Technical Memorandum

TO: Mr. Chris Wend, Washington State Department of Ecology

FROM: Cody Johnson, PE and Piper Roelen, PE, Landau Associates; Joan Davenport and Brett Sheffield, City of Yakima

DATE: September 12, 2018

RE: **Transportation Corridor Wood Debris and Landfill Gas Investigation**
Former Boise Cascade Mill Site and Closed City of Yakima Landfill Site
Yakima, Washington
Facility/Site No. 1927

Landau Associates, Inc. (LAI) has prepared the following technical memorandum on behalf of the City of Yakima (City) to summarize investigation activities conducted at the former Boise Cascade Mill Site (Mill Site) and the former City Municipal Solid Waste (MSW) Landfill Site (Landfill Site), collectively referred to as the Site. The focus of our investigations was to collect Site-specific information regarding subsurface conditions, including the presence or absence of wood debris, and the levels and composition of landfill gas (LFG), to support design of the planned transportation corridor that will be constructed across much of the Landfill Site and the southern end of the Mill Site. Because this work was conducted on an active Model Toxics Control Act (MTCA) cleanup site, this data is being provided to the Washington State Department of Ecology (Ecology) for its use and understanding of environmental conditions at the Site.

Site Background

The Site is located on the eastern edge of the City adjacent to Interstate 82 (I-82). The overall Site includes 20 parcels, comprising 19 parcels owned by LeeLynn, Inc. and Wiley Mt., Inc., and 1 parcel owned by OfficeMax Corporation (OfficeMax), totaling approximately 207 acres. A BNSF-owned right-of-way (ROW) with railroad tracks runs in an east-west orientation through the middle of the Site. The closed MSW landfill is located at the southern end of the Site and was operated by the City between 1963 and 1970. As part of landfill operations, MSW was placed in a former log pond that originally occupied the Site (City of Yakima 1996). When landfill operations ceased, the MSW was covered and the area brought to grade with a mixture of fill soil and wood debris. The Site was then used until 2010 for log storage, including temporary log storage and log chipping operations by the tenant of the landfill parcel, Yakima Resources, LLC (Yakima Resources).

The planned transportation corridor that will extend across the Site includes the northern extension of Bravo Boulevard and the East-West Corridor from East H Street to the bridge crossing over I-12 and the Yakima River (see Figure 1). The transportation corridor is being designed by the Lochner and HLA Engineering & Land Surveying, Inc. (HLA) team in consultation with the City and Yakima County (County). The proposed alignment for the transportation corridor will require construction activities, including subsurface disturbance, in many areas of the Site that are known to be underlain by varying

amounts of wood debris and MSW resulting from historical operations. A better understanding of the locations and quantities of wood debris is necessary for roadway design purposes. Based on the significant quantities of MSW and wood debris present throughout the project area, it is also necessary to determine how much LFG may be produced during the degradation of these materials over time, and what constituents may be in the gas that may trigger health and safety or air emissions requirements.

The investigation activities summarized below obtained Site-specific information along the roadway alignments necessary for the development of the transportation corridor design package.

Transportation Corridor Investigation

As shown on Figure 1, several subsurface investigations have previously been conducted throughout the Site since 1988. LAI conducted additional investigations along the proposed transportation corridor alignment in the fall of 2016, including:

- Surveying and staking the planned transportation corridor alignment based on the information proved by the Lochner/HLA team in March 2016.
- Conducting test pit investigations to further evaluate and document the lateral and vertical extent, occurrence, and physical characteristics of the wood debris present along the proposed roadway alignments (Appendix A).
- Installing and sampling additional LFG monitoring probes (Appendix B).

Roadway Alignment and Exploration Point Survey

A roadway alignment survey was conducted by HLA to mark the locations of the roadway alignments to guide the field investigations. The planned roadway corridor consists of an area that is approximately 120 to 150 feet (ft) wide and approximately 5,300 ft long. The centerline and edges of the proposed roadway alignments within the corridor were staked in the field by HLA at 100-ft intervals to facilitate the subsurface exploration activities. HLA also surveyed the current ground surface elevation of each staked location and the final locations and elevations of the new test pits and LFG monitoring probes. The survey facilitated comparison of ground elevations associated with past explorations within and near the roadway corridor with the elevations of the 2016 exploration locations. The surveys used State Plane as the horizontal datum and North American Vertical Datum of 1988 (NAVD88) as the vertical datum.

Wood Debris Field Investigation

A test-pit investigation was conducted to further evaluate the lateral and vertical extent of wood debris present along the planned roadway alignment. The test-pit information was collected to estimate wood debris volumes and to obtain samples for testing. The final test pit locations were

selected in the field based on the results of the public and private utility clearance surveys, access limitations, and the locations of previous subsurface explorations along or near the roadway alignments and remaining Site infrastructure (e.g., foundations, etc.).

Ken Leingang Excavating, Inc., under subcontract to LAI, provided an excavator and operator to advance 34 test pit explorations at a spacing of approximately 100 ft along the planned roadway alignment, and an additional 21 test pit explorations between some of those test pits to provide the higher data resolution necessary to map and document the depth and types of wood debris encountered. Test pit explorations were conducted September 26 through 30, 2016. Subsurface conditions exposed in the test pits were observed and documented by an LAI field geologist. The test pits were excavated to a typical maximum depth of approximately 15 ft below ground surface (bgs) or to the bottom of the wood debris (if shallower than 15 ft bgs), and were backfilled with the excavated materials. However, if groundwater or MSW was encountered prior to reaching 15 ft bgs, the depth of groundwater or MSW was noted and the test pit was terminated and backfilled.

The test-pit logs for each of the test pit explorations are provided in Appendix A. The locations of the test pits with respect to the roadway alignment plan are shown on Figure 1. Figures 2 through 5 provide cross sections (A-A' through D-D', respectively) which graphically depict the materials expected to be encountered under the proposed roadway based on observations from the current and previous investigations. In general, wood debris was encountered in most of the test pits in the area south of the railroad tracks, with some additional wood debris encountered in test pits within and northeast of the proposed roadway alignment north of the railroad tracks.

Within the exploration areas south of the railroad tracks, the wood debris is further characterized as follows:

- South of the proposed central roundabout (shown on Figures 2, 3, and 4b), the wood debris is present at the ground surface and ranges in thickness from approximately 1.0 to 6.5 ft, is generally loose, and consists of wood chips mixed with approximately 10 to 50 percent by volume of gravel and cobbles, with some interbedded dense gravel layers. MSW was encountered below the wood debris in this area and the test pit excavations were stopped once the MSW was encountered.
- Within and around the proposed central roundabout (shown on the right side of Figure 2 and left-central side of Figure 4b) the wood debris is at or within approximately 1 ft of the ground surface and extends below the completion depths of the test pit excavations (greater than 15 ft bgs). The wood debris varies in type and size with depth generally consisting of:
  - Wood chips mixed with gravel and sand from the ground surface to 1 to 3 ft bgs
  - Grading to bark chips and wood shavings extending 6 to 10 ft bgs
  - Grading to buried logs within saw dust and shavings extending below the completion depths of the test pits (greater than 15 ft bgs).

- North of the proposed central roundabout (shown on the left side of Figure 4b) the wood debris is encountered below a dense layer of silt, sand, gravel and/or cobbles that ranges in thickness from 1 to 11 ft. The wood debris below that dense soil layer generally consists of:
  - Wood chips with up to 50 percent gravel from 1 to 8 ft bgs
  - Grading to buried logs within saw dust and shavings from 8 ft bgs to beyond the termination depth of the test pit.

  In areas where the wood debris did not extend beyond the depth of the test pit, the wood debris was underlain by sandy gravel.

The test pit explorations in the areas of the proposed alignment north of the railroad tracks that will extend to the north and west indicate that this portion of the alignment will not generally be underlain by wood waste or MSW. Although subgrade pockets of wood debris were encountered around test pits TP15-16 (right side of Figure 4a) and TP14A-16 and TP13A-16 (left side of Figure 4b). Several test pits were also excavated northeast of the roadway alignment[1] (shown on Figure 5, Section D-D'); two of the test pits (TP24A-16 and TP25-16) also identified wood debris from approximately 6 ft bgs to below the groundwater table (approximately 14 ft bgs).

The quantity of the wood debris below the proposed roadway alignment was generally estimated by multiplying the proposed width of development (150 ft wide for the roadways and 200-ft diameter for roundabouts) with 1 horizontal to 1 vertical (1H:1V) cuts, by length of proposed roadway over the wood waste, by the depth of wood debris shown on the cross sections. It was estimated that there is approximately 46,900 in-place (bank) cubic yards (CY) of wood debris under the proposed roadway prism. Using elevation and wood debris thickness data from beneath the roadway and from the rest of the Landfill Site to create comparable top and bottom surfaces of the wood debris with computer-aided design (CAD), which calculated an estimated volume of approximately 182,000 in-place CY of wood debris within the horizontal boundaries of the MSW landfill.[2]

It is also noteworthy that, as shown on the right side of Figure 4a and on Figure 5, a layer of large-size concrete debris and boulders (designated as "BD" on the cross sections) exists under approximately 250 linear feet of the alignment, and extends from the ground surface to more than 13 ft deep in some places. For the alignment west of this large concrete and boulder debris pile, the proposed roadway alignment is generally underlain by dense silty sands and gravels.

[1] The roadway alignment was modified after the investigation was completed; these test pits were excavated in the former location of the northern extension of the northern roundabout.

[2] Using the updated elevation data from the roadway investigation, the volume of MSW was also calculated with CAD which estimated a total volume of MSW in the Landfill Site of approximately 319,500 in-place cubic yards.

Wood Debris Analytical Testing

Representative samples of the wood debris encountered were collected and analyzed at the ALS Environmental (ALS) analytical laboratory to help characterize the material for potential reuse and/or disposal. Wood debris sample analysis included the following:

- 20 wood debris samples were analyzed for Toxicity Characteristic Leaching Procedure (TCLP) Resource Conservation and Recovery Act (RCRA) 8 metals by US Environmental Protection Agency (EPA) Method 6010C/7470A
- The same 20 wood debris samples were also tested for High Heat British thermal unit (BTU) Value (BTU/pound [lb]) by Method ASTM International (ASTM) D2015
- Five wood debris samples with the highest BTU value results were also analyzed for total chlorine by EPA Method 5050/9056, which is required to interpret potential of reuse of wood debris as a fuel resource.

The results of the wood debris testing are provided in Table 1 and associated laboratory reports are included as Appendix C. The heating value of the wood debris samples tested range from 3,100 to 9,600 BTU/lb, with an average of 6,550 BTU/lb for the 20 samples tested. The distribution of heating values for each sample is shown on Figures 2, 4b, and 5. The TCLP analysis detected barium in all samples at concentrations ranging from 0.17 to 0.33 milligrams/liter (mg/L) with the exception of detection of 3.0 mg/L in one sample. Without the outlier, the barium concentration averaged 0.24 mg/L. Lead was detected in only two of the 20 samples at concentrations of 0.025 mg/L and 0.042 mg/L. All other TCLP metals were not detected in the 20 samples tested.

Two soil samples collected from the upper 2 ft of test pits TP-15-16 and TP-16B-16 were also analyzed by Northwest total petroleum hydrocarbon-diesel extended range (NWTPH-Dx) method with silica gel cleanup. These samples were collected because visual or odor evidence of potential petroleum hydrocarbons was identified in the shallow portion of the test pits during excavation. These areas were not identified as total petroleum hydrocarbon (TPH)-contaminated soils in the remedial investigation (LAI 2015). As summarized in Table 1 and included in Appendix C, the TPH detected was in the oil range and was 14,000 milligrams per kilogram (mg/kg) at TP-15-16 and 500 mg/kg at TP-16B-16. Based on observations from these two test pits and other nearby test pits with no evidence of petroleum contamination, there could be as much as 2,800 CY of petroleum-contaminated soil in this area of the proposed roadway that may require special management prior to or during construction.

Landfill Gas Probe Installation

To evaluate LFG in the project area, 13 new LFG monitoring probes (GP-32 through GP-44) were installed along the proposed roadway alignment. The spacing of LFG probes along the alignments is approximately 400 ft between probes north of the railroad tracks (where no MSW is located and wood debris is less abundant) and approximately 250 ft between probes within the area of the former

landfill. Five existing LFG probes (GP-5, GP-11, GP-18, GP-19, and GP-28) were previously installed as part of remedial investigation activities. The five existing LFG probes are located within or proximal to the alignments, and were used to limit the number of new installations required. The locations of the new and previously-existing LFG monitoring probes are presented on Figure 1.

The new LFG probes were installed in October 2016 using hollow-stem auger drilling methods, consistent with procedures and materials of construction used for previous LFG probe installations at the Site. A 3.25–inch outside diameter Dames & Moore sampler was used with a 300-lb hammer and a 30-inch drop to retrieve split spoon samples of the materials encountered, and measure the blow counts required to penetrate into the underlying material. Each boring was advanced to 10 ft bgs. The LFG probes were completed with 0.5-inch-diameter Schedule 40 PVC pipe with a 5-ft screen from 5 to 10 ft bgs. The screens were constructed with 0.03-inch to 0.04-inch machine-slotted perforations. The filter pack surrounding the screens consisted of pea gravel to facilitate soil vapor/LFG movement into the probe during purging and monitoring. The probes were constructed by a licensed well driller and an LAI field scientist observed the drill cuttings and prepared a boring and installation log at each location. The boring logs for the LFG probes are provided in Appendix B.

Landfill Gas Monitoring

LFG monitoring was conducted at the 13 new probes and the five existing monitoring points during four monitoring events completed on October 13, November 16, December 21, and December 29, 2016. The LFG measurements were collected during conditions of falling barometric pressure to minimize potential atmospheric dilution effects. A Landtec GEM 5000 soil vapor/LFG analyzer was used to monitor *in situ* concentrations of methane, oxygen, carbon dioxide, and balance gases (the mixture of all other gases making up the balance of the air sample), to evaluate for potential soil-vapor impacts from degrading MSW or wood debris.

In addition to the data collected using the portable LFG analyzer, samples of LFG were collected during the second and fourth monitoring events at the four LFG monitoring probe locations with the highest concentrations of methane based on evaluation of the initial monitoring event result (GP-38, GP-39, GP41, and GP-43). The samples were collected into certified-clean stainless steel Summa canisters with Silonite linings for laboratory analysis of total reduced sulfur by ASTM standard D-5504, fixed gases (methane, carbon dioxide, carbon monoxide, oxygen, and nitrogen) by ASTM D-1945, non-methane organic compounds (NMOCs) by EPA Method 25C, and volatile organic compounds (VOCs) by EPA Compendium Method TO-15.

The field measurement results are presented in Table 2. A summary of the laboratory analytical results is presented in Table 3 and the analytical laboratory reports are included in Appendix C. A summary of pertinent data is provided below:

- The highest concentrations of methane, ranging from approximately 48 to 72 percent by volume (pbv), were detected in areas of buried MSW. Lower methane concentrations were detected outside the landfill boundaries where only buried wood debris is present, ranging from approximately 1 to 20 pbv. Methane was typically not detected at monitoring points where MSW or wood debris is not present, except at locations in close proximity to MSW or wood debris deposits. Figure 6 shows the limits of the MSW landfill and presents the methane results for all previous LFG monitoring events at the site, including the four 2016 monitoring events.
- The laboratory fixed-gas results are similar to the concentrations measured using the hand-held LFG analyzer, confirming the usability of the field-collected data for design.
- Elevated concentrations of hydrogen sulfide (H_2S) were detected in several samples. The most notable of these observations was a detection of 14,000 micrograms per cubic meter ($\mu g/m^3$) H_2S in GP-39 on November 11, 2016.
- Static pressure measurements across the landfill ranged generally from -0.55 to 0.11 inches of water (in. H_2O).
- The results of VOC testing indicate detectable concentrations of VOCs in the LFG coming from within the MSW landfill boundaries. The VOCs detected are those typically associated with LFG. The highest observed total VOC concentration (expressed as the sum of all detected VOCs) was at GP-39 in the sample collected on November 16 29, 2016, with a concentration of approximately 76,500 $\mu g/m^3$—less than 3 percent of the concentration typically present in LFG.

Limitations

This technical memorandum has been prepared for the exclusive use of the City of Yakima and the Washington State Department of Ecology for specific application to the Former Boise Cascade Mill Site and Closed City of Yakima Landfill Site Transportation Corridor. No other party is entitled to rely on the information, conclusions, and recommendations included in this document without the express written consent of LAI. Further, the reuse of information, conclusions, and recommendations provided herein for extensions of the project or for any other project, without review and authorization by LAI, shall be at the user's sole risk. LAI warrants that within the limitations of scope, schedule, and budget, our services have been provided in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions as this project. We make no other warranty, either express or implied.

LANDAU ASSOCIATES, INC.

Cody Johnson, PE
Senior Engineer

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Principal

CMJ/PMR/ljl
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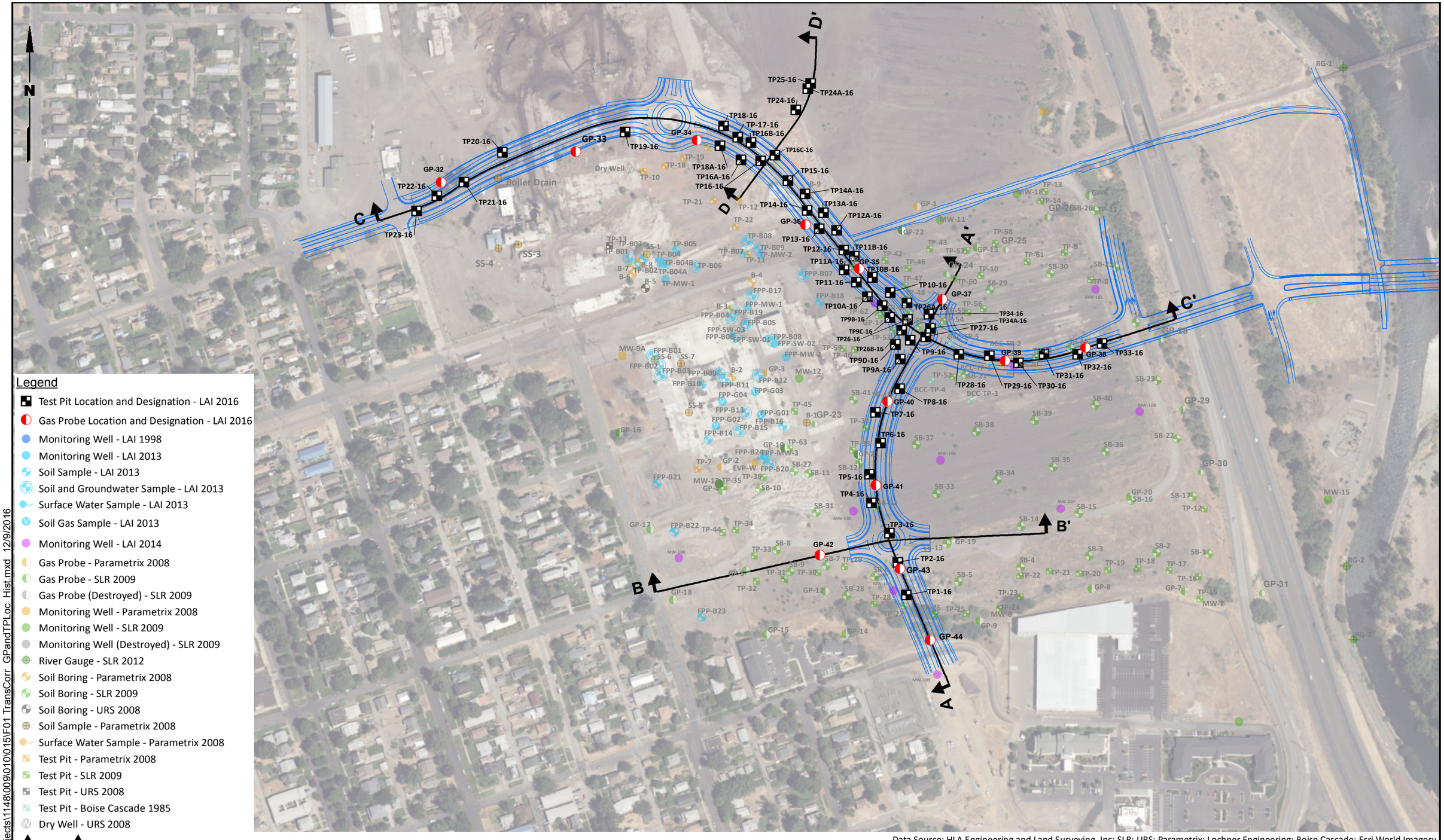
Attachments:
Figure 1. Gas Probe and Test Pit Locations
Figure 2. Geologic Cross Section A-A'
Figure 3. Geologic Cross Section B-B'
Figure 4a. Geologic Cross Section C-C'
Figure 4b. Geologic Cross Section C-C'
Figure 5. Geologic Cross Section D-D'
Figure 6. Landfill Gas Monitoring Results
Table 1. Test Pit Soil and Wood Debris – Analytical Results
Table 2. Landfill Gas Monitoring Field Measurements
Table 3. Landfill Gas Monitoring Data – Analytical Results
Appendix A. Test Pit Boring Logs
Appendix B. Landfill Gas Probes Logs
Appendix C. Analytical Laboratory Reports

References

City of Yakima. 1996. Letter: Interstate I-82 Gateway Project – January 11, 1996 Meeting Regarding Landfill and Wetland Issues. From City of Yakima, to Washington State Department of Ecology. January 22.

LAI. 2015. Agency Review Draft: Supplemental Remedial Investigation Report, Closed City of Yakima Landfill Site, Yakima, Washington. Landau Associates, Inc. September 29.



