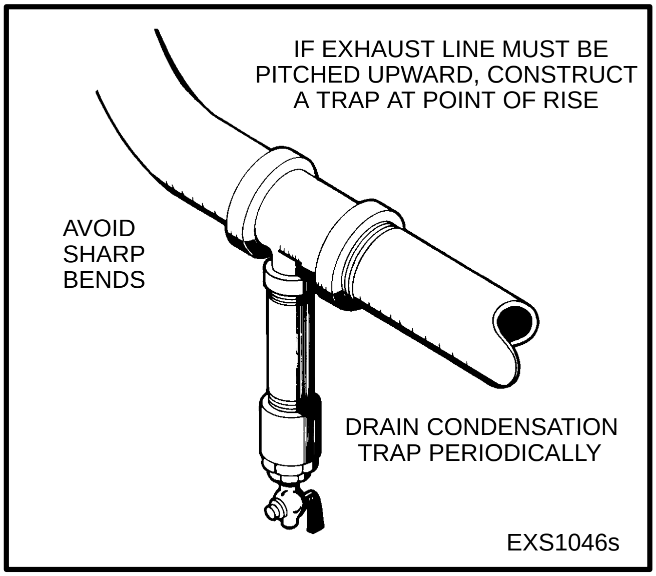

FIGURE 4-4. CONDENSATION TRAP

VENTILATION AND COOLING

Generator sets create considerable heat that must be removed by proper ventilation. Outdoor installations rely on natural air circulation but indoor installations need properly sized and positioned vents for required airflow.

Vents and Ducts

For indoor installations, locate vents so incoming air passes through the immediate area of the installation before exhausting. Install the air outlet higher than the air inlet to allow for convection air movement.

Size the vents and ducts so they are large enough to allow the required flow rate of air. The ”free area” of ducts must be as large as the exposed area of the radiator. Refer to the ES series Product Data Sheets for the airflow requirements.

Wind will restrict free airflow if it blows directly into the air outlet vent. Locate the outlet vent so the effects of wind are eliminated. See Figure 4-5.

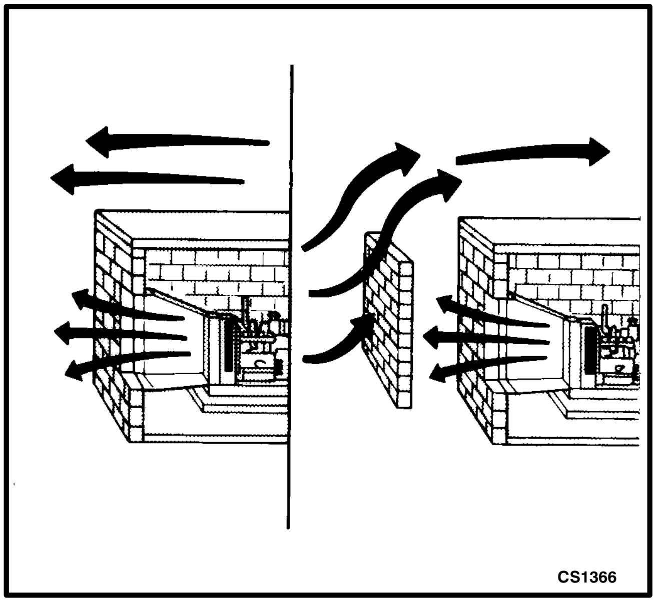

FIGURE 4-5. WIND BARRIER

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Dampers

Dampers or louvres protect the genset and equipment room from the outside environment. Their operation of opening and closing should be controlled by operation of the genset.

In cooler climates movable or discharge dampers are used. These dampers allow the air to be recirculated back to the equipment room. This enables the equipment room to be heated by the generator set when operating.

Radiator Set Requirements

Radiator set cooling air is drawn past the rear of the set by a pusher fan that blows air through the radiator (Figure 4-6). Locate the air inlet to the rear of the set. Make the inlet vent opening 1-1/2 times larger than the radiator area. **It is important that the inlet and outlet (louvers) do not restrict the cooling air flow beyond the capability of the engine cooling fan. If this capability is exceeded, engine will overheat.**

Locate the cooling air outlet directly in front of the radiator and as close as possible. The outlet opening must be at least as large as the radiator area. Length and shape of the air outlet duct should offer minimum restriction to airflow.

The radiator has an air discharge duct adapter flange. Attach a canvas or sheet metal duct to the flange and the air outlet opening using screws and nuts so duct can be removed for maintenance purposes. The duct prevents recirculation of heated air. Before installing the duct, remove the radiator core guard.

Standard Radiator Cooling uses a set mounted radiator and engine pusher fan to cool engine water jacket. Air travels from the generator end of the set, across the engine and out through the radiator. An integral discharge duct adapter flange surrounds the radiator grille.

Set Mounted Heat Exchanger Cooling uses a liquid-to-liquid heat exchanger that requires a connection to a supply of pressurized cold water and to a drain to discharge the water when it has passed through the heat exchanger. The engine coolant pump pumps coolant through the closed, pressurized loop between the engine and heat exchanger.

The cold water supply line should have a manual shutoff valve, water strainer and 12 VDC water solenoid valve to shut off the water supply when the engine is not running. A thermostatic water flow valve is also recommended. See Application Manual T-030 for more information.

A powered ceiling vent will probable be required for ventilating the generator room.

Remote Radiator Cooling (Optional) substitutes a remote mounted radiator and an electrically driven fan for the set mounted components. Removal of the radiator and the fan from the set reduces noise levels without forcing dependence on a continuous cooling water supply. The remote radiator installation must be completely protected against freezing.

Remote radiator plumbing will vary with installation. Follow recommendations given in Application Manual T-030. See product data sheet for friction head and static head limits.

Before filling cooling system, check all hardware for security. This includes hose clamps, capscrews, fittings and connections. Use flexible coolant lines with heat exchanger, standpipe or remote mounted radiator.

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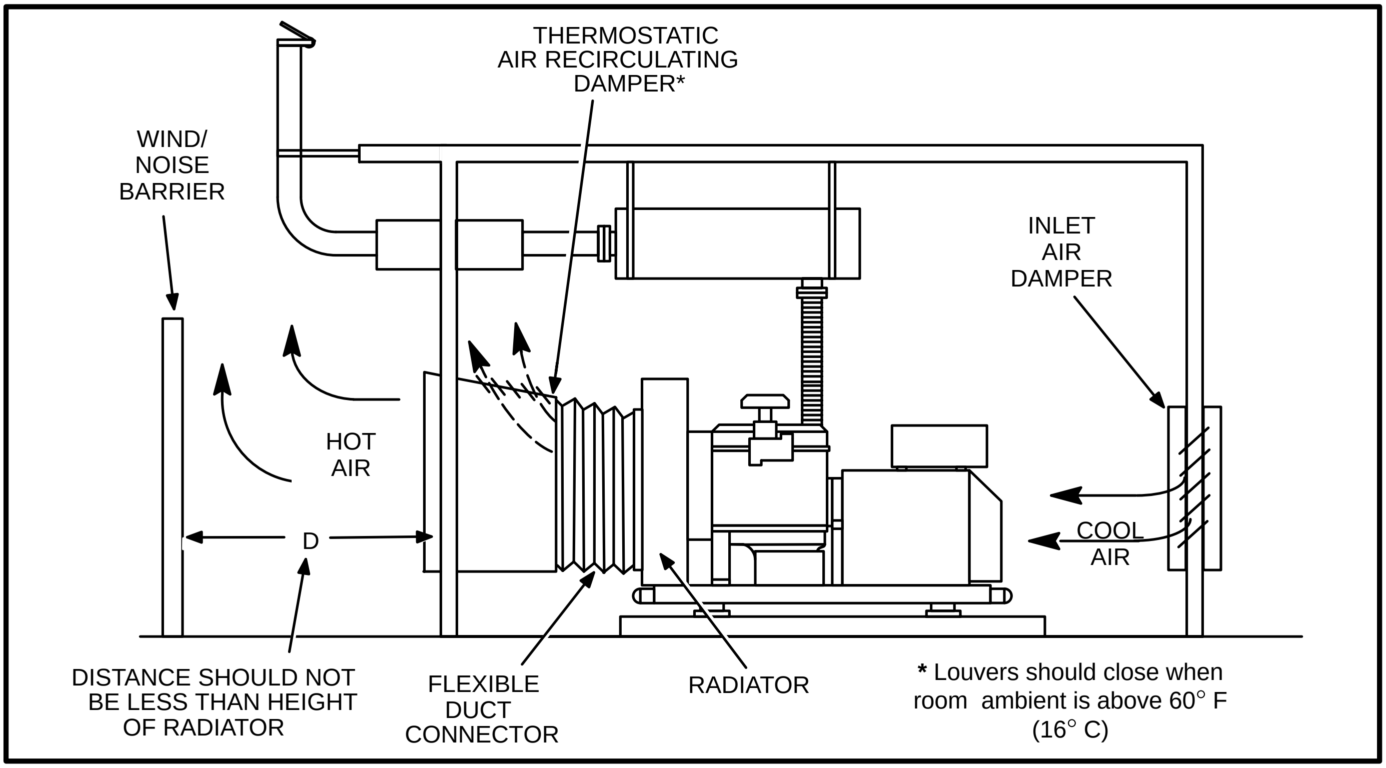

***** Louvers should close when room ambient is above 60° F (16° C)

FIGURE 4-6. TYPICAL RADIATOR SET INSTALLATION

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5. Electrical Connections

GENERAL

The genset electrical system includes connecting the load, installing the control wiring and connecting the batteries. Connect the batteries last to avoid accidental starting of the unit during installation.

⚠CAUTION ***To prevent arcing, always disconnect a battery charger from its AC source before disconnecting the battery cables. Otherwise, disconnecting the cables can result in voltage spikes high enough to damage the DC control circuits of the set.***

⚠WARNING ***Accidental starting of the generator set while working on it can cause severe personal injury or death. Prevent accidental starting by disconnecting the starting battery cables (negative [–] first).***

Arcing can ignite the explosive hydrogen gas given off by batteries, causing severe personal injury. Arcing can occur if the negative (–) battery cable is connected and a tool being used to connect or disconnect the positive (+) battery cable accidentally touches the frame or other grounded metal part of the set. To prevent arcing, always remove the negative (–) cable first, and reconnect it last.

Most local regulations require that wiring connections be made by a licensed electrician and the installation be inspected and approved before operation. All connections, wire sizes, etc. must conform to the requirements of all electrical codes in effect at the installation site.

⚠WARNING ***Improper wiring can cause a fire or electrocution, resulting in severe personal injury or death and/or property and equipment damage.***

TRANSFER SWITCH

If the installation is for standby service, a transfer switch is required for switching the load from the normal power source to the generator set (Figure 5-1). Either a manual or automatic switch can be used. Follow the installation instructions provided with the transfer switch when connecting the load and control wiring.

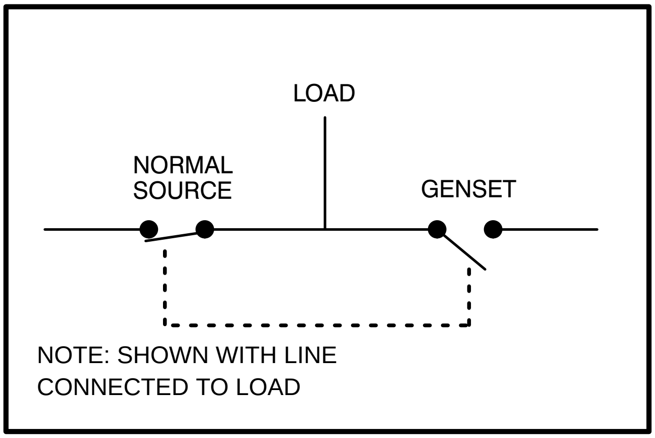

FIGURE 5-1. TYPICAL LOAD TRANSFER SWITCH

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AC WIRING

Generator Voltage Connections

The generator output voltage and maximum current rating are specified on the generator set nameplate. Line-to-neutral voltage is always the lower voltage shown and line-to-line voltage is the higher rating.