Legend

- Test Pit Location and Designation - LAI 2016
- Gas Probe Location and Designation - LAI 2016
- Monitoring Well - LAI 1998
- Monitoring Well - LAI 2013
- Soil Sample - LAI 2013
- Soil and Groundwater Sample - LAI 2013
- Surface Water Sample - LAI 2013
- Soil Gas Sample - LAI 2013
- Monitoring Well - LAI 2014
- Gas Probe - Parametrix 2008
- Gas Probe - SLR 2009
- Gas Probe (Destroyed) - SLR 2009
- Monitoring Well - Parametrix 2008
- Monitoring Well - SLR 2009
- Monitoring Well (Destroyed) - SLR 2009
- River Gauge - SLR 2012
- Soil Boring - Parametrix 2008
- Soil Boring - SLR 2009
- Soil Boring - URS 2008
- Soil Sample - Parametrix 2008
- Surface Water Sample - Parametrix 2008
- Test Pit - Parametrix 2008
- Test Pit - SLR 2009
- Test Pit - URS 2008
- Test Pit - Boise Cascade 1985
- Dry Well - URS 2008
- Section Alignment

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Notes

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

0 300 600

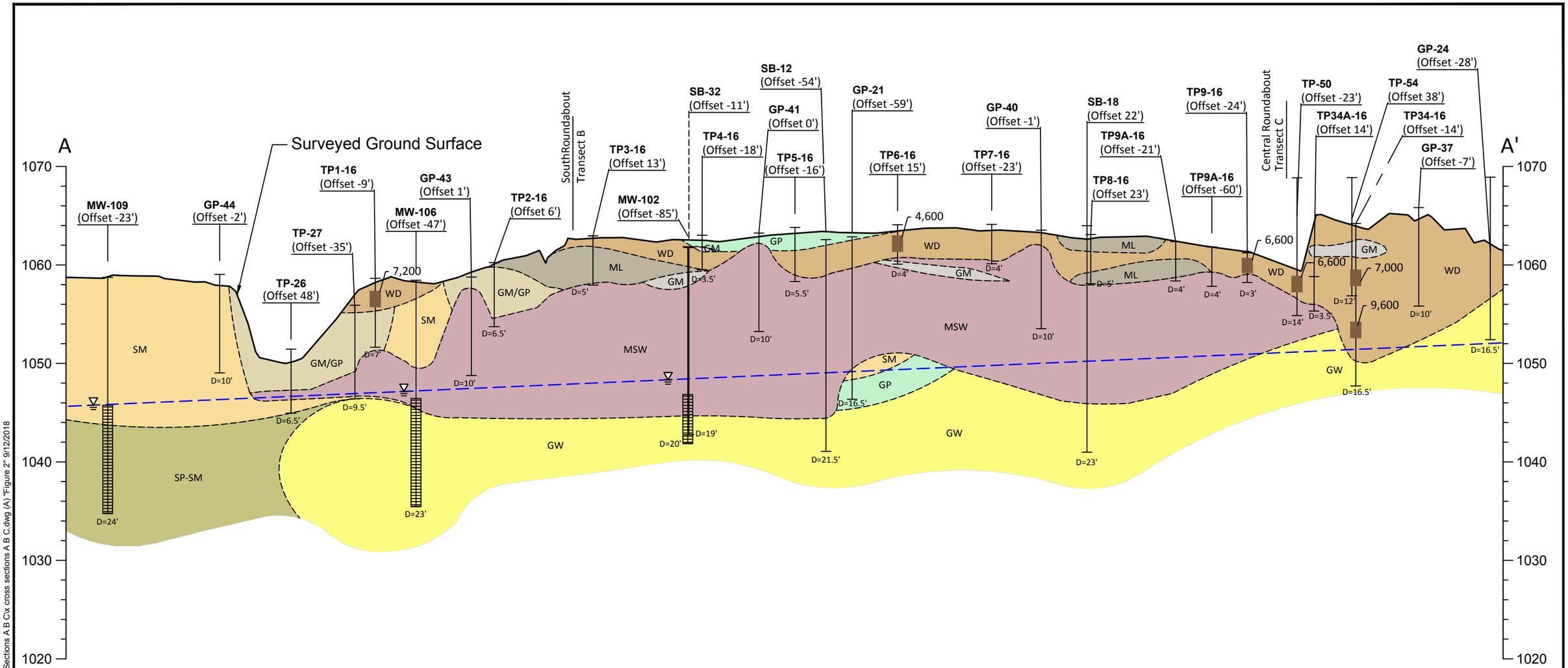
Scale in Feet

Data Source: HLA Engineering and Land Surveying, Inc; SLR; URS; Parametrix; Lochner Engineering; Boise Cascade; Esri World Imagery.

Closed City of Yakima Landfill Site Yakima, Washington

Transportation Corridor Project Gas Probe and Test Pit Locations

Figure 1



MSW (municipal solid waste)
WD (wood debris)
SP (clean sand)
SM (sand with fines)
SP-SM
BD (large concrete debris & boulders)
GP (clean gravel)
GM (gravel with fines)
GM-GP
GW (well graded gravel)
ML (silt and sand)

Legend

7,200 — Sample location of wood debris tested for heating value. Heating value provided in BTU/LB

Groundwater well and screen interval

Approximate groundwater surface, seasonal high (September 2014)

ATD Approximate groundwater surface at time of exploration (September 2016)

Geologic Profile Transect A

Horizontal Scale in Feet: 1"=100'
Vertical Scale in Feet: 1"=10'

0 100 200
Scale in Feet
10x Vertical Exaggeration

Source: Yakima County GIS; SLR, URS, Parametrix 2008, Boise 1985.

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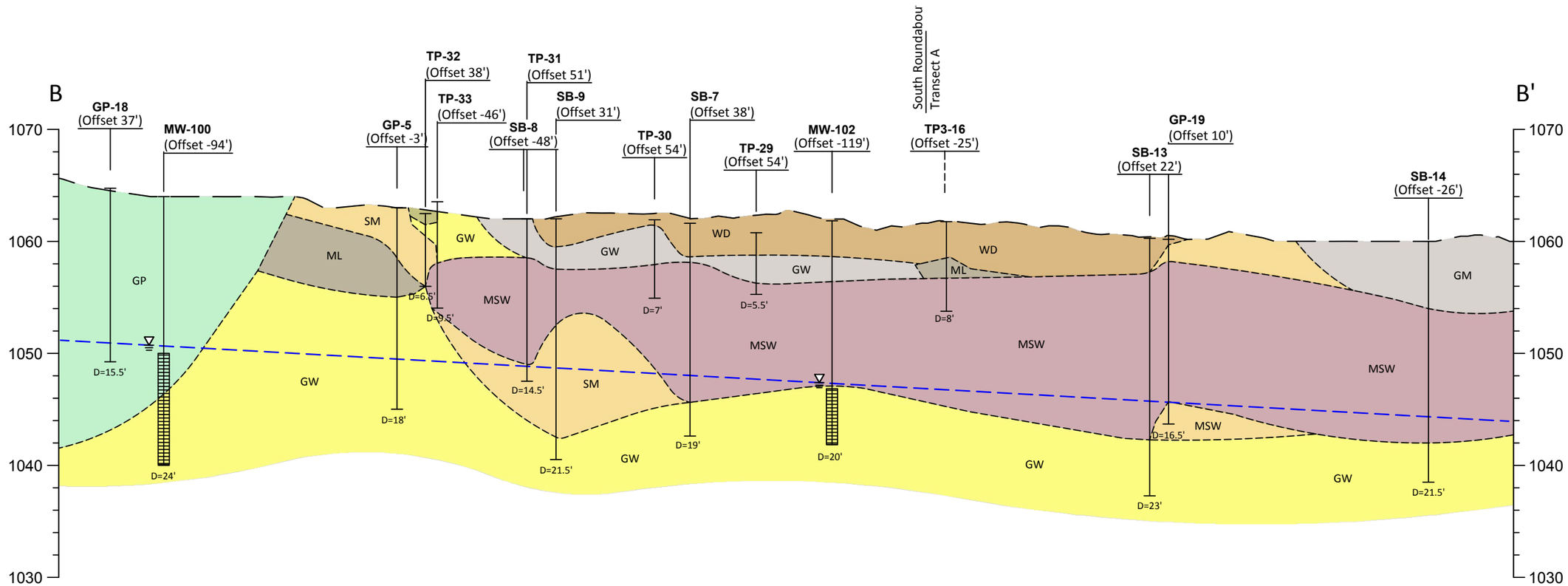
Closed City of Yakima Landfill Site Yakima, Washington	**Geologic Cross Section A-A'**	Figure 2



Geologic Profile Transect B

Horizontal Scale in Feet: 1"=100'
Vertical Scale in Feet: 1"=10'

Legend

- MSW (municipal solid waste)
- WD (wood debris)
- SP (clean sand)
- SM (sand with fines)
- SP-SM
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Scale in Feet
10x Vertical Exaggeration

Source: Yakima County GIS; SLR, URS, Parametrix 2008, Boise 1985.

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Closed City of Yakima Landfill Site Yakima, Washington	**Geologic Cross Section B-B'**	Figure 3

C

1080
1070
1060
1050
1040
1030

Surveyed Ground Surface

TP23-16 (Offset 37')
TP22-16 (Offset 18')
GP-32 (Offset -3')
TP21-16 (Offset 12')
TP20-16 (Offset -31')
GP-33 (Offset 58')
TP19-16 (Offset 42')
North Roundabout
Transect C
GP-34 (Offset 27')
TP18-16 (Offset -28')
TP18A-16 (Offset 35')
TP17-16 (Offset -15')
TP16B-16 (Offset -24')
TP16C-16 (Offset -75')
Transect D
TP16-16 (Offset 5')
TP16A-16 (Offset 42')
TP15-16 (Offset -10')

SM
ML
SM
GM
GP-GM
BD
GM
ATD (perched)
GP
WD
ATD
GP
GP
GP
GP

D=14.5'
D=15'
D=10'
D=8'
D=8.5'
D=10'
ATD
D=16.5'
D=10'
D=3'
D=8'
D=11'
D=4.5'
D=3'
D=2.5'
D=3'
D=6.75'
D=13'

Matchline: See Figure 4b

MSW (municipal solid waste)
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Legend

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Heating value provided in BTU/LB

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0 100 200
Scale in Feet
10x Vertical Exaggeration

Source: Yakima County GIS; SLR, URS, Parametrix 2008, Boise 1985.

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Closed City of Yakima Landfill Site
Yakima, Washington

Geologic Cross Section C-C'

Figure 4a

C'

Surveyed Ground Surface

Central Roundabout Transect A

BNSF Railroad Tracks

Matchline: See Figure 4a

GP-36 (Offset 18')
TP13A-16 (Offset -37')
TP14-16 (Offset -1')
TP14A-16 (Offset -24')
TP12A-16 (Offset -34')
TP13-16 (Offset 8')
GP-35 (Offset -10')
TP41 (Offset 5')
TP11A-16 (Offset 28')
TP11B-16 (Offset -27')
TP12-16 (Offset -13')
TP10B-16 (Offset -31')
TP11-16 (Offset 21')
TP26A-16 (Offset -60')
TP9C-16 (Offset 19')
GP-11 (Offset 23')
TP9B-16 (Offset 6')
TP10-16 (Offset -43')
MW-101 (Offset 20')
TP10A-16 (Offset 23')
TP53 (Offset 46')
TP49 (Offset -32')
TP26-16 (Offset -22')
TP26B-16 (Offset 21')
TP50 (Offset -17')
TP9-16 (Offset 34')
TP27-16 (Offset -3')
TP28-16 (Offset 6')
SB-21 (Offset 67')
TP29-16 (Offset -13')
GP-39 (Offset 0')
MW-104 (Offset 16')
SB-20 (Offset -3')
TP30-16 (Offset 4')
TP51 (Offset -9')
TP31-16 (Offset -18')
SB-19 (Offset -14')
TP32-16 (Offset 5')
GP-38 (Offset 12')
TP33-16 (Offset 2')
SB-24 (Offset -29')
GP-28 (Offset 50')

1080
1070
1060
1050
1040
1030

GM, GP, WD, SP-SM, GP-GM, ML, SM, SP, GW, MSW, BD

5,500 9,200 4,600 5,300 8,600 3,100 7,300 7,100 3,500 6,000 9,000 6,600 4,400

D=10' D=10' D=9.5' D=9.5' D=11' D=10' D=12' D=8' D=15' D=15' D=15.5' D=15' D=16.5' D=15' D=6' D=3' D=8.5' D=14' D=3' D=2' D=5.5' D=10' D=2.5' D=12.5' D=2' D=3.5' D=10' D=1.75' D=18' D=9' D=14' D=13.5' D=14' D=15.25' D=16' D=25' D=21.5' D=26.2' D=26.3' D=20.5' D=20.5'

ATD

LANDAU ASSOCIATES, INC. | G:\Projects\1148\009\010\014\Cross Sections A B C.dwg (A) "Figure 4b" 9/12/2018

Legend

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0 100 200
Scale in Feet
10x Vertical Exaggeration

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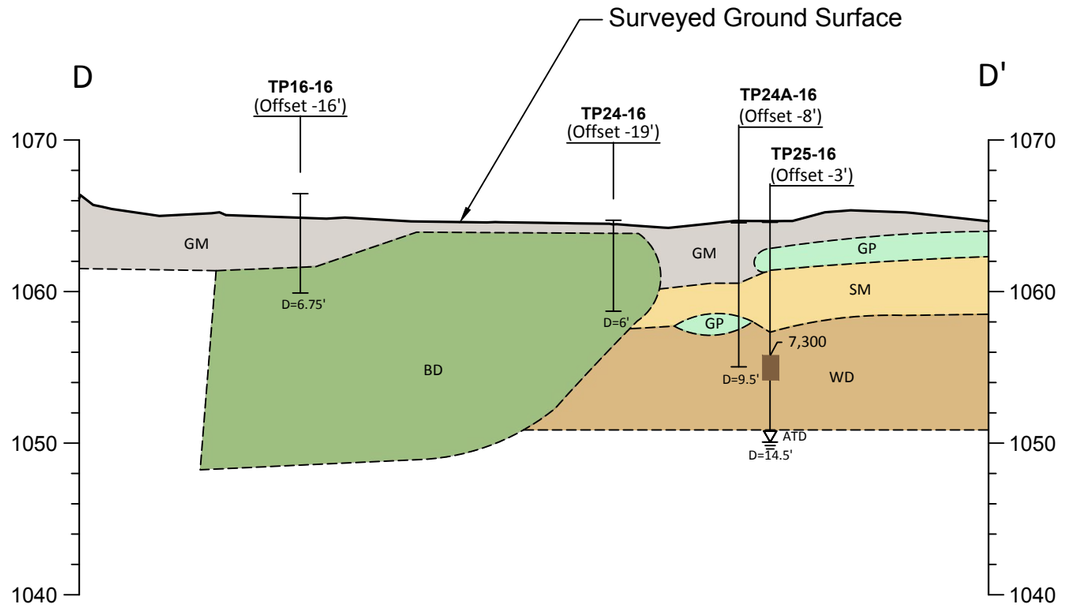
Closed City of Yakima Landfill Site
Yakima, Washington

Geologic Cross Section C-C'

Figure 4b



Geologic Profile Transect D

Horizontal Scale in Feet: 1"=100'
Vertical Scale in Feet: 1"=10'

Legend

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Groundwater well and screen interval

Approximate groundwater surface, seasonal high (September 2014)

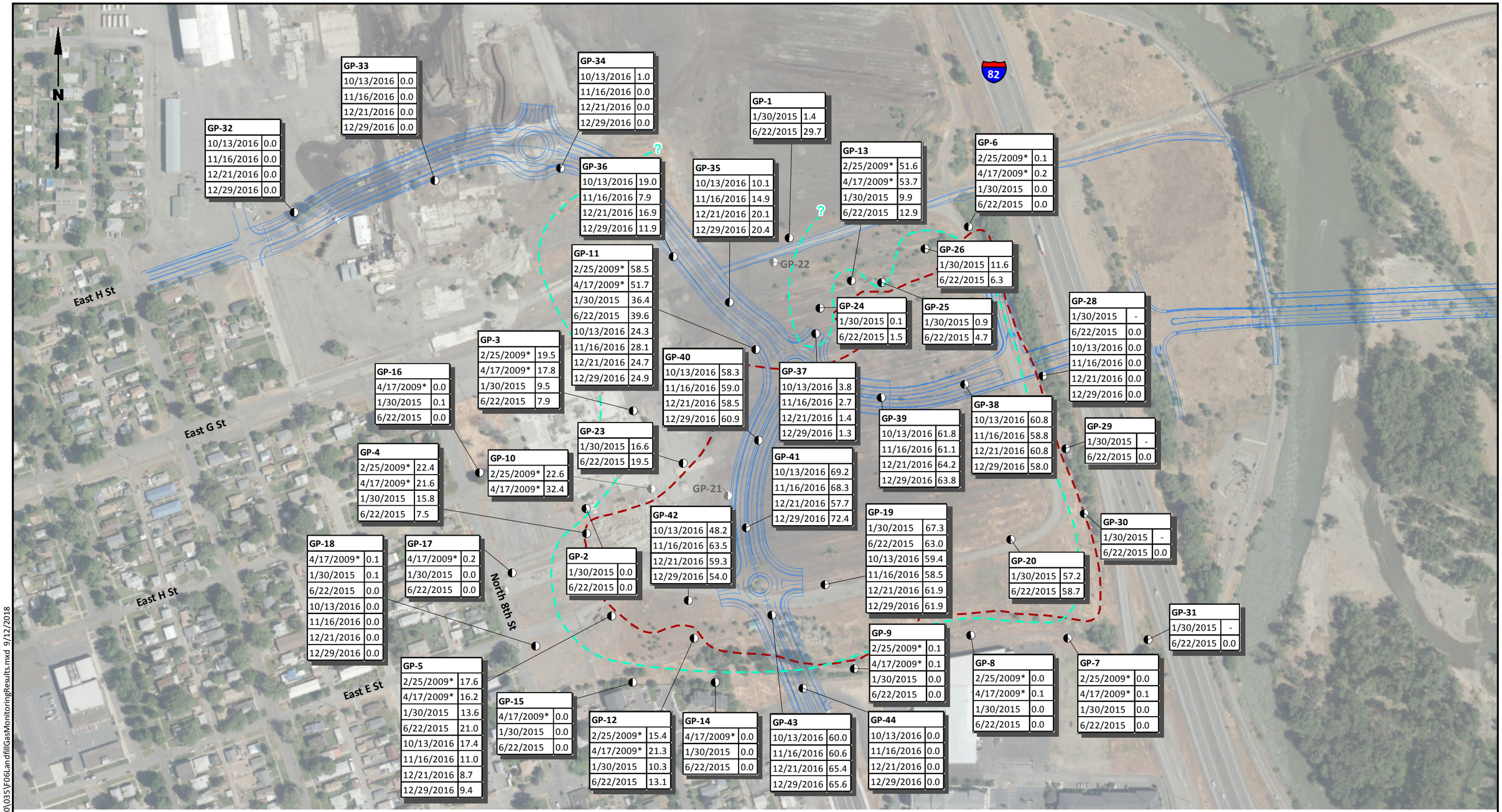
ATD Approximate groundwater surface at time of exploration (September 2

0 100 200
Scale in Feet
10x Vertical Exaggeration

Source: Yakima County GIS; SLR, URS, Parametrix 2008, Boise 1985.

LANDAU ASSOCIATES

Closed City of Yakima Landfill Site Yakima, Washington	**Geologic Cross Section D-D'**	Figure 5



Legend

- Gas Probe
- Gas Probe (Destroyed)
- Extent of Municipal Solid Waste
- Approximate Extent of Landfill Gas (Methane >5% by volume)

Monitoring Date — Methane Concentration (% by volume)

GP-7	
2/25/2009*	0.0
4/17/2009*	0.1
1/30/2015	0.0
6/22/2015	0.0

*Data reported by SLR (2009)

Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Data Source: Esri World Imagery.

0 300 600

Scale in Feet

LANDAU ASSOCIATES

Closed City of Yakima
Landfill Site
Yakima, Washington

Landfill Gas Monitoring Results

Figure 6

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Table 1
Test Pit Soil and Wood Debris - Analytical Results
Transportation Cooridor
Yakima, Washington

Analyte	Location ID, Sample Depth Interval (ft), Laboratory Sample ID, Sample Date, and Sample Type										
	TP-15-16 1.5-2.0 EV16100003-01 9/27/2016 N	TP-16B-16 0-2.0 EV16100003-02 9/28/2016 N	TP-1-16 S-1 1.0-2.0 EV16100095-01 9/26/2016 N	TP-6-16 S-2 1.5-2.0 EV16100095-02 9/26/2016 N	TP-9-16 S-1 0-1.5 EV16100095-03 9/26/2016 N	TP-9B-16 S-4 8.0-9.0 EV16100095-04 9/29/2016 N	TP-9C-16 S-3 5.0-6.0 EV16100095-05 9/30/2016 N	TP-10-16 S-2 1.0-2.0 EV16100095-06 9/26/2016 N	TP-10-16 S-5 10.0-12.0 EV16100095-07 9/26/2016 N	TP-10A-16 S-4 6.0-7.0 EV16100095-08 9/29/2016 N	TP-10B-16 S-4 5.0-5.5 EV16100095-09 9/29/2016 N
Petroleum Hydrocarbons (mg/kg; NWTPH-dx)											
Diesel Range Organics	620 U	25 U	--	--	--	--	--	--	--	--	--
Oil Range Organics	**14,000**	**500**	--	--	--	--	--	--	--	--	--
TCLP Metals (mg/L; SW-846 7470/6020)											
Mercury	--	--	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U
Arsenic	--	--	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U
Barium	--	--	**3.0**	**0.25**	**0.29**	**0.24**	**0.23**	**0.31**	**0.28**	**0.18**	**0.17**
Cadmium	--	--	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U
Chromium	--	--	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U
Lead	--	--	**0.042**	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U
Selenium	--	--	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U
Silver	--	--	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U
Gross Heating Value (BTU/lb; ASTM D5865)											
Heating Value	--	--	**7,200**	**4,600**	**6,600**	**3,500**	**7,300**	**3,100**	**6,000**	**8,600**	**5,300**
Chlorine (mg/kg; EPA 9056)											
Chlorine	--	--	--	--	--	--	--	--	--	**56**	--

Table 1
Test Pit Soil and Wood Debris - Analytical Results
Transportation Cooridor
Yakima, Washington

Analyte	Location ID, Sample Depth Interval (ft), Laboratory Sample ID, Sample Date, and Sample Type										
	TP-11-16 S-3 3.0-3.5 EV16100095-10 9/26/2016 N	**TP-11A-16 S-3 5.0-6.0 EV16100095-11 9/29/2016 N**	**TP-11B-16 S-5 8.0-9.0 EV16100095-12 9/29/2016 N**	**TP-25-16 S-5 8.0-10.0 EV16100095-13 9/28/2016 N**	**TP-26-16 S-3 4.0-4.5 EV16100095-14 9/28/2016 N**	**TP-26A-16 S-3 6.0-7.0 EV16100095-15 9/30/2016 N**	**TP-26B-16 S-3 4.0-5.0 EV16100095-16 9/30/2016 N**	**TP-28-16 S-1 1.0-2.0 EV16100095-17 9/28/2016 N**	**TP-34-16 S-4 6.0-7.0 EV16100095-18 9/30/2016 N**	**TP-34-16 S-5 10.0-11.0 EV16100095-19 9/30/2016 N**	**TP-34A-16 S-1 0-3.0 EV16100095-20 9/30/2016 N**
Petroleum Hydrocarbons (mg/kg; NWTPH-dx)											
Diesel Range Organics	--	--	--	--	--	--	--	--	--	--	--
Oil Range Organics	--	--	--	--	--	--	--	--	--	--	--
TCLP Metals (mg/L; SW-846 7470/6020)											
Mercury	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U
Arsenic	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U
Barium	**0.18**	**0.27**	**0.23**	**0.19**	**0.21**	**0.27**	**0.33**	**0.20**	**0.28**	**0.20**	**0.25**
Cadmium	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U
Chromium	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U
Lead	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	**0.025**
Selenium	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U
Silver	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U
Gross Heating Value (BTU/lb; ASTM D5865)											
Heating Value	**9,200**	**5,500**	**4,600**	**7,300**	**9,000**	**7,100**	**8,500**	**4,400**	**7,000**	**9,600**	**6,600**
Chlorine (mg/kg; EPA 9056)											
Chlorine	**41**	--	--	--	**56**	--	**130**	--	--	**53**	--

Notes

Bold = detected analyte

U = The analyte was not detected at the reported concentration.