These generators can be configured for the voltages shown in the Reconnection Diagram. Most of these voltages must be reconnected by the installer to give the voltage required by the installation. Before shipping, the factory tests the generator set output by connecting the generator to produce a particular test voltage. The generator may be connected at the factory to produce a specified voltage per customer order. The installer must always check the stator lead terminal connections and perform any necessary reconnect to obtain the voltage desired. Note that some voltages are available only on certain specific generators.

Refer to Reconnection Diagram when reviewing the voltage connection information and use the electrical schematic supplied with your generator set when actually performing load connections.

⚠CAUTION ***Reconnecting factory connected generator sets to lower voltages can reduce set ratings, and also render line circuit breakers too small. Consult with your distributor before performing reconnection for a different voltage.***

Load Connections

Flexible conduit and stranded conductors must be used for connections to take up movement of the set.

When installing sets with AC meters, the generator output leads must be routed through current transformers for proper meter operation. The transformers are labeled CT21, CT22 and CT23. Refer to Reconnection Diagram to identify the output leads that must be routed through each current transformer, and also appropriate transformer post selection for meter sensing leads.

Load Balancing

When connecting loads to the generator set, balance the loads so the current flow from each line terminal (L1, L2 and L3) is about the same. This is especially important if both single phase and three phase loads are connected. Any combination of single phase and three phase loading can be used as long as each line current is within 10 percent of median value and no line current exceeds the nameplate rating of the generator. Check the current flow from each line by observing the control panel ammeter.

Grounding

Grounding involves making a conducting connection between the metal parts of the generator set or one of its electrical circuits and the earth. The design and installation of a grounding system is affected by many factors such as the use of multiple transformers, ground fault protection requirements and physical location of the generator. Follow the recommendations of the consulting engineer when installing the grounding system.

⚠WARNING ***Contact with electrical equipment can result in severe personal injury or death. It is extremely important that bonding and equipment grounding be properly done. All metallic parts that could become energized under abnormal conditions must be properly grounded.***

Typical requirements for bonding and grounding are given in the National Electrical Code, Article 250. All connections, wire sizes, etc. must conform to the requirements of the electrical codes in effect at the installation site.

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DC WIRING

Remote Control Connections

Provisions are made inside the control box for adding optional remote starting stations, alarms and remote monitoring of genset. Refer to DC wiring diagram shipped with genset for remote connections.

If the distance between the generator set and remote stations is less than 1000 feet (305 m), use 18 gauge stranded copper wire. If the distance is 1000 to 2000 feet (305 to 610 m), use 16 gauge stranded copper wire. Always run control circuit wiring in a separate conduit from the AC power cables to avoid inducing currents that could cause problems within the control.

⚠CAUTION ***Do not install DC control wiring in the same conduit as the AC power. AC voltage induced currents can create operational problems with electronic solid-state devices.***

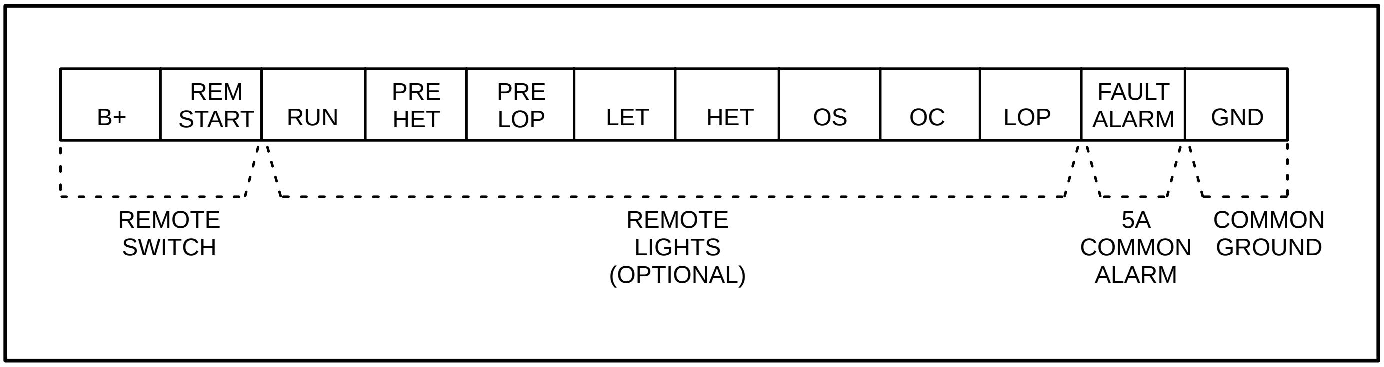

FIGURE 5-1. CONNECTIONS FOR REMOTE CONTROL AND ANNUNCIATION

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Battery Connections

Starting the unit requires 12 volt battery current. Necessary battery cables and rack are on the unit. Service batteries as necessary. Infrequent use (as in emergency standby service), may allow battery to self-discharge to the point where it cannot start the unit. If installing an automatic transfer switch that has no built-in charge circuit, connect a separate trickle charger. Onan automatic transfer switches include such a battery charging circuit.

⚠WARNING ***Ignition of explosive battery gases can cause severe personal injury. Always connect battery negative (-) last to prevent arcing.***

⚠WARNING ***Do not smoke while servicing the batteries. Explosive gases are emitted from batteries in operation. Ignition of these gases can cause severe personal injury.***

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6. Prestart Preparations

GENERAL

Before attempting the initial start of the generator set, be sure it is serviced and ready for operation. Refer to the Maintenance section of the Operator's Manual for the recommended procedures for adding oil, coolant or fuel.

Gensets are shipped with oil and coolant added. Be sure to check these systems to make sure they are at proper operating levels before starting.

LUBRICATION

Before starting, check engine dipstick and if required, fill the crankcase with the recommended oil.

COOLANT

Before starting, check the coolant level in the radiator and if required, fill the radiator with the recommended coolant.

FUEL

Open all manual shutoff valves. Be sure manual changeover switch is moved to desired fuel. Check for leaks. If any are suspected, do not start set until fixed.

VENTILATION

Verify all air vents and ducts are open and free from any obstructions.

EXHAUST SYSTEM

Check the exhaust system for proper installation. Verify there is at least 12 inches (305 mm) clearance between exhaust pipes and combustible materials. Check for leaks. If any are suspected, do not start set until fixed.