Abbreviations and Acronyms

-- = not analyzed
BTU = British Thermal Unit
EPA = US Environmental Protection Agency
ft = feet
ID = identification
lb = pound
mg/kg = miligrams per kilogram
mg/L = miligrams per liter
N = primary sample
NWTPH = Northwest Total Petroleum Hydrocarbon
TCLP = Toxicity Characteristic Leaching Procedure

Table 2
Landfill Gas Monitoring Field Measurements
Transportation Corridor
Yakima, Washington

Monitoring Point	Methane (pbv)				Carbon Dioxide (pbv)				Oxygen (pbv)				Balance Gasses (pbv)				Static Pressure (inches of water)			
	10/13/16	11/16/16	12/21/16	12/29/16	10/13/16	11/16/16	12/21/16	12/29/16	10/13/16	11/16/16	12/21/16	12/29/16	10/13/16	11/16/16	12/21/16	12/29/16	10/13/16	11/16/16	12/21/16	12/29/16
GP-5	17.4	11.0	8.7	9.4	23.0	17.5	16.9	17.2	0.0	0.7	0.0	0.3	59.6	70.9	74.4	73.10	0.03	-0.03	-0.02	0.01
GP-11	24.3	28.1	24.7	24.9	31.3	34.3	32.2	32.3	0.0	0.0	0.0	0.2	44.4	37.6	43.1	42.6	0.03	0.03	0.00	0.00
GP-18	0.0	0.0	0.0	0.0	1.6	2.0	1.5	1.5	20.3	19.3	18.9	19.9	78.0	78.7	79.6	78.5	-0.02	0.02	-0.01	-0.03
GP-19	59.4	58.5	61.9	61.9	40.5	41.5	38.1	37.8	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.05	-0.02	0.01	0.05
GP-28	0.0	0.0	0.0	0.0	19.6	18.8	11.7	11.5	3.3	4.8	9.9	10.2	77.1	76.4	78.3	78.2	-0.02	-0.01	-0.01	-0.01
GP-32	0.0	0.0	0.0	0.0	1.5	1.6	1.2	1.2	20.2	20.0	19.8	20.2	78.3	78.4	79.1	78.5	0.00	0.00	0.02	0.02
GP-33	0.0	0.0	0.0	0.0	9.8	10.8	10.0	10.4	7.3	5.6	4.6	6.5	82.9	83.6	85.4	83.0	0.00	-0.02	0.01	-0.01
GP-34	1.0	0.0	0.0	0.0	7.0	12.9	3.2	3.6	0.0	0.2	16.9	17.5	92.0	86.8	79.9	78.8	-0.01	-0.01	0.00	-0.01
GP-35	10.1	14.9	20.1	20.4	23.5	24.7	25.0	25.6	0.0	0.0	0.0	0.2	66.4	60.4	54.8	53.8	-0.03	0.04	-0.55	0.04
GP-36	19.0	9.9	16.9	11.9	32.6	27.5	26.3	22.0	0.0	0.0	0.0	0.3	48.4	62.5	56.8	65.8	0.00	-0.04	-0.01	-0.01
GP-37	3.8	2.7	1.4	1.3	23.8	25.7	21.7	21.3	0.0	0.0	0.0	0.2	72.4	71.6	76.9	77.2	0.01	0.02	-0.22	0.01
GP-38	60.8	58.8	60.8	58.0	38.1	41.2	39.2	39.1	0.0	0.0	0.0	0.3	1.1	0.0	0.0	2.6	-0.01	-0.02	0.00	0.06
GP-39	61.8	61.1	64.2	63.8	38.2	38.9	35.8	35.8	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.05	-0.04	0.05	12.84
GP-40	58.3	59.0	58.5	60.9	38.9	41.0	33.8	37.1	0.0	0.0	0.0	0.2	2.9	0.0	7.7	1.8	0.12	0.07	0.11	0.09
GP-41	69.2	68.3	57.7	72.4	30.3	31.7	22.9	27.3	0.0	0.0	0.0	0.2	0.6	0.0	19.4	1.8	0.12	0.01	0.11	0.11
GP-42	48.2	63.5	59.3	54.0	36.7	35.9	30.5	29.5	0.0	0.0	0.0	0.3	15.1	0.9	10.2	16.2	0.05	0.02	0.04	9.90
GP-43	60.0	60.6	65.4	65.6	40.0	39.4	34.6	34.1	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.02	-0.05	0.00	0.00
GP-44	0.0	0.0	0.0	0.0	2.3	3.6	3.0	3.0	19.1	17.5	16.6	18.0	78.6	78.9	80.4	78.9	-0.02	0.02	0.00	0.01
Ambient	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	21.7	21.1	19.2	20.9	78.1	78.8	80.7	78.8	0.00	0.01	0.00	0.00

pbv = percent by volume

Table 3
Landfill Gas Monitoring Data - Analytical Results
Transportation Corridor
Yakima, Washington

Analyte	Cas No	Sample ID, Laboratory ID, Sample Date, and Results									
		Ambient-11162016 P1605444-003 11/16/2016	Ambient-12292016 P1700001-001 12/29/2016	GP-38-11162016 P1605444-005 11/16/2016	GP-38-12292016 P1700001-002 12/29/2016	GP-39-11162016 P1605444-004 11/16/2016	GP-39-12292016 P1700001-003 12/29/2016	GP-41-11162016 P1605444-002 11/16/2016	GP-41-12292016 P1700001-005 12/29/2016	GP-43-11162016 P1605444-001 11/16/2016	GP-43-12292016 P1700001-004 12/29/2016
ASTM D1946 (%, v/v)											
Oxygen	7782-44-7	**22.0**	**22.2**	**1.72**	**0.286**	0.13 U	0.22 U	**0.254**	**0.376**	**7.30**	**0.380**
Nitrogen	7727-37-9	**77.9**	**77.8**	**8.71**	**5.76**	**0.668**	**1.18**	**10.2**	**4.02**	**26.2**	**2.82**
Carbon Monoxide	630-08-0	0.12 U	0.22 U	0.15 U	0.22 U	0.13 U	0.22 U	0.15 U	0.23 U	0.14 U	0.22 U
Methane	74-82-8	0.12 U	0.22 U	**55.1**	**57.9**	**64.0**	**66.0**	**57.5**	**70.5**	**42.6**	**65.9**
Carbon Dioxide	124-38-9	0.12 U	0.22 U	**34.4**	**36.0**	**35.2**	**32.6**	**32.0**	**25.1**	**23.9**	**30.8**
EPA 25C Modified (ppmV)											
Total Gaseous Nonmethane Organics (TGNMO) as Methane		1.2 U	2.2 U	**220**	**250**	**630**	**600**	**640**	**310**	**350**	**230**
ASTM D 5504-12 (µg/m3)											
Hydrogen Sulfide	7783-06-4	8.3 U	15 U	10 U	**3,400**	**14,000**	**12,000**	10 U	**640**	**10,000**	**5,100**
Carbonyl Sulfide	463-58-1	15 U	27 U	**63**	27 U	16 U	27 U	18 U	28 U	17 U	27 U
Methyl Mercaptan	74-93-1	12 U	22 U	14 U	**38**	**37**	22 U	14 U	23 U	**59**	**30**
Ethyl Mercaptan	75-08-1	15 U	28 U	19 U	27 U	**39**	**28**	19 U	29 U	**45**	28 U
Dimethyl Sulfide	75-18-3	15 U	28 U	19 U	27 U	17 U	28 U	19 U	29 U	**47**	**110**
Carbon Disulfide	75-15-0	9.3 U	17 U	11 U	17 U	10 U	17 U	11 U	**110**	11 U	17 U
Isopropyl Mercaptan	75-33-2	19 U	34 U	23 U	34 U	21 U	34 U	23 U	36 U	21 U	34 U
tert-Butyl Mercaptan	75-66-1	22 U	41 U	27 U	40 U	25 U	40 U	27 U	42 U	25 U	41 U
n-Propyl Mercaptan	107-03-9	19 U	34 U	23 U	34 U	21 U	34 U	23 U	36 U	21 U	34 U
Ethyl Methyl Sulfide	624-89-5	19 U	34 U	23 U	34 U	21 U	34 U	23 U	36 U	21 U	34 U
Thiophene	110-02-1	20 U	38 U	25 U	37 U	23 U	38 U	25 U	39 U	24 U	38 U
Isobutyl Mercaptan	513-44-0	22 U	41 U	27 U	40 U	25 U	40 U	27 U	42 U	25 U	41 U
Diethyl Sulfide	352-93-2	22 U	41 U	27 U	40 U	25 U	40 U	27 U	42 U	25 U	41 U
n-Butyl Mercaptan	109-79-5	22 U	41 U	27 U	40 U	25 U	40 U	27 U	42 U	25 U	41 U
Dimethyl Disulfide	624-92-0	11 U	21 U	14 U	21 U	13 U	21 U	14 U	22 U	13 U	21 U
3-Methylthiophene	616-44-4	24 U	44 U	29 U	43 U	27 U	44 U	29 U	46 U	28 U	44 U
Tetrahydrothiophene	110-01-0	21 U	40 U	26 U	39 U	24 U	39 U	26 U	41 U	25 U	40 U
2,5-Dimethylthiophene	638-02-8	27 U	50 U	33 U	50 U	31 U	50 U	34 U	53 U	32 U	51 U
2-Ethylthiophene	872-55-9	27 U	50 U	33 U	50 U	31 U	50 U	34 U	53 U	32 U	51 U
Diethyl Disulfide	110-81-6	15 U	27 U	18 U	27 U	17 U	27 U	18 U	29 U	17 U	28 U
EPA TO-15 Modified (µg/m^3)											
Propene	115-07-1	**1.3**	**3.4**	**800**	**870**	**800**	**1,200**	**500**	**1,500**	**800**	**1,200**
Dichlorodifluoromethane (CFC 12)	75-71-8	**2.2**	**2.1**	**110**	**53**	**970**	**1,100**	**1,100**	**4,100**	**1,600**	**1,500**
Chloromethane	74-87-3	0.60 U	1.1 U	37 U	11 U	170 U	55 U	150 U	57 U	69 U	37 U
1,2-Dichloro-1,1,2,2-Tetrafluoroethane (CFC 114)	76-14-2	0.60 U	1.1 U	**1,400**	**1,100**	**1,100**	**1,300**	**980**	**2,900**	**980**	**1,200**
Vinyl Chloride	75-01-4	0.60 U	1.1 U	**90**	**78**	**6,600**	**11,000**	**3,700**	**9,400**	**3,900**	**5,400**
1,3-Butadiene	106-99-0	0.60 U	1.1 U	37 U	11 U	170 U	55 U	150 U	57 U	69 U	37 U
Bromomethane	74-83-9	0.60 U	1.1 U	37 U	11 U	170 U	55 U	150 U	57 U	69 U	37 U
Chloroethane	75-00-3	0.60 U	1.1 U	37 U	**26**	170 U	**83**	150 U	57 U	69 U	37 U
Ethanol	64-17-5	6.0 U	11 U	370 U	110 U	1,700 U	550 U	1,500 U	570 U	690 U	370 U
Acetonitrile	75-05-8	0.60 U	1.1 U	37 U	11 U	170 U	55 U	150 U	57 U	69 U	37 U

Table 3
Landfill Gas Monitoring Data - Analytical Results
Transportation Corridor
Yakima, Washington

Analyte	Cas No	Sample ID, Laboratory ID, Sample Date, and Results									
		Ambient-11162016 P1605444-003 11/16/2016	Ambient-12292016 P1700001-001 12/29/2016	GP-38-11162016 P1605444-005 11/16/2016	GP-38-12292016 P1700001-002 12/29/2016	GP-39-11162016 P1605444-004 11/16/2016	GP-39-12292016 P1700001-003 12/29/2016	GP-41-11162016 P1605444-002 11/16/2016	GP-41-12292016 P1700001-005 12/29/2016	GP-43-11162016 P1605444-001 11/16/2016	GP-43-12292016 P1700001-004 12/29/2016
Acrolein	107-02-8	2.4 U	4.4 U	150 U	43 U	670 U	220 U	590 U	230 U	280 U	150 U
Acetone	67-64-1	6.0 U	11 U	370 U	110 U	1,700 U	550 U	1,500 U	570 U	**4,200**	**970**
Trichlorofluoromethane	75-69-4	**1.1**	1.1 U	37 U	11 U	170 U	55 U	150 U	57 U	**510**	**430**
2-Propanol (Isopropyl Alcohol)	67-63-0	6.0 U	11 U	370 U	110 U	1,700 U	550 U	1,500 U	570 U	**1,700**	370 U
Acrylonitrile	107-13-1	0.60 U	1.1 U	37 U	11 U	170 U	55 U	150 U	57 U	69 U	37 U
1,1-Dichloroethene	75-35-4	0.60 U	1.1 U	37 U	**11**	170 U	55 U	150 U	57 U	**99**	**81**
Methylene Chloride	75-09-2	0.60 U	1.1 U	37 U	11 U	170 U	55 U	150 U	57 U	**110**	**85**
3-Chloro-1-propene (Allyl Chloride)	107-05-1	0.60 U	1.1 U	37 U	11 U	170 U	55 U	150 U	57 U	69 U	37 U
Trichlorotrifluoroethane	76-13-1	0.60 U	1.1 U	37 U	11 U	170 U	55 U	150 U	57 U	69 U	37 U
Carbon Disulfide	75-15-0	6.0 U	11 U	370 U	110 U	1,700 U	550 U	1,500 U	570 U	690 U	370 U
trans-1,2-Dichloroethene	156-60-5	0.60 U	1.1 U	37 U	11 U	170 U	55 U	150 U	57 U	**150**	**120**
1,1-Dichloroethane	75-34-3	0.60 U	1.1 U	37 U	11 U	170 U	55 U	150 U	57 U	69 U	37 U
Methyl tert-Butyl Ether	1634-04-4	0.60 U	1.1 U	37 U	11 U	170 U	55 U	150 U	57 U	69 U	37 U
Vinyl Acetate	108-05-4	6.0 U	11 U	370 U	110 U	1,700 U	550 U	1,500 U	570 U	690 U	370 U
2-Butanone (MEK)	78-93-3	6.0 U	11 U	370 U	110 U	1,700 U	550 U	1,500 U	570 U	**5,500**	**1,500**
cis-1,2-Dichloroethene	156-59-2	0.60 U	1.1 U	37 U	**21**	**1,500**	**380**	**970**	**97**	**5,100**	**2,800**
Ethyl Acetate	141-78-6	1.2 U	**3.3**	73 U	22 U	340 U	110 U	290 U	110 U	140 U	74 U
n-Hexane	110-54-3	0.60 U	1.1 U	**830**	**920**	**820**	**840**	**400**	**620**	**660**	**580**
Chloroform	67-66-3	0.60 U	1.1 U	37 U	11 U	170 U	55 U	150 U	57 U	69 U	37 U
Tetrahydrofuran (THF)	109-99-9	0.60 U	1.1 U	37 U	11 U	170 U	55 U	150 U	57 U	**1,100**	**910**
1,2-Dichloroethane	107-06-2	0.60 U	1.1 U	37 U	11 U	170 U	55 U	150 U	57 U	69 U	37 U
1,1,1-Trichloroethane	71-55-6	0.60 U	1.1 U	37 U	11 U	170 U	55 U	150 U	57 U	69 U	37 U
Benzene	71-43-2	**0.60**	1.1 U	**78**	**70**	**410**	**450**	**220**	**490**	**370**	**340**
Carbon Tetrachloride	56-23-5	0.60 U	1.1 U	37 U	11 U	170 U	55 U	150 U	57 U	69 U	37 U
Cyclohexane	110-82-7	1.2 U	2.2 U	**1,800**	**2,200**	**2,800**	**3,000**	**320**	**410**	**580**	**500**
1,2-Dichloropropane	78-87-5	0.60 U	1.1 U	37 U	11 U	170 U	55 U	150 U	57 U	69 U	37 U
Bromodichloromethane	75-27-4	0.60 U	1.1 U	37 U	11 U	170 U	55 U	150 U	57 U	69 U	37 U
Trichloroethene	79-01-6	0.60 U	1.1 U	37 U	**19**	170 U	**77**	150 U	57 U	**460**	**450**
1,4-Dioxane	123-91-1	0.60 U	1.1 U	37 U	11 U	170 U	55 U	150 U	57 U	69 U	37 U
Methyl Methacrylate	80-62-6	1.2 U	2.2 U	73 U	22 U	340 U	110 U	290 U	110 U	140 U	74 U
n-Heptane	142-82-5	0.60 U	1.1 U	**2,200**	**3,100**	**2,000**	**2,400**	**490**	**920**	**2,000**	**1,900**
cis-1,3-Dichloropropene	10061-01-5	0.60 U	1.1 U	37 U	11 U	170 U	55 U	150 U	57 U	69 U	37 U
4-Methyl-2-pentanone	108-10-1	0.60 U	1.1 U	37 U	11 U	170 U	**78**	150 U	57 U	**1,000**	**630**
trans-1,3-Dichloropropene	10061-02-6	0.60 U	1.1 U	37 U	11 U	170 U	55 U	150 U	57 U	69 U	37 U
1,1,2-Trichloroethane	79-00-5	0.60 U	1.1 U	37 U	11 U	170 U	55 U	150 U	57 U	69 U	37 U
Toluene	108-88-3	**2.2**	1.1 U	**110**	**54**	**1,900**	**1,400**	**260**	**550**	**8,400**	**6,300**
2-Hexanone	591-78-6	0.60 U	1.1 U	37 U	11 U	170 U	55 U	150 U	57 U	69 U	37 U
Dibromochloromethane	124-48-1	0.60 U	1.1 U	37 U	11 U	170 U	55 U	150 U	57 U	69 U	37 U
1,2-Dibromoethane	106-93-4	0.60 U	1.1 U	37 U	11 U	170 U	55 U	150 U	57 U	69 U	37 U
n-Butyl Acetate	123-86-4	0.60 U	1.1 U	37 U	11 U	170 U	55 U	150 U	57 U	69 U	37 U
n-Octane	111-65-9	0.60 U	1.1 U	**490**	**260**	**1,700**	**1,900**	**320**	**1,800**	**1,800**	**1,500**

Table 3
Landfill Gas Monitoring Data - Analytical Results
Transportation Corridor
Yakima, Washington

Analyte	Cas No	Sample ID, Laboratory ID, Sample Date, and Results									
		Ambient-11162016 P1605444-003 11/16/2016	Ambient-12292016 P1700001-001 12/29/2016	GP-38-11162016 P1605444-005 11/16/2016	GP-38-12292016 P1700001-002 12/29/2016	GP-39-11162016 P1605444-004 11/16/2016	GP-39-12292016 P1700001-003 12/29/2016	GP-41-11162016 P1605444-002 11/16/2016	GP-41-12292016 P1700001-005 12/29/2016	GP-43-11162016 P1605444-001 11/16/2016	GP-43-12292016 P1700001-004 12/29/2016
Tetrachloroethene	127-18-4	0.60 U	1.1 U	37 U	11 U	170 U	**67**	**230**	57 U	**810**	**640**
Chlorobenzene	108-90-7	0.60 U	1.1 U	37 U	**190**	170 U	55 U	150 U	57 U	**96**	37 U
Ethylbenzene	100-41-4	0.60 U	1.1 U	**38**	**62**	**3,800**	**4,200**	150 U	**910**	**4,500**	**3,800**
m,p-Xylenes	179601-23-1	1.2 U	2.2 U	**1,200**	**440**	**7,600**	**8,600**	290 U	**2,200**	**8,600**	**7,400**
Bromoform	75-25-2	0.60 U	1.1 U	37 U	11 U	170 U	55 U	150 U	57 U	69 U	37 U
Styrene	100-42-5	0.60 U	1.1 U	37 U	11 U	170 U	55 U	150 U	57 U	**160**	**96**
o-Xylene	95-47-6	0.60 U	1.1 U	**430**	**130**	**2,800**	**3,200**	150 U	**910**	**2,200**	**1,800**
n-Nonane	111-84-2	0.60 U	1.1 U	**140**	**200**	**13,000**	**15,000**	**480**	**9,800**	**3,200**	**3,200**
1,1,2,2-Tetrachloroethane	79-34-5	0.60 U	1.1 U	37 U	11 U	170 U	55 U	150 U	57 U	69 U	37 U
Cumene	98-82-8	0.60 U	1.1 U	37 U	**300**	**690**	**780**	150 U	**240**	**750**	**550**
alpha-Pinene	80-56-8	0.60 U	1.1 U	**110**	**65**	**1,200**	**1,300**	150 U	**1,300**	**4,100**	**4,300**
n-Propylbenzene	103-65-1	0.60 U	1.1 U	37 U	**170**	**1,000**	**1,300**	150 U	**240**	**690**	**560**
4-Ethyltoluene	622-96-8	0.60 U	1.1 U	**51**	**28**	**470**	**570**	150 U	**91**	**290**	**260**
1,3,5-Trimethylbenzene	108-67-8	0.60 U	1.1 U	**220**	**110**	**1,500**	**1,800**	150 U	**520**	**550**	**450**
1,2,4-Trimethylbenzene	95-63-6	0.60 U	1.1 U	**260**	**270**	**3,400**	**3,800**	150 U	**920**	**1,500**	**1,300**
Benzyl Chloride	100-44-7	0.60 U	1.1 U	37 U	11 U	170 U	55 U	150 U	57 U	69 U	37 U
1,3-Dichlorobenzene	541-73-1	0.60 U	1.1 U	37 U	11 U	170 U	55 U	150 U	57 U	69 U	37 U
1,4-Dichlorobenzene	106-46-7	0.60 U	1.1 U	**61**	**100**	170 U	**69**	150 U	57 U	69 U	37 U
1,2-Dichlorobenzene	95-50-1	0.60 U	1.1 U	37 U	**22**	170 U	**79**	150 U	**76**	69 U	37 U
d-Limonene	5989-27-5	0.60 U	1.1 U	37 U	11 U	**620**	**620**	150 U	**90**	**8,000**	**6,900**
1,2-Dibromo-3-chloropropane	96-12-8	0.60 U	1.1 U	37 U	11 U	170 U	55 U	150 U	57 U	69 U	37 U
1,2,4-Trichlorobenzene	120-82-1	0.60 U	1.1 U	37 U	11 U	170 U	55 U	150 U	57 U	69 U	37 U
Naphthalene	91-20-3	0.60 U	1.1 U	37 U	11 U	170 U	55 U	150 U	57 U	69 U	37 U
Hexachlorobutadiene	87-68-3	0.60 U	1.1 U	37 U	11 U	170 U	55 U	150 U	57 U	69 U	37 U

Nondetected compound show the method detection limit (MDL) as the reporting limit.
J = Indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
J1 = The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
U = Indicates the compound was not detected at the reported concentration.
Bold = Detected compound.
Box = Exceedance of screening level.
NA = Not analyzed.
EPA = U.S. Environmental Protection Agency
µg/m³ = micrograms per cubic meter
SIM = selected ion monitoring

APPENDIX A

Test Pit Boring Logs

Soil Classification System

MAJOR DIVISIONS			GRAPHIC SYMBOL	USCS LETTER SYMBOL[1]	TYPICAL DESCRIPTIONS [2][3]
COARSE-GRAINED SOIL (More than 50% of material is larger than No. 200 sieve size)	GRAVEL AND GRAVELLY SOIL (More than 50% of coarse fraction retained on No. 4 sieve)	CLEAN GRAVEL (Little or no fines)		GW	Well-graded gravel; gravel/sand mixture(s); little or no fines
				GP	Poorly graded gravel; gravel/sand mixture(s); little or no fines
		GRAVEL WITH FINES (Appreciable amount of fines)		GM	Silty gravel; gravel/sand/silt mixture(s)
				GC	Clayey gravel; gravel/sand/clay mixture(s)
	SAND AND SANDY SOIL (More than 50% of coarse fraction passed through No. 4 sieve)	CLEAN SAND (Little or no fines)		SW	Well-graded sand; gravelly sand; little or no fines
				SP	Poorly graded sand; gravelly sand; little or no fines
		SAND WITH FINES (Appreciable amount of fines)		SM	Silty sand; sand/silt mixture(s)
				SC	Clayey sand; sand/clay mixture(s)
FINE-GRAINED SOIL (More than 50% of material is smaller than No. 200 sieve size)	SILT AND CLAY (Liquid limit less than 50)			ML	Inorganic silt and very fine sand; rock flour; silty or clayey fine sand or clayey silt with slight plasticity
				CL	Inorganic clay of low to medium plasticity; gravelly clay; sandy clay; silty clay; lean clay
				OL	Organic silt; organic, silty clay of low plasticity
	SILT AND CLAY (Liquid limit greater than 50)			MH	Inorganic silt; micaceous or diatomaceous fine sand
				CH	Inorganic clay of high plasticity; fat clay
				OH	Organic clay of medium to high plasticity; organic silt
	HIGHLY ORGANIC SOIL			PT	Peat; humus; swamp soil with high organic content

OTHER MATERIALS	GRAPHIC SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
PAVEMENT		AC or PC	Asphalt concrete pavement or Portland cement pavement
ROCK		RK	Rock (See Rock Classification)
WOOD		WD	Wood, lumber, wood chips
DEBRIS		DB	Construction debris, garbage

Notes:
1. USCS letter symbols correspond to symbols used by the Unified Soil Classification System and ASTM classification methods. Dual letter symbols (e.g., SP-SM for sand or gravel) indicate soil with an estimated 5-15% fines. Multiple letter symbols (e.g., ML/CL) indicate borderline or multiple soil classifications.
2. Soil descriptions are based on the general approach presented in the Standard Practice for Description and Identification of Soils (Visual-Manual Procedure), outlined in ASTM D 2488. Where laboratory index testing has been conducted, soil classifications are based on the Standard Test Method for Classification of Soils for Engineering Purposes, as outlined in ASTM D 2487.
3. Soil description terminology is based on visual estimates (in the absence of laboratory test data) of the percentages of each soil type and is defined as follows:

Primary Constituent:	> 50% - "GRAVEL," "SAND," "SILT," "CLAY," etc.
Secondary Constituents:	> 30% and ≤ 50% - "very gravelly," "very sandy," "very silty," etc.
	> 15% and ≤ 30% - "gravelly," "sandy," "silty," etc.
Additional Constituents:	> 5% and ≤ 15% - "with gravel," "with sand," "with silt," etc.
	≤ 5% - "with trace gravel," "with trace sand," "with trace silt," etc., or not noted.

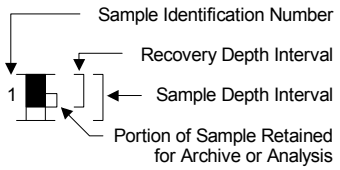
4. Soil density or consistency descriptions are based on judgement using a combination of sampler penetration blow counts, drilling or excavating conditions, field tests, and laboratory tests, as appropriate.

Drilling and Sampling Key

SAMPLER TYPE

Code	Description
a	3.25-inch O.D., 2.42-inch I.D. Split Spoon
b	2.00-inch O.D., 1.50-inch I.D. Split Spoon
c	Shelby Tube
d	Grab Sample
e	Single-Tube Core Barrel
f	Double-Tube Core Barrel
g	2.50-inch O.D., 2.00-inch I.D. WSDOT
h	3.00-inch O.D., 2.375-inch I.D. Mod. California
i	Other - See text if applicable
1	300-lb Hammer, 30-inch Drop
2	140-lb Hammer, 30-inch Drop
3	Pushed
4	Vibrocore (Rotosonic/Geoprobe)
5	Other - See text if applicable

SAMPLE NUMBER & INTERVAL



Field and Lab Test Data

Code	Description
PP = 1.0	Pocket Penetrometer, tsf
TV = 0.5	Torvane, tsf
PID = 100	Photoionization Detector VOC screening, ppm
W = 10	Moisture Content, %
D = 120	Dry Density, pcf
-200 = 60	Material smaller than No. 200 sieve, %
GS	Grain Size - See separate figure for data
AL	Atterberg Limits - See separate figure for data
GT	Other Geotechnical Testing
CA	Chemical Analysis

Groundwater

▽	Approximate water level at time of drilling (ATD)
▼	Approximate water level at time other than ATD

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Yakima, Washington

Soil Classification System and Key

Figure A-1

TP-1-16

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft): 1058.64 Logged By: BEC	
0	1058	S-1	d5	CA-WD		WD	Brown, WOOD debris with gravel and silt (loose, dry to damp)	Groundwater not encountered.
	1056						**(FILL)**	
		S-2	d5				Light brown, sandy, gravelly COBBLE with some concrete debris (medium dense, damp)	
5	1054							
	1052					DB	MUNICIPAL SOLID WASTE	
						DB	MUNICIPAL SOLID WASTE	
10								
15								
20								

Test Pit Completed 09/26/16
Total Depth of Test Pit = 7.0 ft.

TP-2-16

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft): 1060.23 Logged By: BEC	
0	1060	S-1	d5			GP	Gray brown, sandy GRAVEL (5/8 inch minus crushed rock) (dense, damp)	Groundwater not encountered.
	1058	S-2	d5			GP-GM		
	1056					GM	Brown, GRAVEL with silt and sand (3 inch minus crushed rock) (geotextile fabric at bottom of contact) (dense, dry to damp)	
5	1054							
						DB	Dark brown, sandy, very silty GRAVEL with cobbles (loose to medium dense, moist)	
							MUNICIPAL SOLID WASTE	
10								
15								
20								

Test Pit Completed 09/26/16
Total Depth of Test Pit = 6.5 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

1148009.010.013 12/2/16 N:\PROJECTS\1148009.010.013.GPJ TEST PIT LOG W/ ELEVATION

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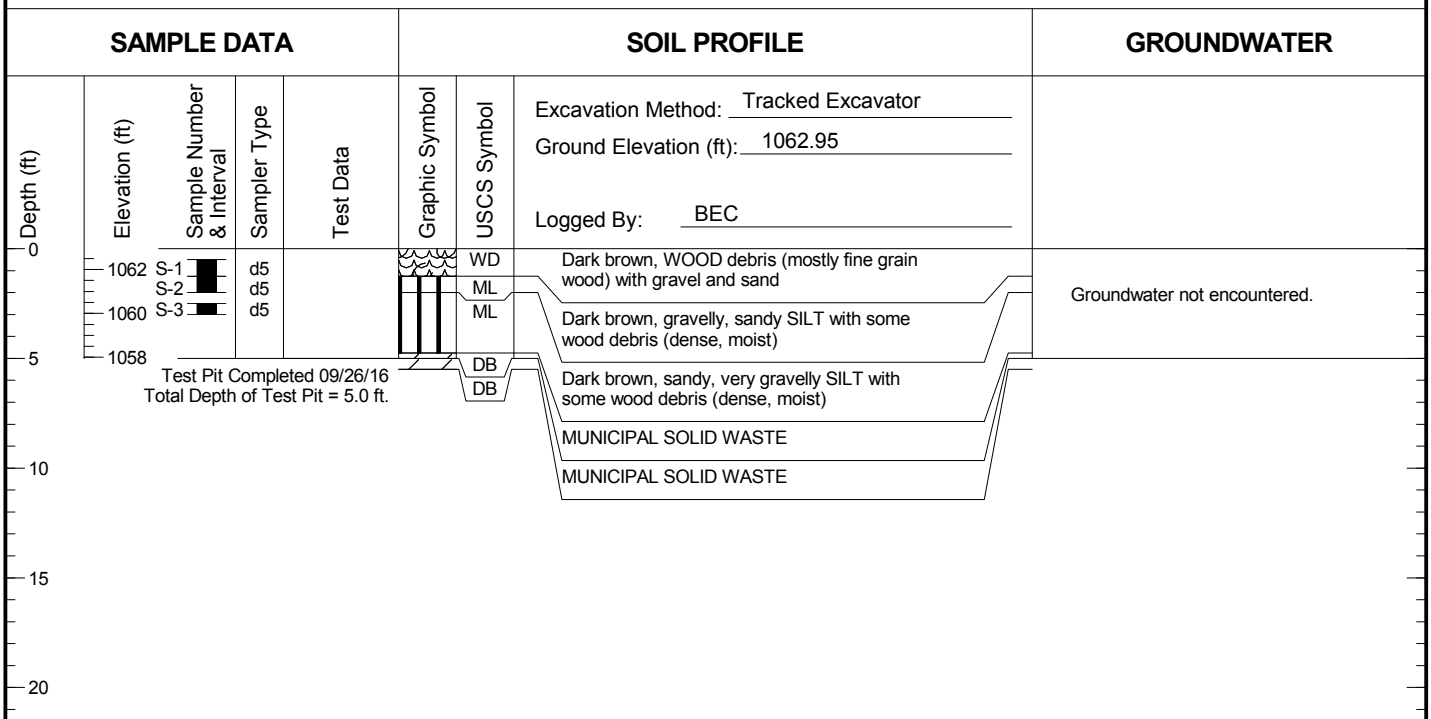
Yakima, Washington

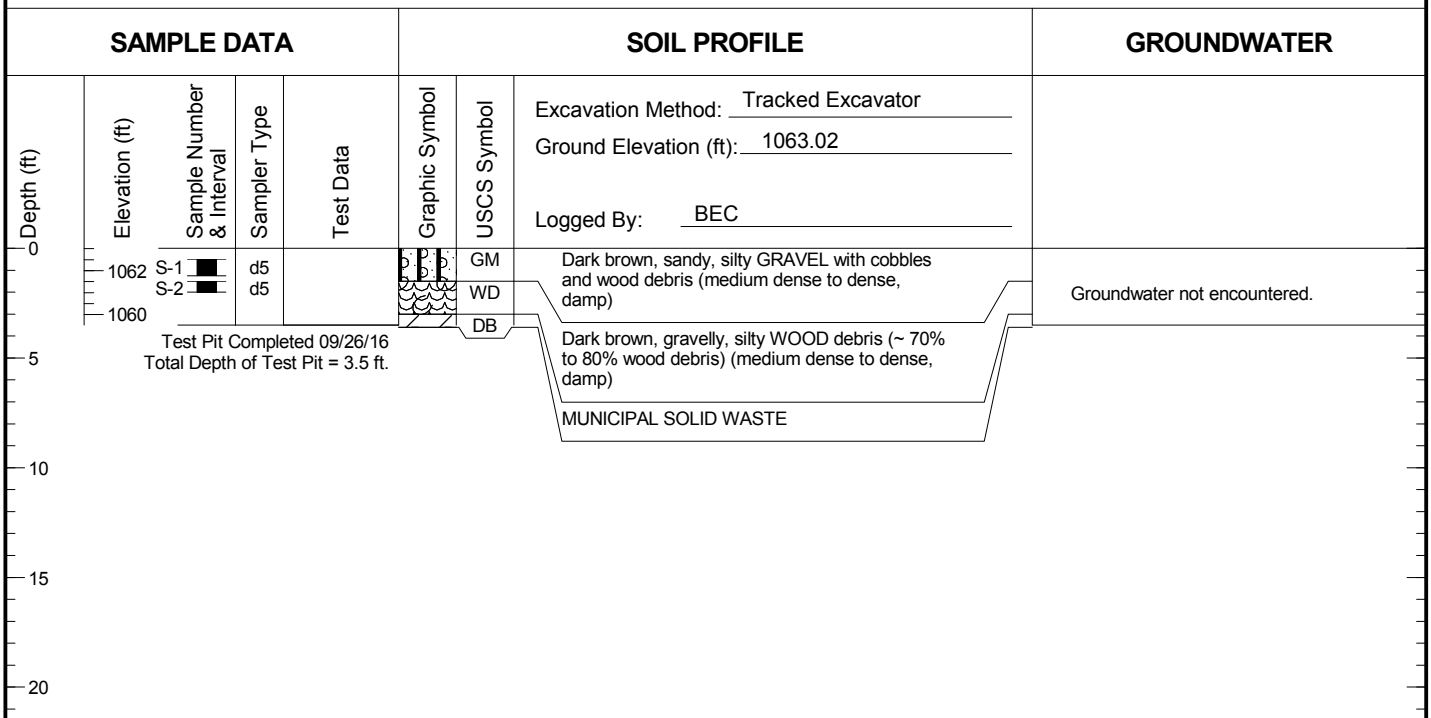
Log of Test Pits

Figure
A-2

TP-3-16



TP-4-16



Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

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Transportation Corridor Project
Yakima, Washington

Log of Test Pits

Figure
A-3

TP-5-16

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft): 1063.81 Logged By: BEC	
0	1062	S-1	d5			WD	Dark brown, gravelly WOOD debris with cobbles (~50 to 60% wood debris) (loose, dry)	Groundwater not encountered.
		S-2	d5			GP		
	1060	S-3	d5			WD	Gray, sandy GRAVEL (gravel and 3 inch minus crushed rock)(geotextile fabric at bottom of contact) (dense, damp)	
5						DB	Dark gray, gravelly, silty WOOD debris (mostly fine wood debris)(~70% wood debris) (medium dense to dense, damp)	
							MUNICIPAL SOLID WASTE	
10								
15								
20								

Test Pit Completed 09/26/16
Total Depth of Test Pit = 5.5 ft.

TP-6-16

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft): 1064.08 Logged By: BEC	
0	1064	S-1	d5			WD	Dark brown, WOOD debris with gravel (~50% wood)	Groundwater not encountered.
	1062	S-2	d5	CA-WD		WD		
		S-3	d5			DB	Dark brown to gray, gravelly, silty WOOD debris (mostly fine grain wood)(~80%)	
5							MUNICIPAL SOLID WASTE	
10								
15								
20								

Test Pit Completed 09/26/16
Total Depth of Test Pit = 4.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

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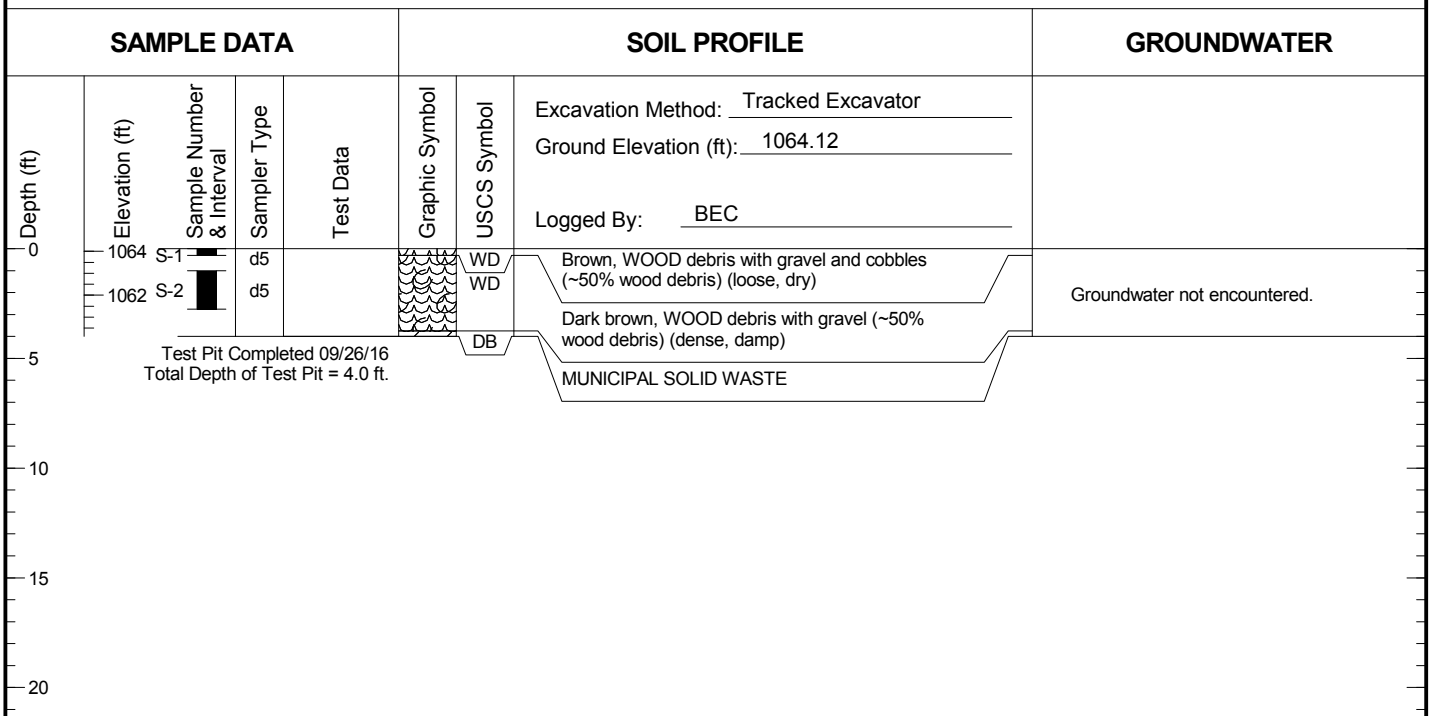
Transportation Corridor Project
Yakima, Washington

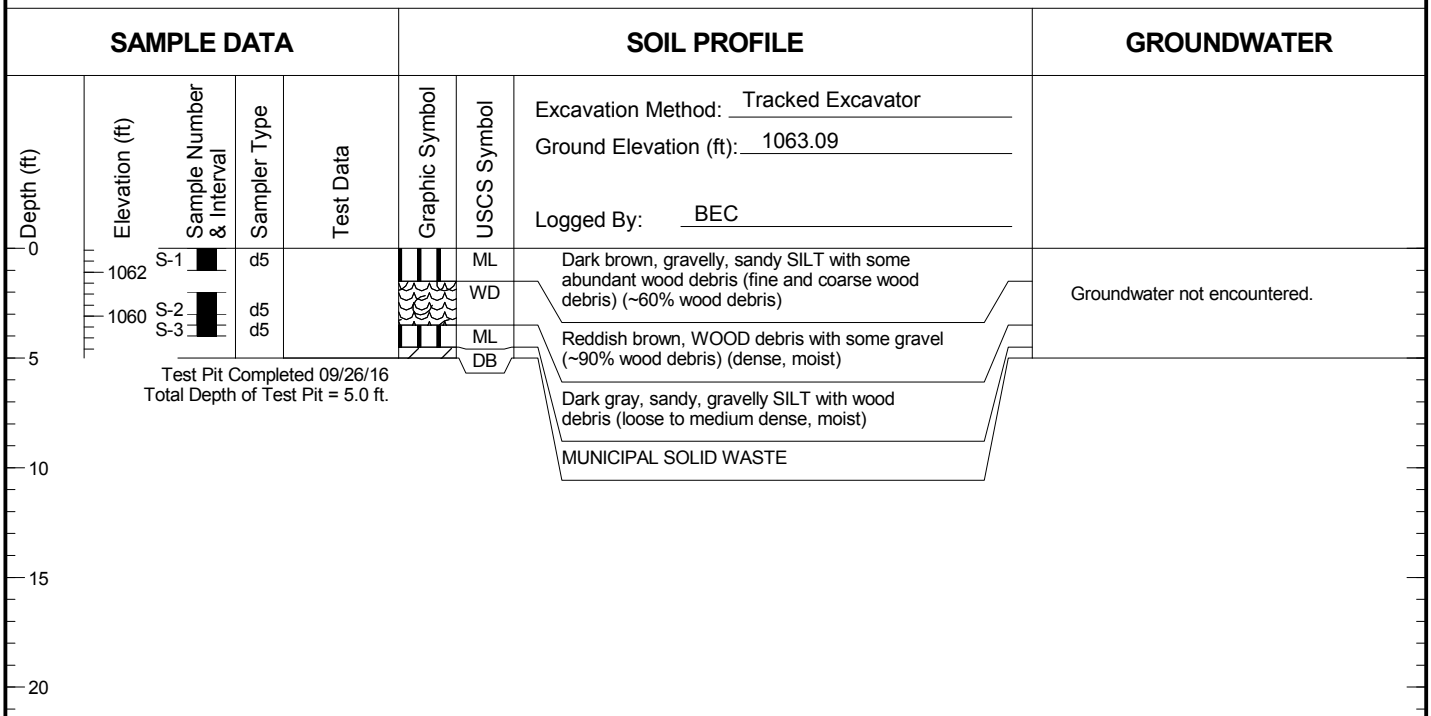
Log of Test Pits

Figure
A-4

TP-7-16



TP-8-16



Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

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Transportation Corridor Project
Yakima, Washington

Log of Test Pits

Figure
A-5

TP-9-16

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft): 1061.22 Logged By: BEC	
0	1060	S-1	d5	CA-WD		WD	Reddish brown, WOOD debris with some gravel (coarse wood debris to 3 foot length)(~90% wood debris) (medium dense, moist)	Groundwater not encountered.
		S-2	d5			DB	MUNICIPAL SOLID WASTE	
5								
10								
15								
20								

Test Pit Completed 09/26/16
Total Depth of Test Pit = 3.0 ft.