ELECTRICAL SYSTEM

Verify all electrical connections are secure and all wiring is complete and inspected. Replace and secure any access panels that may have been removed during installation.

Battery Connections

The battery is connected for a negative (–) ground system. Connect positive (+) battery cable before connecting negative (–) battery cable to prevent arcing. Verify that battery connections are secure

Service the battery as necessary.

MECHANICAL CHECKS

Check the generator set for loose or damaged components and repair or replace as required.

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7. Initial Start and Checks

Before putting the generator set under load conditions, verify the set will perform correctly by checking the following areas.

STARTING

Press the panel Start/Stop/Remote switch to the **Run** position. The starter should crank the engine and the engine should start within a few seconds. The engine control automatically disconnects the starter when the engine gets to about 500 RPM.

Cranking continues if the engine does not start right away. Cranking periods of 15 seconds are alternated with rest periods of 15 seconds until the engine starts. The engine control will shut down the set in approximately 75 seconds if the engine does not start. This is indicated by the fault lamp on the control panel. See *Troubleshooting* charts in the Operator's Manual.

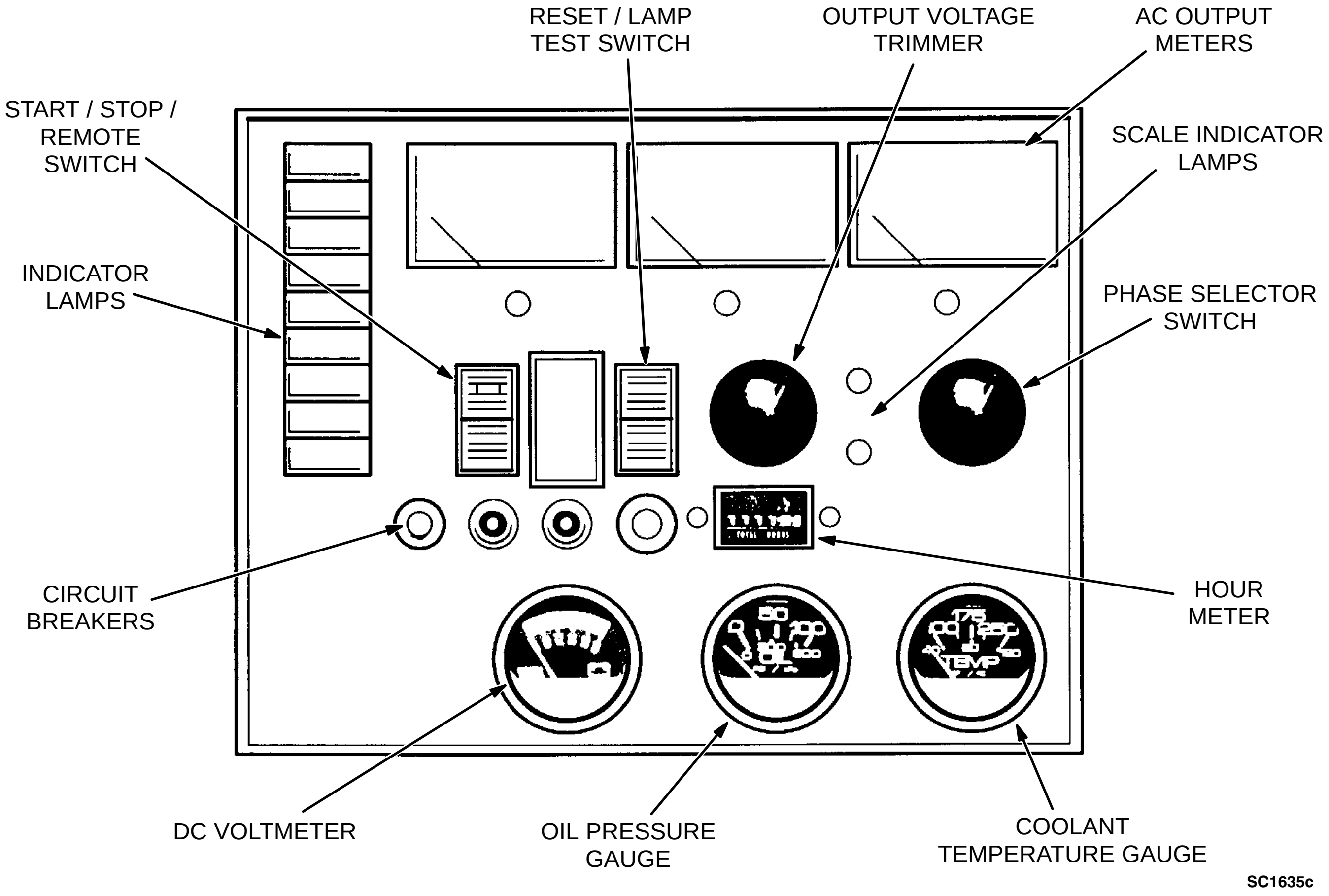

FIGURE 7-1. CONTROL PANEL

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ENGINE GAUGES

Check the following while the genset is operating:

Oil Pressure Gauge

The oil pressure should be in the range of 40 to 65 psi (275 to 448 kPa) when the engine is at operating temperature.

Water Temperature Gauge

The water temperature should be in the range of 180° to 195°F (83° to 91°C) depending on the load and ambient temperature.

DC Ammeter/DC Voltmeter

The maximum charge rate for the set mounted battery charging alternator is 65 amperes. Charge rate should taper to zero following start-up as battery becomes charged. The DC voltmeter should read between 12 and 14 volts.

AC METERS (IF EQUIPPED)

Note the AC instruments on the control panel. The frequency meter and voltmeter should indicate rated nameplate frequency and voltage at no load. Turn the control panel Output Voltage Trimmer (if equipped) for nameplate voltage. Use the Phase Selector Switch to read each of the line-to-line voltages.

Frequency Meter

The generator frequency should be stable and the reading should be the same as the nameplate rating.

AC Voltmeter

Turn the phase selector switch to each line-to-line phase selection shown on the volts scale (L1-L2 on single phase sets; L1-L2, L2-L3 and L3-L1 on three phase sets). Read the AC voltmeter using the upper or lower scale as indicated by the scale indicator light. At no load, the line-to-line voltage should be the same as the set nameplate rating.