TP-9A-16

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft): 1062.37 Logged By: BEC	
0	1062	S-1	d5			WD	Dark Brown and reddish brown, WOOD debris with gravel and concrete debris (~90% wood debris) (medium dense, moist)	Groundwater not encountered.
	1060	S-2	d5			ML		
5						DB	Dark gray, sandy, gravelly SILT with debris (~20% wood and concrete debris) (dense, moist)	
10							MUNICIPAL SOLID WASTE	
15								
20								

Test Pit Completed 09/26/16
Total Depth of Test Pit = 4.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

1148009.010.013 12/2/16 N:\PROJECTS\1148009.010.013.GPJ TEST PIT LOG W/ ELEVATION

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Transportation Corridor Project
Yakima, Washington

Log of Test Pits

Figure
A-6

TP-9B-16

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft): 1064.69 Logged By: BEC	
0	1064	S-1	d5			GM	Brown, sandy, very silty GRAVEL with abundant wood debris (dense, dry to damp)	Groundwater not encountered.
		S-5	d5			WD		
	1062	S-2	d5					
5	1060	S-3	d5			WD	Brown, gravelly, sandy WOOD debris (dense, moist)	
	1058						Brown, WOOD debris (~70% shavings and 30% sawdust size wood debris)	
	1056	S-4	d5	CA-WD			WOOD debris (~10 to 15% bark, 25% sawdust, and 60% shaving size wood debris)	
10	1054							
	1052							
		S-6	d5					
15	1050							
20								

Test Pit Completed 09/29/16
Total Depth of Test Pit = 16.5 ft.

TP-9C-16

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft): 1064.65 Logged By: BEC	
0	1064	S-1	d5			WD	Brown, WOOD debris with gravel and sand (~80% bark and 15% shaving size wood debris) (dense, dry)	Groundwater not encountered.
	1062	S-2	d5			WD		
5	1060	S-3	d5	CA-WD			Brown, WOOD debris with gravel (~90% shaving and sawdust size wood debris) (medium dense to dense, damp)	
	1058						- numerous logs from 7 to 15 feet	
	1056	S-4	d5			WD	Brown, WOOD debris (~ 80% chips and 20% shavings size wood debris)	
10	1054	S-5	d5			WD	Brown, WOOD debris (~ 50% sawdust and 50% shavings size wood debris)	
	1052							
		S-6	d5					
15	1050							
20								

Test Pit Completed 09/30/16
Total Depth of Test Pit = 15.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

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Transportation Corridor Project
Yakima, Washington

Log of Test Pits

Figure
A-7

TP-09D-16

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft): 1061.83 Logged By: BEC	
0	1060	S-1	d5			WD	Brown, gravelly WOOD debris (~60% bark and 40% shaving size wood debris)	Groundwater not encountered.
						DB	MUNICIPAL SOLID WASTE	
5								
10								
15								
20								

Test Pit Completed 09/30/16
Total Depth of Test Pit = 2.5 ft.

TP-10-16

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft): 1064.21 Logged By: BEC	
0	1064	S-1	d5			GM	Brown, silty, sandy GRAVEL with cobbles and some wood debris (~ 10% wood debris) (medium dense, moist)	Groundwater not encountered.
		S-2	d5	CA-WD		WD		
	1062					WD		
		S-3	d5				Brown to reddish brown, WOOD debris with gravel (~90% wood debris) (dense, moist)	
5	1060	S-4	d5			WD		
	1058					WD	Brown, WOOD debris (~ 50% shaving and 50% sawdust size wood debris)	
	1056						Brown, WOOD debris with some gravel (~ 80% shaving and 15% bark size wood debris)	
10	1054	S-5	d5	CA-WD			Brown WOOD debris with numerous logs from 8 to 13 feet (~ 2 foot diameter to 8 foot lengths)	
	1052	S-6	d5					
	1050	S-7	d5				- becoming wet at 15 feet	
15								
20								

Test Pit Completed 09/26/16
Total Depth of Test Pit = 15.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

1148009.010.013 12/2/16 N:\PROJECTS\1148009.010.013.GPJ TEST PIT LOG W/ ELEVATION

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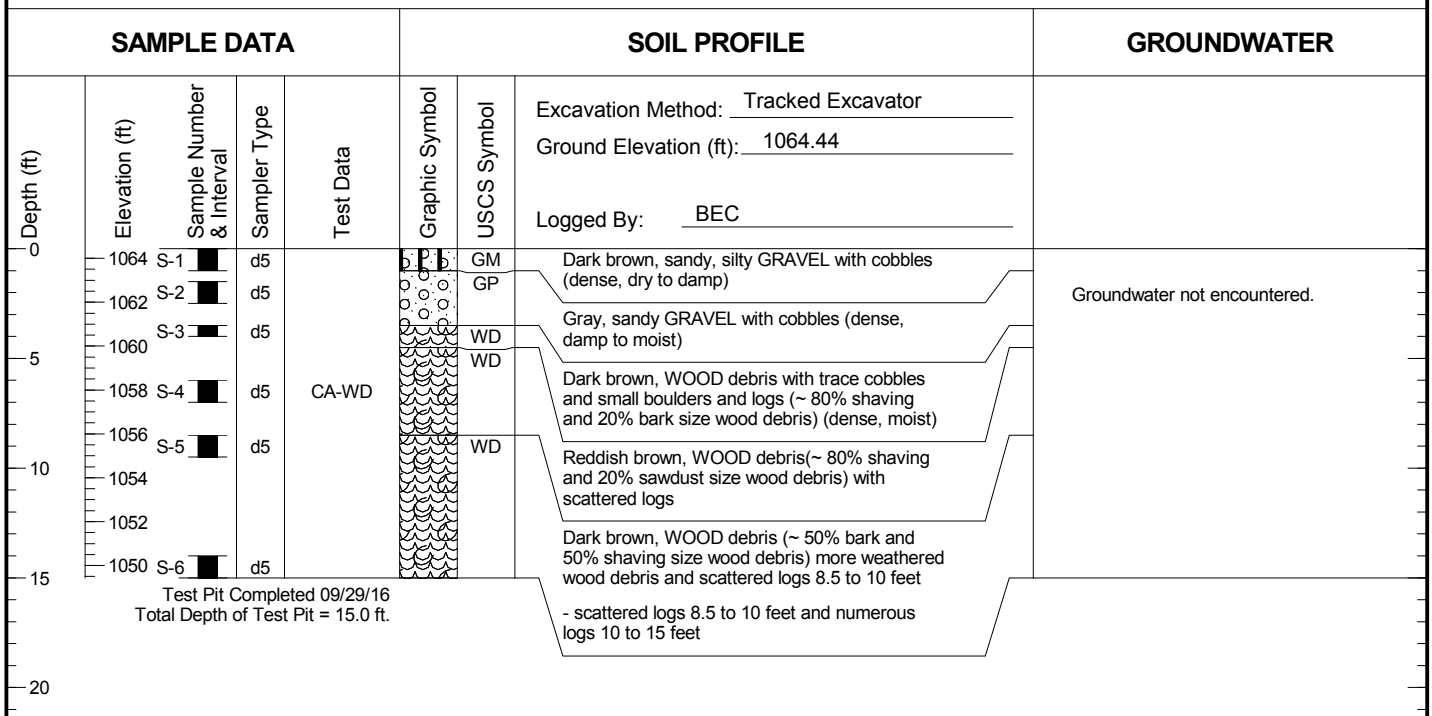
Yakima, Washington

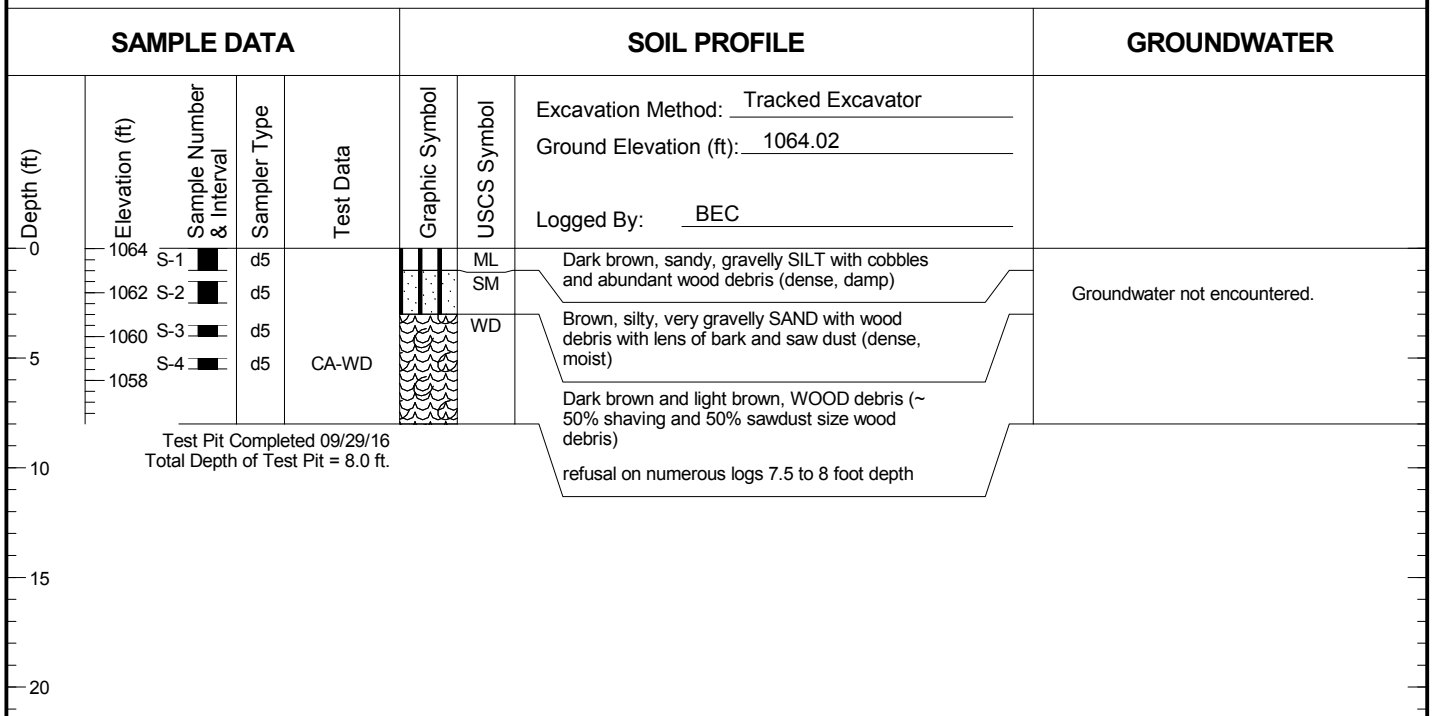
Log of Test Pits

Figure
A-8

TP-10A-16



TP-10B-16



Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

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Yakima, Washington

Log of Test Pits

Figure
A-9

TP-11-16

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft): 1064.72 Logged By: BEC	
0	1064	S-1	d5			WD	Brown, quarry spalls (6 to 8 minus) (very dense, moist)	Groundwater not encountered.
		S-2	d5			WD		
	1062	S-3	d5	CA-WD			Dark brown, sandy, gravelly WOOD debris (`30% wood debris) (dense, moist)	
5	1060						Reddish brown, WOOD debris (mixture of coarse and fine wood size debris)	
	1058	S-4	d5				- numberous logs 6 to 12 feet - refusal on numerous logs	
	1056	S-5	d5					
10	1054							
15								
20								

Test Pit Completed 09/26/16
Total Depth of Test Pit = 12.0 ft.

TP-11A-16

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft): 1065.07 Logged By: BEC	
0	1064	S-1	d5			GM	Brown, silty, sandy GRAVEL with cobbles (9 inch minus quarry spalls) (medium dense to dense, damp)	Groundwater not encountered.
						WD		
	1062	S-2	d5				Brown, silty, sandy WOOD debris (~ 50% wood debris) (medium dense, damp)	
5	1060	S-3	d5	CA-WD		WD	Brown, WOOD debris with trace cobbles and small boulders (~ 60% bark and 40% shaving and sawdust size wood debris)	
	1058						- logs 6 to 11 feet - refusal on logs running parallel to trench	
	1056							
10								
15								
20								

Test Pit Completed 09/29/16
Total Depth of Test Pit = 11.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

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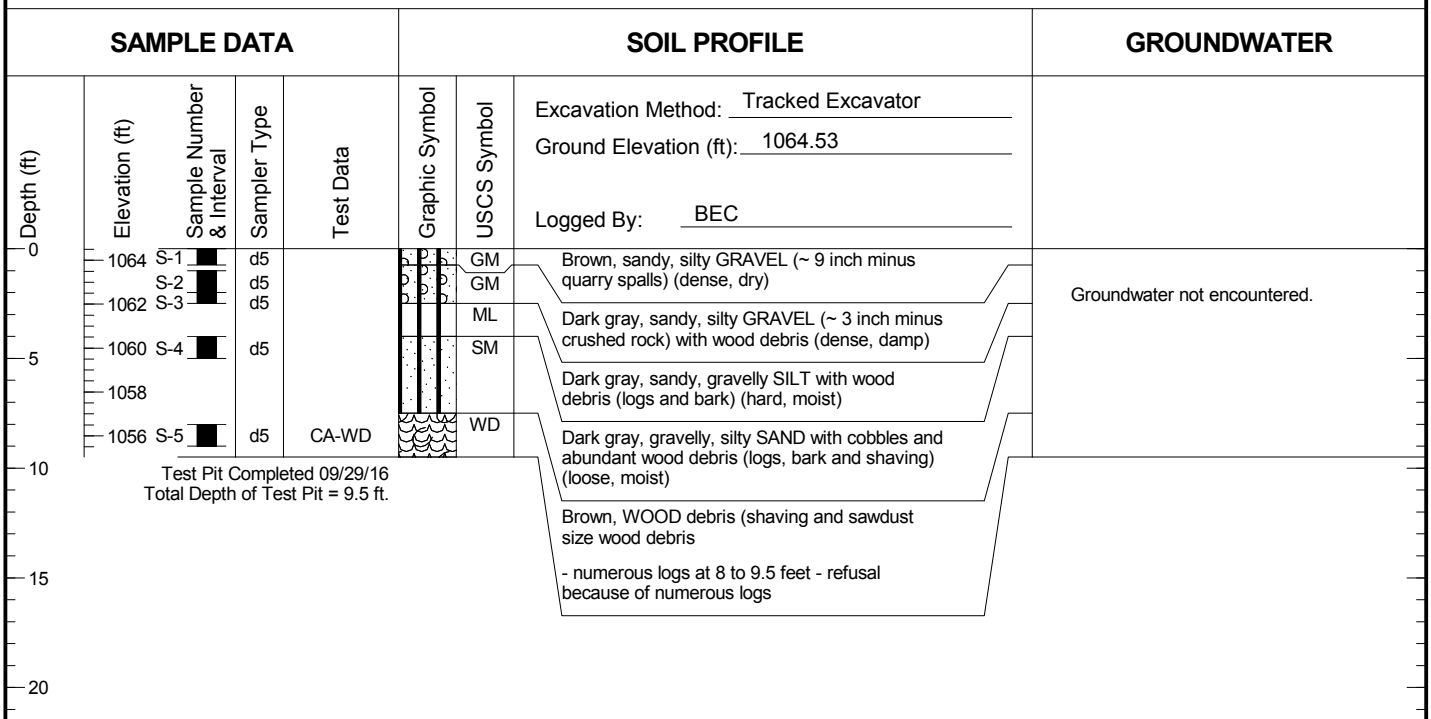
Yakima, Washington

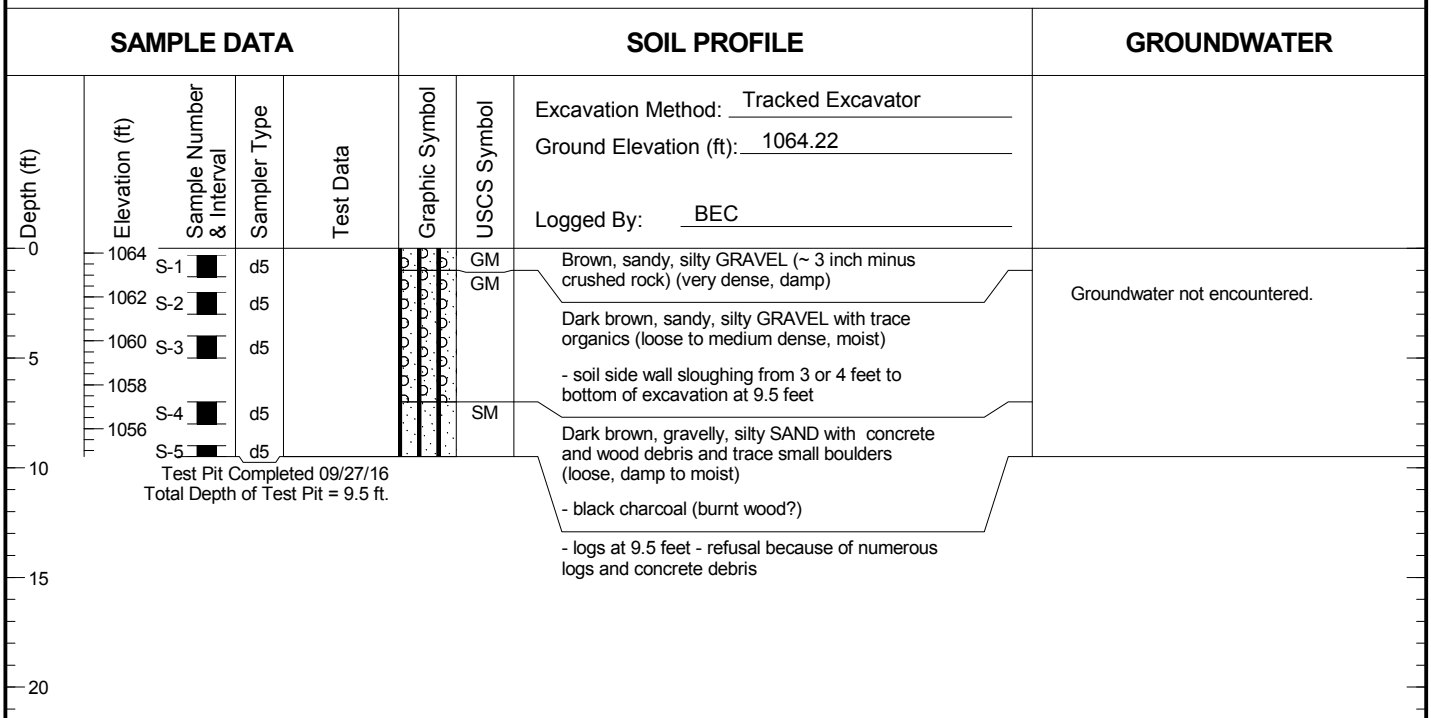
Log of Test Pits

Figure
A-10

TP-11B-16



TP-12-16



Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

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Log of Test Pits

Figure
A-11

TP-12A-16

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft): 1063.50 Logged By: BEC	
0	1062	S-1	d5			GM	Brown, silty, sandy GRAVEL with cobbles and concrete debris (16 inch diameter) and abundant wood debris (medium dense, dry to damp)	Groundwater not encountered.
		S-2	d5			GP-GM		
5	1060	S-3	d5			GP-GM	Gray, sandy, cobbly GRAVEL with silt (dense, damp)	
	1058							
	1056	S-4	d5			GM	Dark gray, medium to coarse sandy, very cobbly GRAVEL with silt and trace wood debris (medium dense to dense, damp)	
10	1054						Dark brown, silty, sandy GRAVEL with cobbles and trace wood debris (dense, moist) - abandoned excavation because of concern of utilities below a pea gravel layer crossing excavation base (dense, moist)	
15								
20								

Test Pit Completed 09/30/16
Total Depth of Test Pit = 10.0 ft.

TP-13-16

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft): 1064.65 Logged By: BEC	
0	1064	S-1	d5			WD	WOOD debris (chip size wood debris)	
		S-2	d5			GM		
	1062	S-3	d5			GM	Brown, sandy, silty GRAVEL and cobbles (rounded and crushed) with concrete and wood debris (~5% wood debris) (dense, damp)	
		S-4	d5					
5	1060					SP-SM	Gray, sandy GRAVEL (1 1/4 inch minus crushed) with silt and some wood debris (dense, damp)	
	1058	S-5	d5			GP		
	1056	S-6	d5			WD	Gray, gravelly SAND with silt, cobbles, and small boulders and wood and concrete debris (medium dense, moist)	
10	1054							
	1052	S-7	d5			WD	Gray, sandy GRAVEL with cobbles and small boulders (medium dense, moist)	▽ Slow Seepage groundwater seepage encountered at 15.0 ft.
15	1050	S-8	d5				Reddish brown, WOOD debris with gravel and sand	
20							Brown, WOOD debris (sawdust size wood debris)	

Test Pit Completed 09/27/16
Total Depth of Test Pit = 15.3 ft.

Notes:
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3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

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Yakima, Washington

Log of Test Pits

Figure
A-12

TP-13A-16

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft): 1062.73 Logged By: BEC	
0	1062	S-1	d5			GM	Brown, sandy, silty GRAVEL (9 inch minus quarry spalls) with wood debris (dense, damp)	
		S-2	d5			GP		
	1060						Gray and brown, medium to coarse sandy GRAVEL with cobbles and trace silt and wood debris (dense, damp)	
5	1058	S-3	d5			WD		
	1056					GP/ GM	Brown, WOOD debris (~ 90% bark and 10% shaving size wood debris)	
	1054	S-4	d5				Brown, sandy, cobbly GRAVEL with varing silt content (loose, damp)	
10	1052	S-5	d5			SM	Gray, silty medium SAND (loose, moist)	
	1050	S-6	d5			GP	Gray to brown, medium to coarse sandy, cobbly GRAVEL (medium dense to dense, moist to wet)	▽ Moderate Seepage groundwater seepage encountered at 13.5 ft.
15							- excavation stopped because of water in excavation, excavation was 35 foot long due to old loose backfill (trench fill)	
20								

Test Pit Completed 09/29/16
Total Depth of Test Pit = 14.0 ft.