AC Ammeter

Turn the phase selector switch to each phase selection shown on the amperes scale (L1and L2 on single phase sets; L1, L2 and L3 on three phase sets). Read the ammeter using the upper or lower scale as indicated by the scale indicator light. At no load, the current readings should be zero. With a load applied, each line current should be approximately the same and no line current should exceed the set nameplate reading

EXHAUST SYSTEM

With the genset operating, inspect the entire exhaust system including the exhaust manifold, muffler and exhaust pipe. Visually and audibly check for leaks at all connections, welds, gaskets and joints. Make sure exhaust pipes are not heating surrounding areas excessively. If any leaks are detected, have them corrected immediately.

⚠WARNING ***Inhalation of exhaust gases can result in severe injury or death. Inspect exhaust system visually and audibly for leaks daily. Shut down generator set and repair any leaks immediately.***

ENGINE MONITOR INDICATOR LAMPS

Move the Run/Stop/Remote switch on the engine panel to the Stop position. Hold the Reset/Lamp Test switch in the Test position. All indicator lamps should light. Verify all the lamps are on and then release the switch. Contact your authorized service center if any lamps require replacement.

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FUEL SYSTEM

With the genset operating, inspect the fuel supply lines, filters and fittings for leaks. Check any flexible sections for cuts, cracks and abrasions and make sure they are not rubbing against any sharp, abrasive or hot surface.

⚠WARNING ***Leaking fuel creates a fire hazard that can result in severe personal injury or death. Shut off set and repair any leaks immediately.***

DC ELECTRICAL SYSTEM

With the generator set off, check the terminals on the battery for clean and tight connections. Loose or corroded connections create resistance that can hinder starting. Turn off the battery charger before removing battery cables. Clean and reconnect the battery cables if loose. Always connect the negative battery cable last.

⚠WARNING ***Ignition of explosive gases can cause severe personal injury. Do not smoke while servicing the batteries.***

COOLING SYSTEM

With the generator stopped, check for loose belts and fittings, leaking gaskets and hoses, or any signs of mechanical damage. Before removing any fan guards or safety guards, turn off the battery charger (if equipped) and remove battery cables to prevent accidental startup. If any problems or coolant leaks are found, have them corrected immediately.

With the set running, listen for any unusual noises that can indicate mechanical problems. Refer to Operator’s or Service Manual for required adjustments.

LUBRICATION SYSTEM

Open access doors and inspect entire engine for oil leaks. When engine has been stopped for at least 10 minutes, check the oil level.

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8. Installation Checklist

GENERAL

☐ GenSet wattage capacity is sufficient to handle maximum anticipated load.

☐ At least 3 feet of clearance is provided around entire genset for servicing and ventilation.

☐ GenSet is located in an area not subject to flooding.

☐ All operating personnel have read and are familiar with Operator's Manual.

☐ All operators have been thoroughly briefed on correct operation and exercise procedures.

☐ All operators have been thoroughly briefed on preventive maintenance procedures.

☐ All operators have read and understand all Safety Precautions in Operator's Manual.

GENSET SUPPORT

☐ Floor, roof or earth on which the genset rests is strong enough and will not allow shifting or movement. Observe local codes on soil bearing capacity due to freezing and thawing.

☐ GenSet is properly supported and retained to approved base which is separate and independent of the surface on which it sits. Vibration isolators are installed between base and set.

☐ Supporting base is large enough - extends 12-inches all around set.

COOLING AIR FLOW

☐ GenSet air inlet is faced into direction of strongest, prevailing winds.

☐ Air inlet openings are unrestricted and at least 1-1/2 times larger than air outlet area.

☐ Cooling air outlet is on downwind side of building (if not, wind barrier is constructed).

☐ Proper ducting material (sheet metal, canvas) is used between radiator and air outlet.

FUEL SYSTEM

☐ Fuel tanks meet or exceed all Local, State or National codes.

☐ Fuel lines are properly installed, supported and protected against damage.

☐ Flexible fuel line is installed between main fuel supply line and genset to protect against vibration, expansion and contraction.

☐ Fuel line shutoff valves are installed to prevent fuel flow in case of leaks.

☐ External fuel pumps are connected and operated to be turned On when genset is started and turned Off when genset is shut down.

☐ No fuel leaks are found in supply line or engine fuel system.

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EXHAUST SYSTEM

☐ Operators are thoroughly briefed on the dangers of carbon monoxide gas, preventing the buildup of this gas in inhabited areas.

☐ Areas around set are well ventilated. No possibility of exhaust fumes entering building doors, windows, or intake fans.

☐ Exhaust gases are piped safely outside and away from building.

☐ The correct length of approved rigid pipe is connected to the genset flexible pipe using approved securing methods with no weight resting on engine exhaust components. There are no bends in flex section.

☐ Condensation drain is provided in lowest section of exhaust piping.

☐ Exhaust piping is insulated to guard against burns to personnel.

☐ Exhaust piping passing through walls or ceilings have approved fire-proof materials and are in compliance with all codes.

☐ Exhaust piping is large enough in diameter to prevent back pressure on engine.

AC AND DC WIRING

☐ Wire sizes, insulation, conduits and connection methods all meet applicable codes.

☐ AC and DC wires are separated in their own conduit to prevent electrical induction.

☐ All load, line and generator connections are proper and correct.

GENSET PRESTART

☐ GenSet engine is properly serviced with oil and coolant.

☐ Batteries are properly installed, serviced and charged.

☐ Battery charger and engine coolant heater are connected and operational.

☐ All genset covers and safety shields are installed properly.

☐ All fuel and coolant shutoff valves are operational.

☐ Fuel system is primed.

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Minneapolis, MN 55432
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San Juan 28-6 #31 Site Remediation Installation
Incident No. NCS 1816655680
May 2020 SVE Install

Photo 1: Trenching for piping lay down.

San Juan 28-6 #31 Site Remediation Installation
Incident No. NCS 1816655680
May 2020 SVE Install

Photo 2: SVE piping install.

San Juan 28-6 #31 Site Remediation Installation
Incident No. NCS 1816655680
May 2020 SVE Install

Photo 3: SVE piping connection setup to SVE wells.