TP-14-16

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft): 1063.52 Logged By: BEC	
0		S-1	d5			GP-GM	Brown, sandy GRAVEL (3 inch minus crushed) with silt and trace wood debris (very dense, dry)	
	1062	S-2	d5			GP	Gray, sandy, very cobbly GRAVEL with trace silt and small boulders (dense, damp to moist)	
	1060	S-3	d5					
5	1058							
	1056	S-4	d5			SM	Dark gray, gravelly, silty SAND with wood debris (loose, moist)	
	1054	S-5	d5			SM	Dark gray, gravelly, very silty, fine to medium SAND with some wood debris (loose to medium dense, moist)	
10	1052							▽ Moderate Seepage groundwater seepage encountered at 13.0 ft.
		S-6	d5			GP	Gray, medium to coarse sandy, cobbly GRAVEL (medium dense, moist)	
15								
20								

Test Pit Completed 09/27/16
Total Depth of Test Pit = 13.5 ft.

Notes:
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2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

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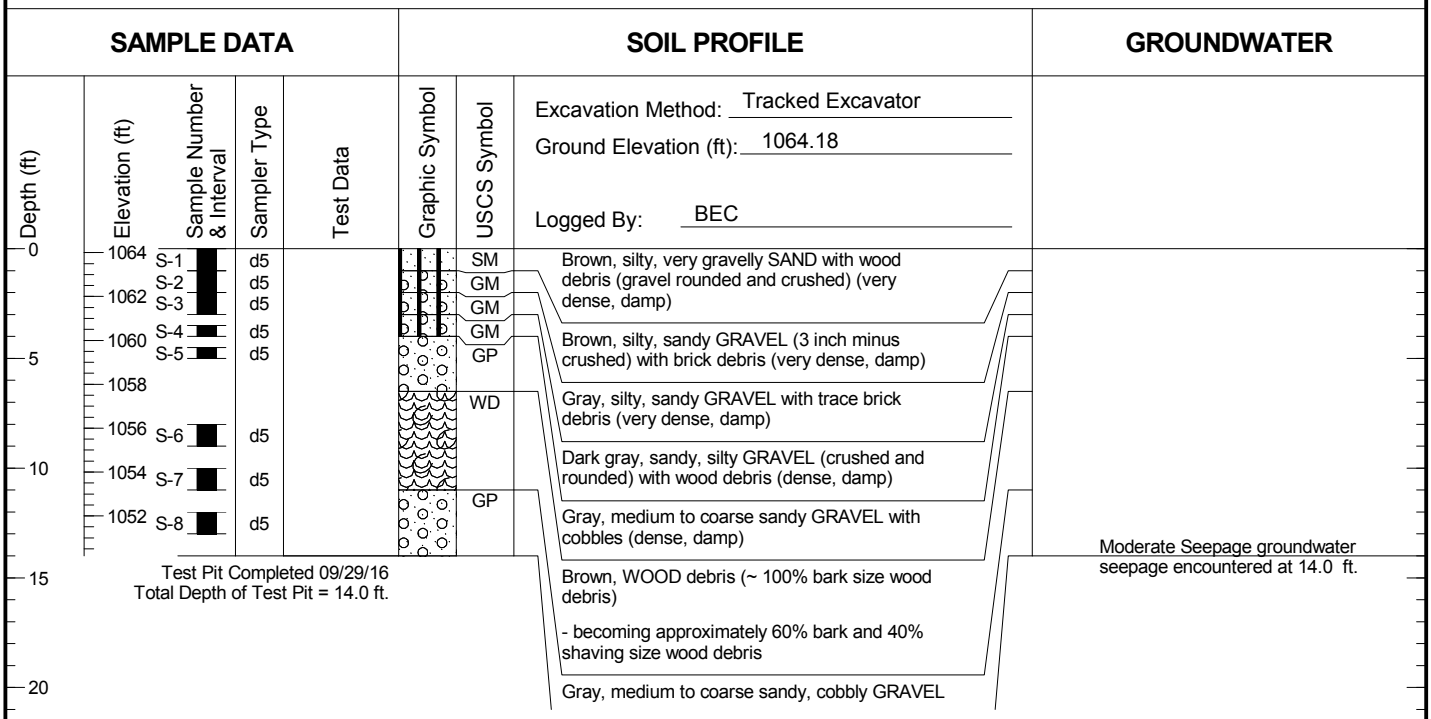
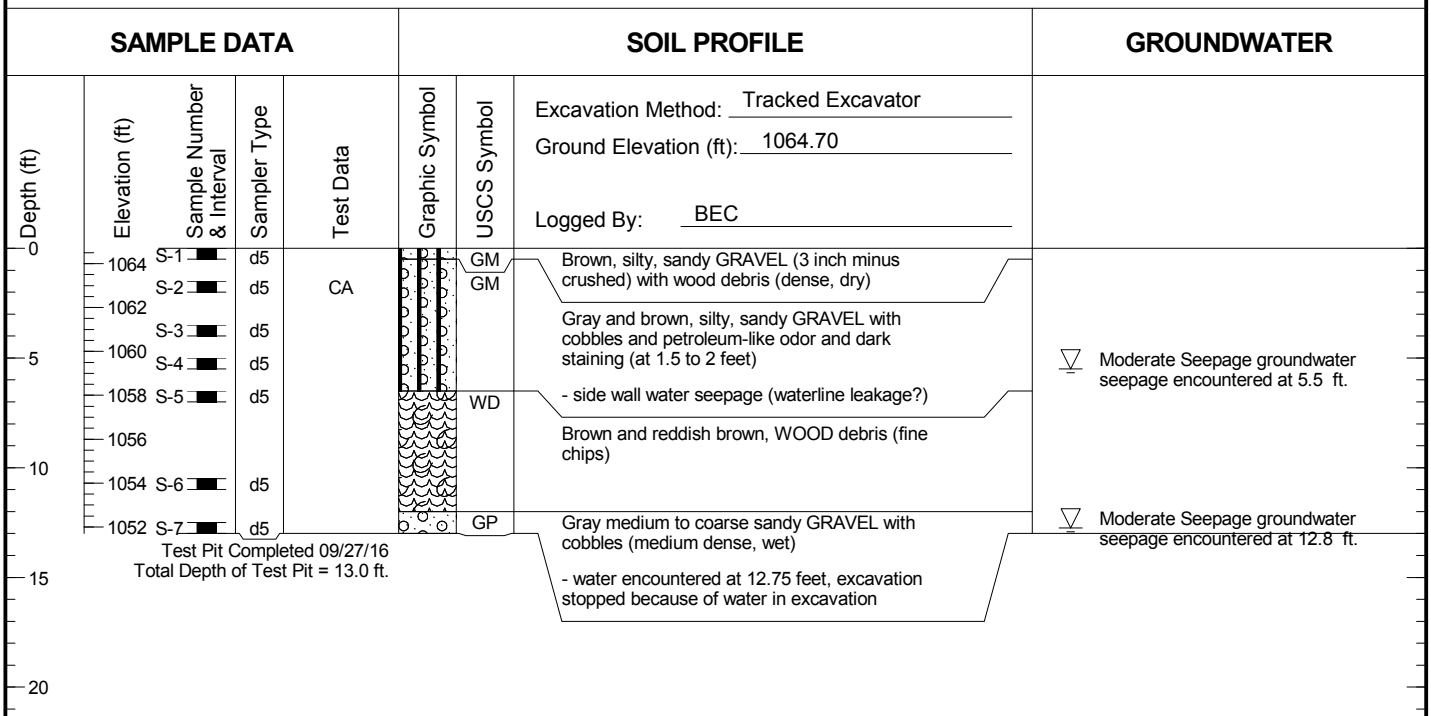
Log of Test Pits

Figure
A-13

TP-14A-16



TP-15-16



Notes:
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2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
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Log of Test Pits

Figure
A-14

TP-16-16

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft): 1066.46 Logged By: BEC	
0	1066	S-1	d5			GM	Brown, silty, sandy GRAVEL with cobbles and trace wood debris (dense, dry)	Groundwater not encountered.
	1064	S-2	d5			GM	Gray, sandy, silty GRAVEL and BOULDERS (basalt rock to 3 to 4 foot length) (medium dense to dense, damp)	
5	1062							
	1060	S-3	d5				- refusal at 6.75 feet because of large boulders	
		S-3	d5					
		Test Pit Completed 09/27/16 Total Depth of Test Pit = 6.8 ft.						
10								
15								
20								

TP-16A-16

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft): 1065.34 Logged By: BEC	
0	1064	S-1	d5			GM	Light brown, sandy, GRAVEL with cobbles (medium dense to dense, damp)	Groundwater not encountered.
		S-2	d5				Dark gray, sandy, silty BOULDER (basalt rock to 3 foot diameter) (medium dense to dense, damp)	
		Test Pit Completed 09/28/16 Total Depth of Test Pit = 2.5 ft.					- refusal at 2.25 feet because of large boulders	
5								
10								
15								
20								

Notes:
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3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

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Log of Test Pits

Figure
A-15

TP-16B-16

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft): 1065.36 Logged By: BEC	
0	1064	S-1	d5	CA		GM	Dark gray, sandy, silty GRAVEL with cobbles and boulders with petroleum like odor and staining (at 1 to 2,5 feet) and some concrete, wood, metal, and plastic debris (construction debris?) (medium dense, damp)	Groundwater not encountered.
		S-2	d5				Dark gray, sandy, silty BOULDER (basalt rock to 3 foot diameter) (medium dense, moist) - refusal at 2.75 feet because of large boulders	
5								
10								
15								
20								

Test Pit Completed 09/28/16
Total Depth of Test Pit = 3.0 ft.

TP-16C-16

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft): 1073.87 Logged By: BEC	
0	1072	S-1	d5			GM	Brown, silty, sandy, very cobbly GRAVEL (quarry spalls to 12 diameter and rounded gravel) (dense, dry to damp)	Groundwater not encountered.
		S-2	d5				Dark gray, sandy, silty BOULDER (basalt rock to 3 to 4 foot diameter) (medium dense to dense, dry to damp) - refusal at 4 feet because of large boulders	
	1070							
5								
10								
15								
20								

Test Pit Completed 09/30/16
Total Depth of Test Pit = 4.0 ft.

Notes:
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2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

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Yakima, Washington

Log of Test Pits

Figure
A-16

TP-17-16

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft): 1066.22 Logged By: BEC	
0	1066						Dark gray, sandy, silty BOULDER (basalt rock to 3 to 4 foot diameter) (medium dense to dense, dry to damp)	Groundwater not encountered.
	1064	S-1	d5					
	1062						- refusal at 4.5 feet because of large boulders	
5								
10								
15								
20								

Test Pit Completed 09/27/16
Total Depth of Test Pit = 4.5 ft.

TP-18-16

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft): 1069.17 Logged By: BEC	
0	1068	S-1	d5				Dark gray, sandy, silty BOULDER (basalt rock to 3 to 4 foot diameter) with wood debris and logs (dense, damp)	Groundwater not encountered.
							- refusal at 3 feet because of large boulders	
5								
10								
15								
20								

Test Pit Completed 09/27/16
Total Depth of Test Pit = 3.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

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Log of Test Pits

Figure
A-17

TP-18A-16

SAMPLE DATA | **SOIL PROFILE** | **GROUNDWATER**

Excavation Method: Tracked Excavator
Ground Elevation (ft): 1069.34
Logged By: BEC

Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Soil Profile
0	1068	S-1	d5			GM	Dark brown, sandy, very silty GRAVEL with cobbles (9 inch minus quarry spalls) (dense, dry to damp)
		S-2	d5			GM	
	1066	S-3	d5			ML	Gray, silty, sandy GRAVEL (2 1/4 inch minus crushed rock) and abundant concrete (8 to 9 inch length)
5	1064						
	1062	S-4	d5			SM	Brown, gravelly, fine sandy SILT with cobbles and some wood debris (lumber) and boulders and some reinforcing steel debris (medium dense to dense, damp)
	1060						
10		S-5	d5				Gray, very silty, fine SAND (loose, damp to moist)
15							Dark gray, silty, sandy, cobbly BOULDERS with some voids between boulders (basalt rock to 4.5 foot diameter) (loose, moist)
							- refusal at 11 feet because of large boulders
20							

Test Pit Completed 09/30/16
Total Depth of Test Pit = 11.0 ft.

Groundwater not encountered.

TP-19-16

SAMPLE DATA | **SOIL PROFILE** | **GROUNDWATER**

Excavation Method: Tracked Excavator
Ground Elevation (ft): 1070.00
Logged By: BEC

Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Soil Profile
0	1070					AC	Asphalt pavement (0.25 to 0.2 foot thickness) and 0.4 foot thickness 5/8 inch minus crushed rock (dense, damp)
	1068	S-1	d5				Brown, sandy, gravelly COBBLE (dense, damp)
	1066						
5	1064	S-2	d5				
	1062	S-3	d5			GP	Brown to gray brown, medium to coarse sandy, cobbly GRAVEL (medium dense, damp)
10	1060						
	1058	S-4	d5				
15							
20							

Test Pit Completed 09/27/16
Total Depth of Test Pit = 12.5 ft.

▽ Moderate Seepage groundwater seepage encountered at 12.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
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Log of Test Pits

Figure
A-18

TP-20-16

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft): 1070.87 Logged By: BEC	
0	1070	S-1	d5			GM	Brown, sandy, silty GRAVEL with abundant wood debris (1 1/4 inch minus crushed rock) (dense, dry to damp)	Groundwater not encountered.
	1068	S-2	d5			SM		
		S-3	d5			GP	Light reddish brown, very silty, fine SAND (medium dense, damp)	
5	1066							
	1064	S-4	d5				Brown, medium to coarse sandy GRAVEL with cobbles and trace silt (dense, damp)	
10							refusal at 8.5 feet with heavy soil side wall caving - caving from 4 to 8.5 feet	
15								
20								

Test Pit Completed 09/27/16
Total Depth of Test Pit = 8.5 ft.

TP-21-16

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft): 1071.26 Logged By: BEC	
0		S-1	d5			PT	Sod/Topsoil	
	1070	S-2	d5			ML		Groundwater not encountered.
	1068	S-3	d5			GP	Light brown, fine sandy SILT with roots and gravel (medium dense, dry to damp)	
5	1066	S-4	d5				Gray brown, sandy, very cobbly GRAVEL (dense, damp)	
	1064	S-5	d5					
10							refusal at 8 feet with heavy soil side wall caving - caving from 3 to 8 feet	
15								
20								

Test Pit Completed 09/27/16
Total Depth of Test Pit = 8.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

TP-22-16

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft): 1071.03 Logged By: BEC	
0	1070	S-1	d5			PT	Sod/Topsoil	
	1068	S-2	d5			SM GM	Light brown, gravelly, silty, fine SAND (dense, damp)	Groundwater not encountered.
5	1066	S-3	d5				Light brown, silty, sandy, cobbly GRAVEL grading to no silt (dense, damp)	
	1064						- small boulders beginning at 6 feet	
	1062	S-4	d5					
10	1060	S-5	d5					
	1058							
15		S-6	d5					

Test Pit Completed 09/28/16
Total Depth of Test Pit = 15.0 ft.

TP-23-16

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft): 1071.22 Logged By: BEC	
0	1070	S-1	d5			PT	Sod/Topsoil	
	1068					SM	Light brown, very silty, fine SAND with gravel (medium dense, damp to moist)	
		S-2	d5					
5	1066	S-3	d5					
		S-4	d5			GM	Light brown, silty, fine to medium sandy, cobbly GRAVEL	
	1064							
	1062	S-5	d5			GP	Light brown, sandy, cobbly GRAVEL with trace silt (medium dense, moist to wet)	
10	1060							
		S-6	d5					
	1058	S-7	d5				- water encountered at 14.5 feet	Moderate Seepage groundwater seepage encountered at 14.5 ft.
15								

Test Pit Completed 09/28/16
Total Depth of Test Pit = 14.5 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

1148009.010.013 12/2/16 N:\PROJECTS\1148009.010.013.GPJ TEST PIT LOG W/ ELEVATION

LANDAU ASSOCIATES

Transportation Corridor Project
Yakima, Washington

Log of Test Pits

Figure
A-20

TP-24-16

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft): 1064.71 Logged By: BEC	
0	1064	S-1	d5			SM	Light brown, gravelly, silty SAND with concrete debris and few metal and brick debris (medium dense, damp)	Groundwater not encountered.
	1062	S-2	d5			DB	Light brown, CONCRETE debris with silt, sand, and gravel (concrete debris 0 to 2.5 foot thickness and 5 to 6 foot in length) voids under some of the concrete debris	
5	1060						refusal at 6 feet in concrete debris	
10								
15								
20								

Test Pit Completed 09/28/16
Total Depth of Test Pit = 6.0 ft.

TP-24A-16

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft): 1064.54 Logged By: BEC	
0	1064	S-1	d5			GM	Brown, sandy, very silty GRAVEL with cobbles (dense, dry to damp)	Groundwater not encountered.
	1062	S-2	d5			GM	Dark gray, silty, sandy GRAVEL with concrete and reinforcing steel debris (medium dense to dense, damp)	
5	1060	S-3	d5			SM	Gray, very silty, fine to medium SAND with wood debris (loose to medium dense, damp)	
	1058	S-4	d5			GP	Gray, medium to coarse sandy GRAVEL with cobbles (loose to medium dense, damp)	
	1056	S-5	d5			WD	Brown, WOOD debris (sawdust size wood debris)	
10							- test pit location at end of abundant concrete debris beginning at TP-24A-16 (65' length trench excavated)	
15								
20								

Test Pit Completed 09/28/16
Total Depth of Test Pit = 9.5 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

1148009.010.013 12/2/16 N:\PROJECTS\1148009.010.013.GPJ TEST PIT LOG W/ ELEVATION

LANDAU ASSOCIATES

Transportation Corridor Project
Yakima, Washington

Log of Test Pits

Figure
A-21

TP-25-16

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft): 1064.57 Logged By: BEC	
0	1064	S-1	d5			GM	Dark brown, sandy, silty GRAVEL with cobbles and some wood debris (very dense, damp)	
	1062	S-2	d5			GP		
	1060	S-3	d5			SM	Gray, medium sandy GRAVEL with cobbles and trace silt (very dense, damp)	
5	1058	S-4	d5				Dark gray, very silty, fine SAND with lens of wood debris from 4 to 7 feet (sawdust size wood debris) (dense, damp to moist)	
	1056	S-5	d5	CA-WD		WD	Brown, WOOD debris (~ 80% bark and 20% sawdust and grading to 40% bark and 60% sawdust size wood debris)	
10	1054							
	1052	S-6	d5					
		S-7	d5			GP	Gray, medium to coarse sandy GRAVEL with cobbles (dense, wet) - water encountered at 14.5 feet	Moderate Seepage groundwater seepage encountered at 14.5 ft.
15								
20								

Test Pit Completed 09/28/16
Total Depth of Test Pit = 14.5 ft.

TP-26-16

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft): 1065.12 Logged By: BEC	
0	1064	S-1	d5			GM	Brown, silty, sandy GRAVEL (9 to 12 inch minus quarry spalls) with abundant wood debris (medium dense, damp)	
		S-2	d5			WD		Groundwater not encountered.
	1062	S-3	d5	CA-WD		WD	Reddish brown, WOOD debris (~ 9 to 12 inch minus bark and shaving size debris)	
5	1060	S-4	d5				Reddish brown, WOOD debris (~ 8 inch minus bark and chip size 4 to 10 feet and below 10 feet 90% bark and 10% shavings sized wood debris)	
	1058	S-5	d5					
	1056					WD	- numberous logs below 10 feet	
10	1054	S-6	d5				Brown, WOOD debris (~ 80% shaving and 20% bark wood size debris)	
	1052							
		S-7	d5			DB	MUNICIPAL SOLID WASTE	
15								
20								

Test Pit Completed 09/28/16
Total Depth of Test Pit = 15.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

TP-26A-16

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft): 1065.56 Logged By: BEC	
0	1064	S-1	d5			WD	Brown, gravelly, sandy WOOD debris (~80% bark and shaving wood debris) with layers of gray and brown sandy GRAVEL (9 inch minus quarry spalls) with wood debris (medium dense, moist)	Groundwater not encountered.
	1062	S-2	d5			WD		
5	1060	S-3	d5	CA-WD			Brown, WOOD debris (~ 80% bark and 20% shaving at 6 feet 50% bark and 50% shaving size wood debris) - logs at 9 to 15 feet	
	1058							
10	1056	S-4	d5					
	1054					WD	Brown, WOOD debris (~ 50% sawdust and 50% shaving size wood debris)	
15	1052	S-5	d5					
20								

Test Pit Completed 09/30/16
Total Depth of Test Pit = 15.0 ft.

TP-26B-16

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft): 1065.49 Logged By: BEC	
0	1064	S-1	d5			GM	Brown, silty, sandy GRAVEL (9 inch minus quarry spalls with some rounded gravel) (medium dense, moist)	Groundwater not encountered.
		S-2	d5					
	1062					WD	Gray brown, silty, gravelly COBBLE (12 inch minus quarry spalls) (medium dense, moist)	
5	1060	S-3	d5	CA-WD			Reddish brown, WOOD debris (~ 50% bark and 50% shaving size wood debris)	
	1058							
						DB	MUNICIPAL SOLID WASTE	
10								
15								
20								

Test Pit Completed 09/30/16
Total Depth of Test Pit = 8.5 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

1148009.010.013 12/2/16 N:\PROJECTS\1148009.010.013.GPJ TEST PIT LOG W/ ELEVATION

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Transportation Corridor Project
Yakima, Washington

Log of Test Pits

Figure
A-23

TP-27-16

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft): 1060.29 Logged By: BEC	
0	1060	S-1	d5			WD	Brown, WOOD debris (bark and chips) with 30 foot long by 2 foot diameter log	Groundwater not encountered.
	1058					DB	MUNICIPAL SOLID WASTE	
5								
10								
15								
20								

Test Pit Completed 09/28/16
Total Depth of Test Pit = 3.0 ft.