San Juan 28-6 #31 Site Remediation Installation
Incident No. NCS 1816655680
May 2020 SVE Install

Photo 4: SVE piping connection setup to SVE wells.

San Juan 28-6 #31 Site Remediation Installation
Incident No. NCS 1816655680
May 2020 SVE Install

Photo 5: Backfilling trenches.

San Juan 28-6 #31 Site Remediation Installation
Incident No. NCS 1816655680
May 2020 SVE Install

Photo 6: SVE installation complete.

ENCLOSURE F – PILOT TEST DATA

SOIL VAPOR EXTRACTION SYSTEM PILOT TEST DATA

SAN JUAN 28-6 UNIT #31
RIO ARRIBA COUNTY, NEW MEXICO
HILCORP ENERGY COMPANY

Date : 9/20/2021 SVE well dia - 2"

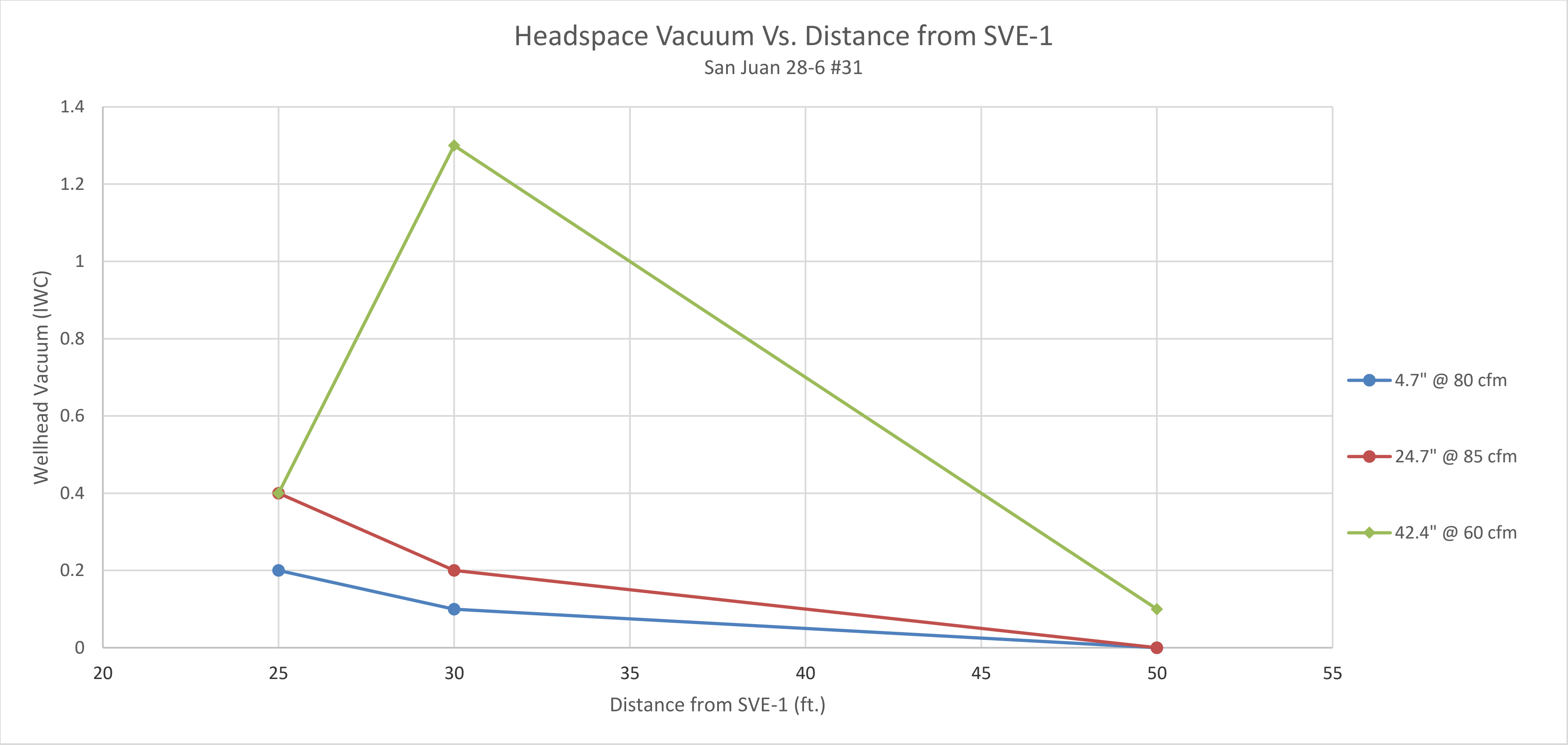
Extraction Test Well

SVE-1

Pilot Test Extraction Well					Observation Wells			Observation Wells		
Time	Wellhead Vacuum (in. wc)	Well Velocity (fpm)	Well Flow (cfm)	PID at Stack (ppm)	**SVE-3**	**SVE-13D**	**SVE-11D**	**SVE-3**	**SVE-13D**	**SVE-11D**
					Distance From Test Well (feet)			Distance From Test Well (feet)		
					50	**25**	**30**	**50**	**25**	**30**
					Vacuum (in. wc)			PID Measurement (ppm)		
13:55	0.0	0	0	0.0						
14:25	5.5	40	110	1,293	-6.3	0.3	0.2	0.0	0.0	0.0
14:50	4.7	52	80	1,194	-6	0.2	0.1	0.0	0.0	0.0
15:25	4.3	60	80	1,146	-6.2	0.1	0.1	0.0	0.0	0.0
15:36	24.5	220	85	1,115	-6.3	0.3	0.1	0.0	0.0	0.0
15:40	24.7	210	85	1,108	-6.7	0.4	0.2	0.0	0.0	0.0
15:50	24.9	220	85	1,120	-6.6	0.3	0.2	0.0	0.0	0.0
15:56	52	570	60	1,287	0.1	0.4	1.4	0.0	0.0	0.0
16:02	42.4	300	60	1,193	0.1	0.4	1.3	0.0	0.0	0.0
16:10	79	620	60	1,049	0.3	0.9	1.8	0.0	0.0	0.0

Notes:

ND - not detected	fpm - feet per minute
in. wc - inches of water column	acfm - actual cubic feet per minute
ppm - parts per million	NM - not measured
PID - photoionization detector	


Headspace Vacuum Vs. Distance from SVE-1
San Juan 28-6 #31
Wellhead Vacuum (IWC)
1.4
1.2
1
0.8
0.6
0.4
0.2
0
20
25
30
35
40
45
50
55
Distance from SVE-1 (ft.)
4.7" @ 80 cfm
24.7" @ 85 cfm
42.4" @ 60 cfm

RADIUS OF EFFECT CALCULATIONS- ESTIMATED FOR SYSTEM

SAN JUAN 28-6 UNIT #31
RIO ARRIBA COUNTY, NEW MEXICO
HILCORP ENERGY COMPANY

Site Specific Information

Test Well	SVE-1	
SVE Screen Length (H)	15	ft
Soil Type	weathered sandstone	
Porosity (n)	25%	percent

Theoretical Specific Information

Radius of Influence (ROI)	30	feet - 0.2 IWC observed in SVE11D at distance of 30 feet	
Flow Rate (1)	32	SCFM	5 active wells 160/5=32 cfm per well
Wellhead Vacuum (1)	40	IWC	blower flow at 40 in wc is 120 scfm
Flow Rate (2)	40	SCFM	3 active wells
Wellhead Vacuum (2)	40	IWC	

Calculations (Flowrate 1 - 85 SCFM)

Total Volume (ft^3)	42,412	= PI * ROI * ROI * H
Volume Pore Space (ft^3)	10,603	= Total Volume * n
Pore Volume Exchange Rate	0.23	days
Annual Pore Volume Exchanges	1,586	>500 Required
Velocity at ROI (ft/min)	0.045	= Flowrate/(2*PI * ROI * H * n)
Velocity at ROI (ft/day)	65	> 3 ft/day recommended

Calculations (Flowrate 2 -40 SCFM)

Total Volume (ft^3)	42,412	= PI * ROI * ROI * H
Volume Pore Space (ft^3)	10,603	= Total Volume * n
Pore Volume Exchange Rate	0.18	days
Annual Pore Volume Exchanges	1,983	>500 Required
Velocity at ROI (ft/min)	0.057	= Flowrate/(2*PI*ROI*H*n)
Velocity at ROI (ft/day)	81	> 3 ft/day recommended

Conclusions

At the elevation corrected flow rate, assuming 5 active extraction wells at 32 cfm per well, the system can achieve an ROE of 30 feet and will achieve the required pore volume exchange and velocity at 1,586 annual exchanges and 65 ft/day, respectively.

Notes:

ft - feet
ROI - radius of influence
IWC - inches water column
min - minute
s - second
SCFM - standard cubic feet per minute

ENCLOSURE G – OPERATION AND MAINTENANCE FORM AND MANUAL

SVE SYSTEM
BIWEEKLY O&M FORM

DATE:

O&M PERSONNEL:

TIME ONSITE:

TIME OFFSITE:

SVE SYSTEM

SVE STATUS:

SVE BLOWER HOURS:

GENERATOR HOURS:

SVE ALARMS:
(check if applicable)

	HIGH/LOW VACUUM
	KO TANK HIGH LEVEL
	HIGH EXHAUST TEMPERATURE

MANIFOLD INLET VACUUM:

AFTER FILTER VACUUM:

EXHAUST TEMPERATURE:

EXHAUST PRESSURE:

EXHAUST FLOW:

KO TANK DRAIN:

BYPASS STATUS:

BLOWER GREASE:

GENERATOR GREASE:

INLINE FILTER CLEAN:

SVE SYSTEM

EXHAUST PID:

AIR SAMPLE COLLECTION:

MANIFOLD	VACUUM (IWC)	PID HEADSPACE (PPM)	FLOW (CFM)	ADJUSTMENTS
INLET				

COMMENTS/OTHER MAINTENANCE:

OPERATIONS AND MAINTENANCE MANUAL

SAN JUAN BASIN, NEW MEXICO SVE SYSTEMS

OCTOBER 2021

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SECTION 1.0

INTRODUCTION

1.0 INTRODUCTION

This Operations and Maintenance (O&M) Manual has been prepared for the Hilcorp Energy Company (Hilcorp) for the purpose of successfully operating the soil vapor extraction (SVE) systems remediating subsurface hydrocarbon impacts in the San Juan Basin, New Mexico. The O&M manual is the base guide for all O&M personnel to follow at sites throughout the basin. This O&M manual is intended to serve as a guide to assist in the routine day-to-day operation and maintenance of the remediation systems. This manual also outlines the remediation system monitoring schedules to comply with regulatory agencies and to document the effectiveness of the systems. Successful operation of the systems will ensure that the environment is protected, the public welfare is promoted, and that federal/state and local laws/regulations are met.

1.2 SVE Process Equipment

A vacuum is applied to the wells and subsurface piping using a regenerative blower system electrified either by solar panels and batteries or directly connected to the power grid. Each system includes a manifold to control flow from each well or group of wells, and the SVE blower system. The manifold includes control valves, sample ports, and a tap plug for obtaining air velocity measurements in the individual lines. The initial flow and applied vacuum settings will be determined during pilot testing, system startup, and initial O&M procedures. As subsurface conditions change, adjustment of the flow rates and applied vacuum to each SVE well may be required. Typically, adjustments will be required to balance the air flowing from the various wells.

Starting from the manifold, the SVE skid generally contains:

- a control valve;
- a vacuum indicator;
- a sample port;
- an air/water separator with storage tank, fluid sight tube and fluid level switch;
- an additional vacuum indicator;
- a dilution air valve;
- a particulate filter;
- a vacuum relief valve;
- a regenerative blower driven by an electric motor;

- a high temperature switch;
- a temperature indicator;
- a pressure indicator;
- a SVE stack drain/sampling valve; and
- a flow indicator.

An SVE system diagram is attached.

SECTION 2.0

SYSTEM OPERATION

Operational procedures are summarized below. These procedures describe the adjustments needed for full system operation. Manufacturer's information for the specific system components shall be examined when seeking information regarding a particular system component. The equipment supplier provided O&M Manuals should also be consulted during operation and maintenance procedures.