TP-28-16

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft): 1061.00 Logged By: BEC	
0	1060	S-1	d5	CA-WD		WD	Brown, WOOD debris (~ 80% bark and 20% shaving size wood debris)	Groundwater not encountered.
						DB	MUNICIPAL SOLID WASTE	
5								
10								
15								
20								

Test Pit Completed 09/28/16
Total Depth of Test Pit = 2.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

TP-29-16

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft): 1060.28 Logged By: BEC	
0	1060	S-1	d5			ML	Brown, sandy, very gravelly SILT with abundent of wood debris (~ 20%) (dense, damp)	Groundwater not encountered.
	1058	S-2	d5			SM		
		S-3	d5				Gray, silty, fine to medium SAND to gravelly, silty, fine to medium SAND with wood debris (medium dense, moist)	
5	1056					GM		
						DB	Gray, silty, very sandy GRAVEL with wood debris with logs from 4 to 6 feet	
							MUNICIPAL SOLID WASTE	
10								
15								
20								

Test Pit Completed 09/28/16
Total Depth of Test Pit = 5.5 ft.

TP-30-16

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft): 1059.82 Logged By: BEC	
0		S-1	d5			WD	Dark brown, WOOD debris with silt, sand, and gravel (~ 80% wood debris)	Groundwater not encountered.
	1058	S-2	d5			SM		
						DB	Gray, silty, very gravelly, fine to medium SAND with some plastic and rubber tire (medium dense, moist)	
5							MUNICIPAL SOLID WASTE	
10								
15								
20								

Test Pit Completed 09/28/16
Total Depth of Test Pit = 2.5 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

TP-31-16

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft): 1058.54 Logged By: BEC	
0	1058	S-1	d5			WD	Brown, WOOD debris (~ 50% bark, 30% shaving, and 20% sawdust size wood debris)	Groundwater not encountered.
		S-2	d5			ML		
						DB	Gray, sandy, very gravelly SILT (medium stiff, moist)	
5							MUNICIPAL SOLID WASTE	
10								
15								
20								

Test Pit Completed 09/29/16
Total Depth of Test Pit = 2.0 ft.

TP-32-16

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft): 1058.12 Logged By: BEC	
0	1058	S-1	d5			WD	Brown to reddish brown, WOOD debris with some sand and gravel (~ 40% shaving, 25% bark, and 25% sawdust size wood debris)	Groundwater not encountered.
	1056	S-2	d5			SM		
						DB	Dark gray, gravelly, silty, fine to medium SAND with scattered plastic, wood, and metal debris (medium dense, moist to wet)	
5							MUNICIPAL SOLID WASTE	
10								
15								
20								

Test Pit Completed 09/29/16
Total Depth of Test Pit = 3.5 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

TP-33-16

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft): 1058.41 Logged By: BEC	
0	1058	S-1	d5			ML	Brown, gravelly, sandy SILT with glass and abundant wood debris (loose, damp)	Groundwater not encountered.
						DB	MUNICIPAL SOLID WASTE	
5								
10								
15								
20								

Test Pit Completed 09/29/16
Total Depth of Test Pit = 1.8 ft.

TP-34-16

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol	Excavation Method: Tracked Excavator Ground Elevation (ft): 1064.21 Logged By: BEC	
0	1064	S-1	d5			WD	Reddish brown, WOOD debris with gravel (6 inch minus quarry spalls) (~ 70% bark and 25% shaving size wood debris) (medium dense, moist)	Groundwater not encountered.
	1062	S-2	d5			GM		
	1060	S-3	d5			WD	Gray, sandy, silty, gravelly COBBLE (12 inch quarry spalls) (dense, wet)	
5	1058	S-4	d5	CA-WD			Brown, WOOD debris (~ 80 to 100% bark and 0 to 20% shaving size wood debris)	
	1056							
10	1054	S-5	d5	CA-WD			- numerous logs 10 to 15 feet	
	1052							
	1050	S-6	d5			ML	Gray, sandy, gravelly SILT with abundant wood debris (medium dense, wet)	
15	1048	S-7	d5			GP-GM	Gray, medium to coarse cobbly GRAVEL with silt (dense, moist)	
20								

Test Pit Completed 09/30/16
Total Depth of Test Pit = 16.5 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

TP-34A-16

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation (ft)	Sample Number & Interval	Sampler Type	Test Data	Graphic Symbol	USCS Symbol		
0	1058	S-1	d5	CA-WD		WD	Brown, WOOD debris (~ 100% bark size wood debris)	Groundwater not encountered.
	1056					GP	Gray, medium to coarse sandy GRAVEL with cobbles (medium dense, moist)	
5						DB	MUNICIPAL SOLID WASTE	
10								
15								
20								

Excavation Method: Tracked Excavator

Ground Elevation (ft): 1058.82

Logged By: BEC

Test Pit Completed 09/30/16
Total Depth of Test Pit = 3.5 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

1148009.010.013 12/2/16 N:\PROJECTS\1148009.010.013.GPJ TEST PIT LOG W/ ELEVATION

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Yakima, Washington

Log of Test Pits

Figure
A-28

APPENDIX B

Landfill Gas Probes Logs

Soil Classification System

MAJOR DIVISIONS			GRAPHIC SYMBOL	USCS LETTER SYMBOL[1]	TYPICAL DESCRIPTIONS [2][3]
COARSE-GRAINED SOIL (More than 50% of material is larger than No. 200 sieve size)	GRAVEL AND GRAVELLY SOIL (More than 50% of coarse fraction retained on No. 4 sieve)	CLEAN GRAVEL (Little or no fines)		GW	Well-graded gravel; gravel/sand mixture(s); little or no fines
				GP	Poorly graded gravel; gravel/sand mixture(s); little or no fines
		GRAVEL WITH FINES (Appreciable amount of fines)		GM	Silty gravel; gravel/sand/silt mixture(s)
				GC	Clayey gravel; gravel/sand/clay mixture(s)
	SAND AND SANDY SOIL (More than 50% of coarse fraction passed through No. 4 sieve)	CLEAN SAND (Little or no fines)		SW	Well-graded sand; gravelly sand; little or no fines
				SP	Poorly graded sand; gravelly sand; little or no fines
		SAND WITH FINES (Appreciable amount of fines)		SM	Silty sand; sand/silt mixture(s)
				SC	Clayey sand; sand/clay mixture(s)
FINE-GRAINED SOIL (More than 50% of material is smaller than No. 200 sieve size)	SILT AND CLAY (Liquid limit less than 50)			ML	Inorganic silt and very fine sand; rock flour; silty or clayey fine sand or clayey silt with slight plasticity
				CL	Inorganic clay of low to medium plasticity; gravelly clay; sandy clay; silty clay; lean clay
				OL	Organic silt; organic, silty clay of low plasticity
	SILT AND CLAY (Liquid limit greater than 50)			MH	Inorganic silt; micaceous or diatomaceous fine sand
				CH	Inorganic clay of high plasticity; fat clay
				OH	Organic clay of medium to high plasticity; organic silt
	HIGHLY ORGANIC SOIL			PT	Peat; humus; swamp soil with high organic content

OTHER MATERIALS	GRAPHIC SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
PAVEMENT		AC or PC	Asphalt concrete pavement or Portland cement pavement
ROCK		RK	Rock (See Rock Classification)
WOOD		WD	Wood, lumber, wood chips
DEBRIS		DB	Construction debris, garbage

Notes:
1. USCS letter symbols correspond to symbols used by the Unified Soil Classification System and ASTM classification methods. Dual letter symbols (e.g., SP-SM for sand or gravel) indicate soil with an estimated 5-15% fines. Multiple letter symbols (e.g., ML/CL) indicate borderline or multiple soil classifications.
2. Soil descriptions are based on the general approach presented in the Standard Practice for Description and Identification of Soils (Visual-Manual Procedure), outlined in ASTM D 2488. Where laboratory index testing has been conducted, soil classifications are based on the Standard Test Method for Classification of Soils for Engineering Purposes, as outlined in ASTM D 2487.
3. Soil description terminology is based on visual estimates (in the absence of laboratory test data) of the percentages of each soil type and is defined as follows:

Primary Constituent:	> 50% - "GRAVEL," "SAND," "SILT," "CLAY," etc.
Secondary Constituents:	> 30% and ≤ 50% - "very gravelly," "very sandy," "very silty," etc.
	> 15% and ≤ 30% - "gravelly," "sandy," "silty," etc.
Additional Constituents:	> 5% and ≤ 15% - "with gravel," "with sand," "with silt," etc.
	≤ 5% - "with trace gravel," "with trace sand," "with trace silt," etc., or not noted.

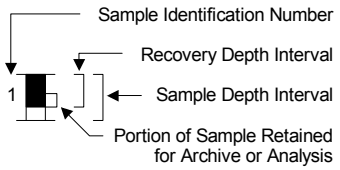
4. Soil density or consistency descriptions are based on judgement using a combination of sampler penetration blow counts, drilling or excavating conditions, field tests, and laboratory tests, as appropriate.

Drilling and Sampling Key

SAMPLER TYPE

Code	Description
a	3.25-inch O.D., 2.42-inch I.D. Split Spoon
b	2.00-inch O.D., 1.50-inch I.D. Split Spoon
c	Shelby Tube
d	Grab Sample
e	Single-Tube Core Barrel
f	Double-Tube Core Barrel
g	2.50-inch O.D., 2.00-inch I.D. WSDOT
h	3.00-inch O.D., 2.375-inch I.D. Mod. California
i	Other - See text if applicable
1	300-lb Hammer, 30-inch Drop
2	140-lb Hammer, 30-inch Drop
3	Pushed
4	Vibrocore (Rotosonic/Geoprobe)
5	Other - See text if applicable

SAMPLE NUMBER & INTERVAL



Field and Lab Test Data

Code	Description
PP = 1.0	Pocket Penetrometer, tsf
TV = 0.5	Torvane, tsf
PID = 100	Photoionization Detector VOC screening, ppm
W = 10	Moisture Content, %
D = 120	Dry Density, pcf
-200 = 60	Material smaller than No. 200 sieve, %
GS	Grain Size - See separate figure for data
AL	Atterberg Limits - See separate figure for data
GT	Other Geotechnical Testing
CA	Chemical Analysis

Groundwater

▽ Approximate water level at time of drilling (ATD)

▼ Approximate water level at time other than ATD

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Yakima, Washington

Soil Classification System and Key

Figure B-1

GP-32

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol	Water Level

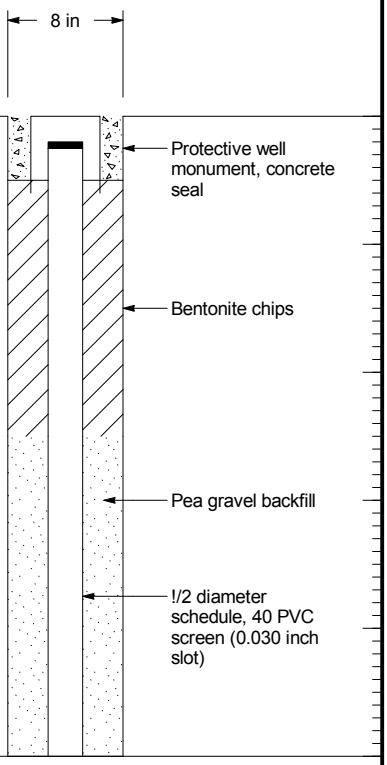
Drilling Method: Hollow-stem Auger

Ground Elevation (ft): 1071.53

Depth (ft)	Elevation	USCS Symbol	
0	1071	SP-SM	SAND with cobbles and silt with increasing cobbles at 6 feet (unable to collect SS samples)
2	1070		
4	1068		
6	1066		
8	1064		
10	1062		
12			
14			
16			
18			
20			

Groundwater not encountered.

Monitoring Well Detail
(DOE#: BJY282)



Boring Completed 10/12/16
Total Depth of Boring = 10.0 ft.

Monitoring Well Completed 10/12/16
Total Depth of Monitoring Well = 10.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

1148009.010.013 12/2/16 N:\PROJECTS\1148009.010.013.GPJ WELL LOG W/ ELEVATION

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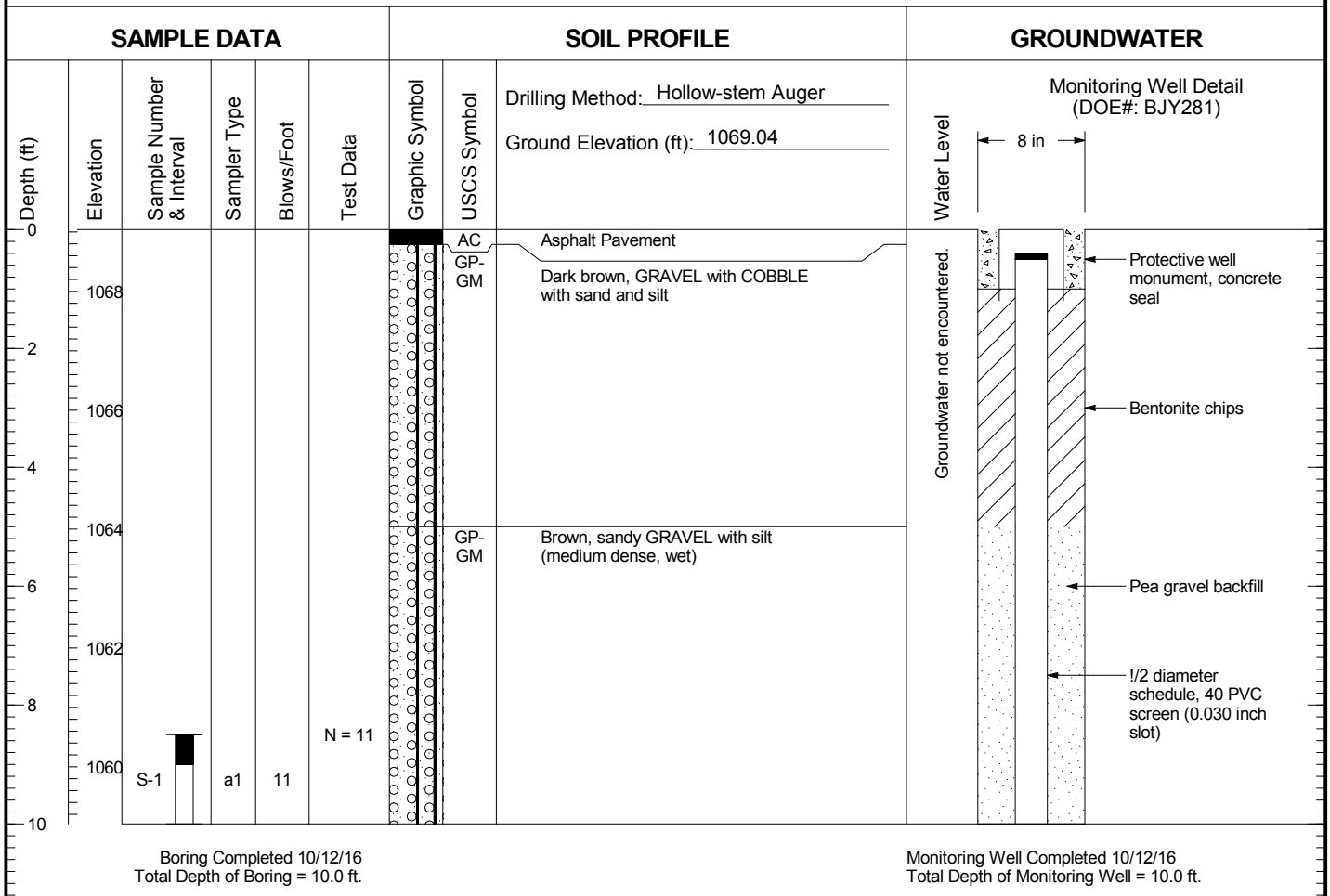
Yakima, Washington

Log of Monitoring Well GP-32

Figure
B-2

GP-33



Boring Completed 10/12/16
Total Depth of Boring = 10.0 ft.

Monitoring Well Completed 10/12/16
Total Depth of Monitoring Well = 10.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

1148009.010.013 12/2/16 N:\PROJECTS\1148009.010.013.GPJ WELL LOG W/ ELEVATION

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Yakima, Washington

Log of Monitoring Well GP-33

Figure
B-3

GP-34

SAMPLE DATA | **SOIL PROFILE** | **GROUNDWATER**

Drilling Method: Hollow-stem Auger

Ground Elevation (ft): 1069.30

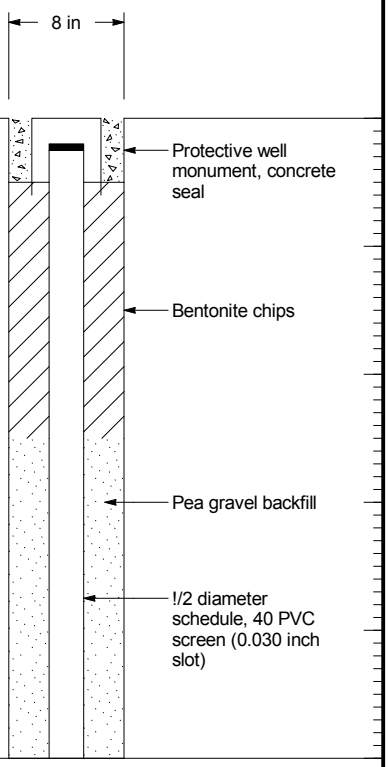
Depth (ft)	Elevation	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol	Water Level
0	1068						AC	Groundwater not encountered.
2	1066						GP-GM	
4	1064							
6	1062							
8	1060							
10								

AC — Asphalt Pavement

GP-GM — Brown, GRAVEL with COBBLE with sand and silt (unable to collect SS samples)

Boring Completed 10/12/16
Total Depth of Boring = 10.0 ft.

Monitoring Well Detail
(DOE#: BJY280)



Monitoring Well Completed 10/12/16
Total Depth of Monitoring Well = 10.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

1148009.010.013 12/2/16 N:\PROJECTS\1148009.010.013.GPJ WELL LOG W/ ELEVATION

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Yakima, Washington

Log of Monitoring Well GP-34

Figure
B-4

GP-35

SAMPLE DATA | **SOIL PROFILE** | **GROUNDWATER**

Drilling Method: Hollow-stem Auger

Ground Elevation (ft): 1064.56

Depth (ft)	Elevation	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol	Soil Description
0	1064						WD	Reddish brown, WOOD debris (dense, moist)
2	1062							
4	1060	S-1	a1	32	PID=15; LEL=6; N = 32			
6	1058						GP-GM	Brown, GRAVEL with COBBLE with sand and silt (unable to collect SS sample)
8	1056							
10								
12								
14								
16								
18								
20								

Water Level: Groundwater not encountered.

Monitoring Well Detail (DOE#: BJY278)

8 in

- Protective well monument, concrete seal
- Bentonite chips
- Pea gravel backfill
- !/2 diameter schedule, 40 PVC screen (0.030 inch slot)

Boring Completed 10/11/16
Total Depth of Boring = 10.0 ft.

Monitoring Well Completed 10/11/16
Total Depth of Monitoring Well = 10.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

1148009.010.013 12/2/16 N:\PROJECTS\1148009.010.013.GPJ WELL LOG W/ ELEVATION

LANDAU ASSOCIATES

Transportation Corridor Project
Yakima, Washington

Log of Monitoring Well GP-35

Figure
B-5

GP-36

SAMPLE DATA | **SOIL PROFILE** | **GROUNDWATER**

Drilling Method: Hollow-stem Auger

Ground Elevation (ft): 1064.53

Depth (ft)	Elevation	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol	Soil Description
0	1064						SP-SM	Brown, very gravelly, fine SAND with silt with wood debris (unable to collect SS samples)
2	1062							
4	1060	S-1	a1		PID=13;LEL=0			
6	1058						ML	Brown to gray, sandy SILT with wood debris and gravel (unable to collect SS samples)
8	1056	S-2	a1					
10								

Groundwater not encountered.

Monitoring Well Detail
(DOE#: BJY279)

8 in

- Protective well monument, concrete seal
- Bentonite chips
- Pea gravel backfill
- !/2 diameter schedule, 40 PVC screen (0.030 inch slot)

Boring Completed 10/12/16
Total Depth of Boring = 10.0 ft.

Monitoring Well Completed 10/12/16
Total Depth of Monitoring Well = 10.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

1148009.010.013 12/2/16 N:\PROJECTS\1148009.010.013.GPJ WELL LOG W/ ELEVATION

LANDAU ASSOCIATES

Transportation Corridor Project
Yakima, Washington

Log of Monitoring Well GP-36

Figure
B-6

GP-37

SAMPLE DATA | **SOIL PROFILE** | **GROUNDWATER**

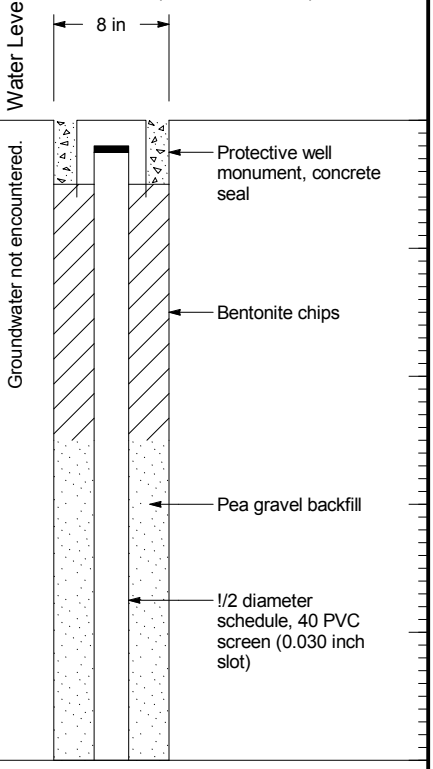
Drilling Method: Hollow-stem Auger

Ground Elevation (ft): 1065.82

Depth (ft)	Elevation	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol	Soil Description
0							WD	Brown, WOOD debris (fine to coarse size) (loose to medium dense, damp)
2	1064							
4	1062	S-1	a1	15	PID=1;LEL=5; N = 15			
6	1060							
8	1058							
10	1056	S-2	a1	9	PID=10.4;LEL=7; N = 5			

Boring Completed 10/11/16
Total Depth of Boring = 10.0 ft.