2.1 ROUTINE O&M SITE VISITS

O&M site visits will occur as needed to achieve near continuous operation of the systems. Typically, system operation checks will be performed every other weekly (twice monthly). Site visits which shall include more involved tasks will be performed monthly, quarterly, semi-annually, annually, and on an as-needed basis. Specific O&M tasks have been determined for each of the above frequencies, and these tasks should be used as a reference guide for determining what actions are necessary for proper system operation. The O&M tasks are summarized on the site specific Monitoring Schedules. The monitoring schedule indicates the frequency required for each of the O&M tasks. The monitoring schedule also shows the monitoring required at individual wells.

Records kept during the O&M procedures shall be recorded in a field book and scanned onto the WSP server each day after returning to the office. WSP will review the site data and log book prior to each site visit to determine what O&M actions occurred during the last site visit and identify any special equipment or maintenance actions required for the planned site visit.

Semi-Monthly System Check

A typical system check during the weekly O&M site visit will consist of the following tasks, in sequential order beginning with arrival on site:

1. Note if the systems are running.

2. Inspect the control panel to determine if any alarms have occurred (if applicable).

3. Record any alarm conditions and the hour meter values for applicable remediation equipment onsite.

4. Note the inlet vacuum for the SVE blower.

5. Record all gauge and flow indicator values for the SVE system.

6. Record vacuum or pressure readings on the manifold assembly and perform minor valve adjustments as needed to optimize system operation.

7. Check air/water separation tank levels and transfer fluid as needed.

8. Lubricate the appropriate generators and blowers, check and add oil/grease as required.

9. Examine/check operation of building heaters and exhaust fans (if applicable).

10. Perform simple adjustments to correct any system operational problems.

11. Perform general housekeeping inside and outside of the equipment area, such as picking up trash or debris surrounding the site. Note any damage or vandalism requiring attention.

12. Collect influent samples per quarterly and annual requirements.

Monthly System Checks

Monthly site visits shall include the following additional efforts:

1. Collect any required air samples.

2. Monitor the SVE exhaust using a photoionization detector (PID).

3. Following the recording of measurements, adjustments of system operation may be made based on the measurements.

4. Perform any required equipment maintenance (See O&M Manual for specific maintenance requirements).

5. Check and clean filters.

Quarterly Site Checks

Quarterly site visits shall include:

1. Measure and record vacuum in each SVE line.

2. Measure and adjust vacuum and measure vapor concentrations using a PID at the SVE wellheads.

3. Clean and replace filters as required by manufacturer’s O&M manual or as needed through visual inspection, and perform all required maintenance items, as required.

4. Clean all fluid level switches.

5. Change and check oil and oil filters, where applicable.

Semi-annual System Checks

Semi-annual site visits shall include:

1. Change generator and SVE blower oil. Replace with oil recommended by the equipment manufacturer or equivalent.

2. Tighten all wire terminals and check connections.

Annual

Annual requirements include:

1. Replace SVE blower air inlet filter elements.

Periodic

The following items will need to be conducted as remediation progresses. The timing of these activities is site dependent and cannot be predicted. These activities shall be performed as soon as possible following discovery of conditions affecting or limiting system performance.

1. Drain the SVE air/water separation or knockout (KO) tank fluid.

2. Clean sludge from the SVE air/water separation tanks.

2.2 SVE SYSTEM PERFORMANCE ADJUSTMENTS

On a routine basis, WSP will evaluate site monitoring data and may complete performance adjustments to the remediation system operation. It may be beneficial to adjust the remediation system's operation over time, and as specific areas of a site require less effort than other areas. Remediation efforts will be characterized by system monitoring information.

For example, as the concentration of contaminants in SVE wells decreases to asymptotic conditions, flow and vacuum in these areas may be adjusted in attempts to increase volatilization and contaminant removal. Additionally, as contaminant concentrations decrease to below 1 milligram per liter (mg/L), flow in individual SVE wells may be decreased and/or shut off to induce higher flow in other wells and target specific areas of the site.

2.2.1 SVE Flow Adjustment

Proper operation of the SVE systems entails applying an optimum vacuum at the screened interval of the SVE well such that the maximum air flow rate through the well is achieved. The SVE systems are designed to run at a specific vacuum and air flow rate, however, due to variable subsurface conditions, the air flow through the subsurface may need to be reduced by opening the blower inlet bypass valve and/or restricting flow from certain wells.

The air flow rate may be measured at the flow lines using a portable air velocity device, such as a thermal anemometer. The air flow rate and applied vacuum can be adjusted by opening/closing ball valves on the individual lines. Typically, these adjustments will be made quarterly. Ideal operation of the SVE system entails balancing flow rates from each well. To balance flow from all SVE wells, minor calculations may be required for sites with different sizes of SVE lines.

To balance the SVE system, follow the following procedure:

1. Measure the air velocity in each line using the thermal anemometer.

2. Calculate the total flow from the SVE wells using the equation Flowrate = Cross Sectional Area X Velocity. Area for the SVE pipes is calculated using the formula Area = π * Diameter^2 / 4.

3. Divide the total flow by the number of wells to be balanced. This number equals the average flow rate.

4. Back calculate the air velocity required to achieve the average flowrate for each pipe size using the equation: Velocity = Average Flowrate / Area.

5. Starting at the well yielding the highest flowrate, use the control valve for each line to reduce the flowrate to the average flowrate by lowering the air velocity measured with the thermal anemometer to the velocity calculated in Step #4.

6. Check lower flow wells to ensure an increase in airflow.

Note that the thermal anemometer yields a rough field estimate, and there may be a large inaccuracy inherent to the instrument. It is therefore only necessary to achieve a balance within 25% of the average flowrate. The system will also change flows as the higher flow wells are reduced and system vacuum is increased. This is another reason why it is not necessary to balance the SVE wells to closer than 25% of the calculated average flow. Also note that most SVE systems have the same sized pipes for all SVE lines, which allows for fewer calculations when balancing the SVE system.

For sites with the same size SVE lines, the average flowrate calculation and velocity back calculations are not necessary. Rather, measure the velocity from each well, calculate the average velocity, and attempt to achieve the average velocity from each well by reducing flow/velocity from the higher flow wells. As with the flowrate calculation method, velocities within 25% of the average velocity do not need adjustment.