Monitoring Well Detail
(DOE#: BJY277)



Monitoring Well Completed 10/11/16
Total Depth of Monitoring Well = 10.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

1148009.010.013 12/2/16 N:\PROJECTS\1148009.010.013.GPJ WELL LOG W/ ELEVATION

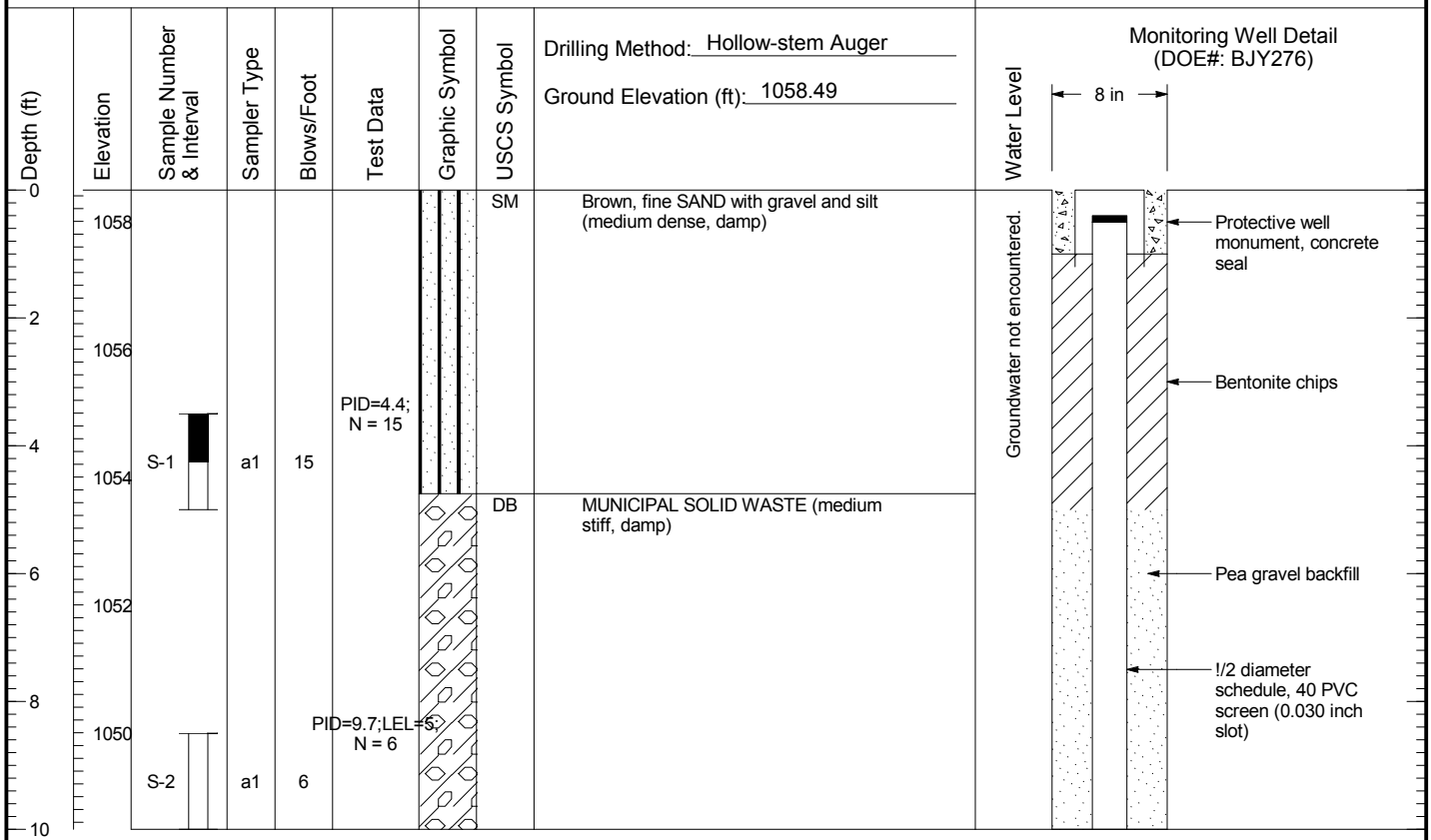
LANDAU ASSOCIATES

Transportation Corridor Project
Yakima, Washington

Log of Monitoring Well GP-37

Figure
B-7

GP-38



Boring Completed 10/11/16
Total Depth of Boring = 10.0 ft.

Monitoring Well Completed 10/11/16
Total Depth of Monitoring Well = 10.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

1148009.010.013 12/2/16 N:\PROJECTS\1148009.010.013.GPJ WELL LOG W/ ELEVATION

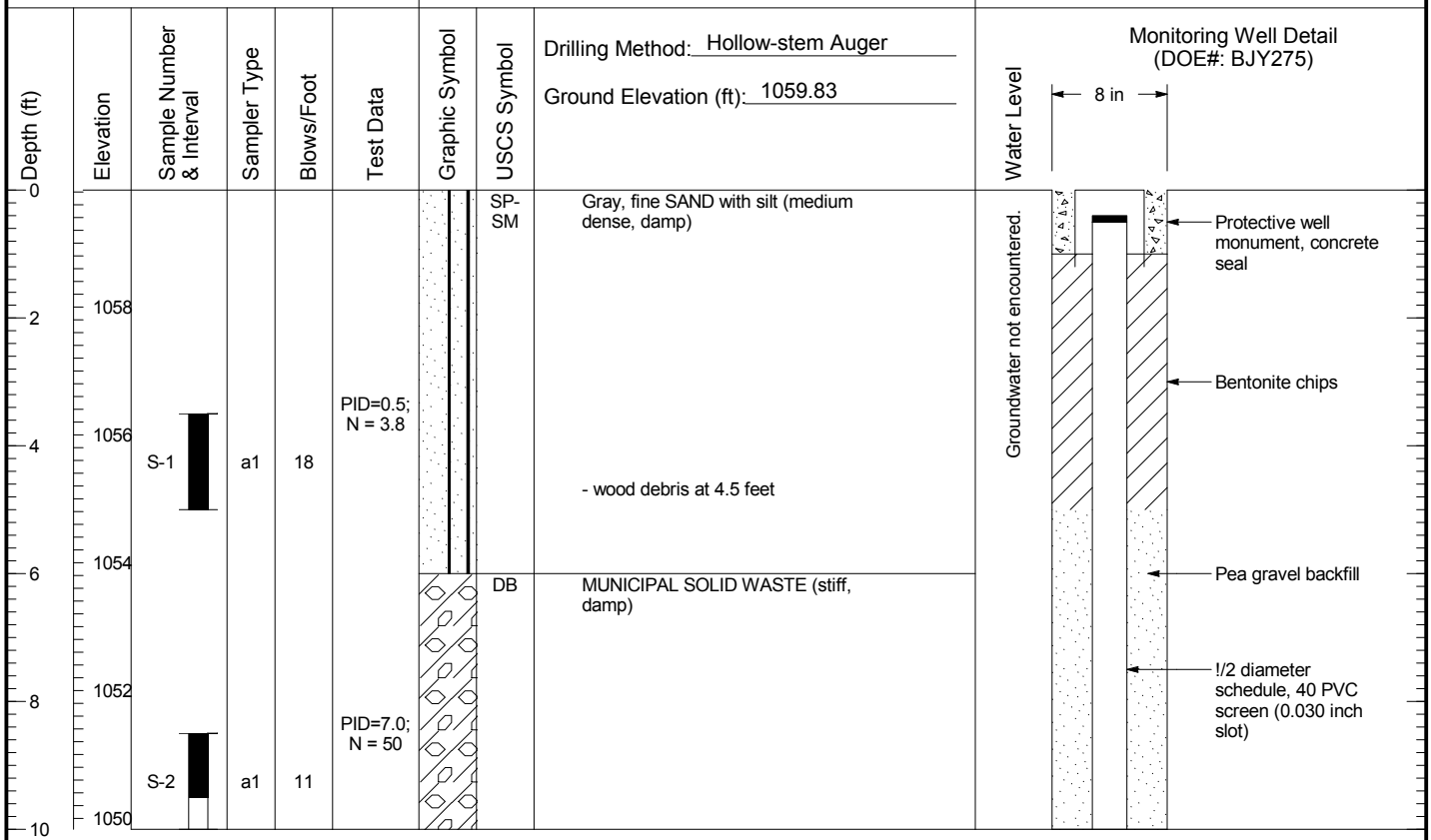
LANDAU ASSOCIATES

Transportation Corridor Project
Yakima, Washington

Log of Monitoring Well GP-38

Figure
B-8

GP-39



Boring Completed 10/11/16
Total Depth of Boring = 10.0 ft.

Monitoring Well Completed 10/11/16
Total Depth of Monitoring Well = 10.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

1148009.010.013 12/2/16 N:\PROJECTS\1148009.010.013.GPJ WELL LOG W/ ELEVATION

LANDAU ASSOCIATES

Transportation Corridor Project
Yakima, Washington

Log of Monitoring Well GP-39

Figure
B-9

GP-40

SAMPLE DATA | **SOIL PROFILE** | **GROUNDWATER**

Drilling Method: Hollow-stem Auger

Ground Elevation (ft): 1063.53

Depth (ft)	Elevation	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol	Soil Description
0							WD	Brown, WOOD debris (fine to coarse size) (dense, damp)
2	1062							
4	1060	S-1	a1	38	PID=3.7			
6	1058						DB	MUNICIPAL SOLID WASTE (hard, damp)
8	1056							
10	1054	S-2	a1	50/ 6"				

Boring Completed 10/11/16
Total Depth of Boring = 10.0 ft.

Monitoring Well Detail
(DOE#: BJY274)

Water Level: Groundwater not encountered.

8 in

- Protective well monument, concrete seal
- Bentonite chips
- Pea gravel backfill
- !/2 diameter schedule, 40 PVC screen (0.030 inch slot)

Monitoring Well Completed 10/11/16
Total Depth of Monitoring Well = 10.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

1148009.010.013 12/2/16 N:\PROJECTS\1148009.010.013.GPJ WELL LOG W/ ELEVATION

LANDAU ASSOCIATES

Transportation Corridor Project
Yakima, Washington

Log of Monitoring Well GP-40

Figure
B-10

GP-41

SAMPLE DATA | **SOIL PROFILE** | **GROUNDWATER**

Drilling Method: Hollow-stem Auger

Ground Elevation (ft): 1063.24

Depth (ft)	Elevation	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol	Soil Description
0	1062						DB	MUNICIPAL SOLID WASTE (very stiff, damp)
2								
4	1060	S-1	a1	21	N = 21			
6	1058							
8	1056				PID=1; N = 26			
10	1054	S-2	a1	26				

Water Level: Groundwater not encountered.

Monitoring Well Detail (DOE#: BJY274)

8 in

- Protective well monument, concrete seal
- Bentonite chips
- Pea gravel backfill
- !/2 diameter schedule, 40 PVC screen (0.030 inch slot)

Boring Completed 10/10/16
Total Depth of Boring = 10.0 ft.

Monitoring Well Completed 10/10/16
Total Depth of Monitoring Well = 10.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

1148009.010.013 12/2/16 N:\PROJECTS\1148009.010.013.GPJ WELL LOG W/ ELEVATION

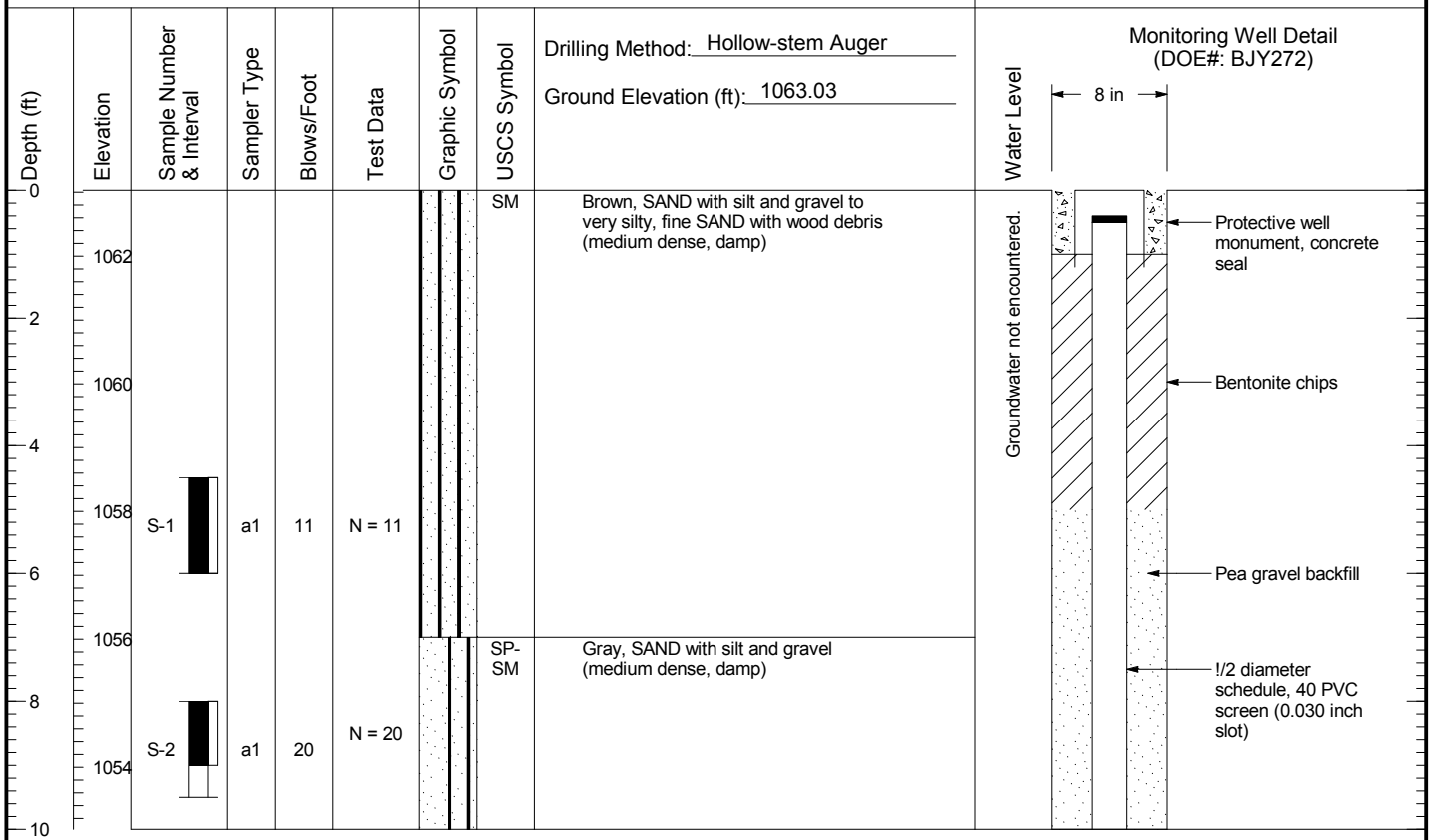
LANDAU ASSOCIATES

Transportation Corridor Project
Yakima, Washington

Log of Monitoring Well GP-41

Figure B-11

GP-42



Boring Completed 10/11/16
Total Depth of Boring = 10.0 ft.

Monitoring Well Completed 10/11/16
Total Depth of Monitoring Well = 10.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

1148009.010.013 12/2/16 N:\PROJECTS\1148009.010.013.GPJ WELL LOG W/ ELEVATION

LANDAU ASSOCIATES

Transportation Corridor Project
Yakima, Washington

Log of Monitoring Well GP-42

Figure
B-12

GP-43

SAMPLE DATA | **SOIL PROFILE** | **GROUNDWATER**

Drilling Method: Hollow-stem Auger

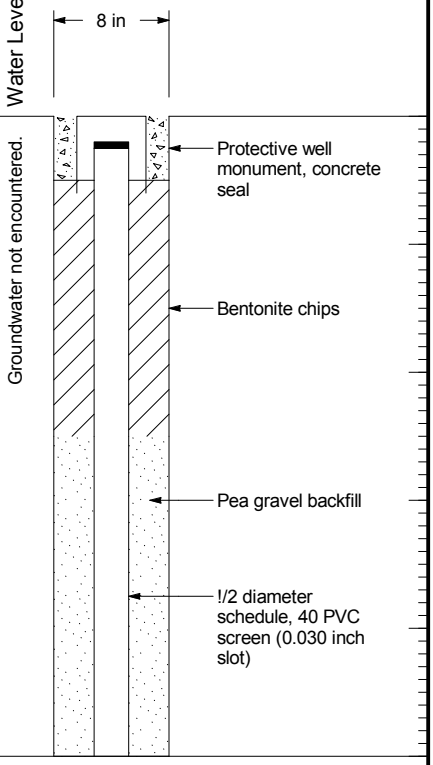
Ground Elevation (ft): 1058.77

Depth (ft)	Elevation	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol	Soil Description
0	1058						DB	MUNICIPAL SOLID WASTE (stiff to very stiff, damp)
2	1056							
4	1054	S-1	a1	18	PID=9.2;LEL=4; N = 17			
6	1052							
8	1050	S-2	a1	10	N = 10			
10								
12								
14								
16								
18								
20								

Boring Completed 10/10/16
Total Depth of Boring = 10.0 ft.

Water Level: Groundwater not encountered.

Monitoring Well Detail (DOE#: BJY271)



Monitoring Well Completed 10/10/16
Total Depth of Monitoring Well = 10.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

1148009.010.013 12/2/16 N:\PROJECTS\1148009.010.013.GPJ WELL LOG W/ ELEVATION

LANDAU ASSOCIATES

Transportation Corridor Project
Yakima, Washington

Log of Monitoring Well GP-43

Figure
B-13

GP-44

SAMPLE DATA | **SOIL PROFILE** | **GROUNDWATER**

Drilling Method: Hollow-stem Auger

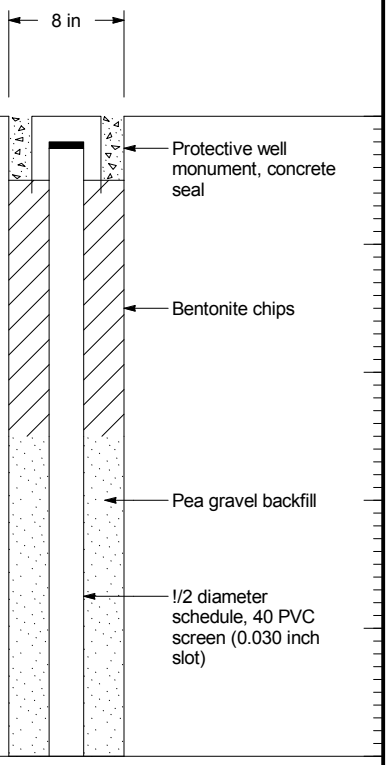
Ground Elevation (ft): 1059.03

Depth (ft)	Elevation	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol	Soil Description
0	1059						SP-SM	Light brown, medium SAND with silt and trace gravel (unable to collect SS samples)
2	1058							
4	1056							
6	1054							
8	1052							
10	1050							

Boring Completed 10/12/16
Total Depth of Boring = 10.0 ft.

Water Level: Groundwater not encountered.

Monitoring Well Detail
(DOE#: BJY283)



Monitoring Well Completed 10/12/16
Total Depth of Monitoring Well = 10.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

1148009.010.013 12/2/16 N:\PROJECTS\1148009.010.013.GPJ WELL LOG W/ ELEVATION

LANDAU ASSOCIATES

Transportation Corridor Project
Yakima, Washington

Log of Monitoring Well GP-44

Figure
B-14

APPENDIX C

Analytical Laboratory Reports

October 10, 2016

Mr. Piper Roelen
Landau Associates, Inc.
130 - 2nd Ave. S.
Edmonds, WA 98020

Dear Mr. Roelen,

On October 3rd, 2 samples were received by our laboratory and assigned our laboratory project number EV16100003. The project was identified as your Transportation Corridor - 1148009.010.013. The sample identification and requested analyses are outlined on the attached chain of custody record.

No abnormalities or nonconformances were observed during the analyses of the project samples.

Please do not hesitate to call me if you have any questions or if I can be of further assistance.

Sincerely,

ALS Laboratory Group

Rick Bagan
Laboratory Director

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Landau Associates, Inc. 130 - 2nd Ave. S. Edmonds, WA 98020	DATE: ALS JOB#: ALS SAMPLE#:	10/10/2016 EV16100003 EV16100003-01
CLIENT CONTACT:	Piper Roelen	DATE RECEIVED:	10/03/2016
CLIENT PROJECT:	Transportation Corridor - 1148009.010.013	COLLECTION DATE:	9/27/2016 10:45:00 AM
CLIENT SAMPLE ID	TP-15-16(1.5-2)09272016	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range (C12-C24)	NWTPH-DX w/ SGA	U	620	25	MG/KG	10/06/2016	EBS
TPH-Oil Range (C24-C40)	NWTPH-DX w/ SGA	**14000**	1200	25	MG/KG	10/06/2016	EBS

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25 25X Dilution	NWTPH-DX w/ SGA	**109 DS2**	10/06/2016	EBS

U - Analyte analyzed for but not detected at level above reporting limit.
DS2 - Due to high dilution factor surrogate results should be considered uncontrolled.
Chromatogram indicates that it is likely that sample contains light oil.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Landau Associates, Inc. 130 - 2nd Ave. S. Edmonds, WA 98020	DATE: ALS JOB#: ALS SAMPLE#:	10/10/2016 EV16100003 EV16100003-02
CLIENT CONTACT:	Piper Roelen	DATE RECEIVED:	10/03/2016
CLIENT PROJECT:	Transportation Corridor - 1148009.010.013	COLLECTION DATE:	9/28/2016 9:55:00 AM
CLIENT SAMPLE ID	TP-16B-16(0-2)09282016	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range (C12-C24)	NWTPH-DX w/ SGA	U	25	1	MG/KG	10/06/2016	EBS
TPH-Oil Range (C24-C40)	NWTPH-DX w/ SGA	**500**	50	1	MG/KG	10/06/2016	EBS

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX w/ SGA	**80.2**	10/06/2016	EBS

U - Analyte analyzed for but not detected at level above reporting limit.
Chromatogram indicates that it is likely that sample contains lube oil.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Landau Associates, Inc. 130 - 2nd Ave. S. Edmonds, WA 98020	DATE:	10/10/2016
		ALS SDG#:	EV16100003
		WDOE ACCREDITATION:	C601
CLIENT CONTACT:	Piper Roelen		
CLIENT PROJECT:	Transportation Corridor - 1148009.010.013		

LABORATORY BLANK RESULTS

MB-092716S - Batch 108429 - Soil by NWTPH-DX

ANALYTE	METHOD	RESULTS	UNITS	REPORTING LIMITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range (C12-C24)	NWTPH-DX	U	MG/KG	25	09/27/2016	EBS
TPH-Oil Range (C24-C40)	NWTPH-DX	U	MG/KG	50	09/27/2016	EBS

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Landau Associates, Inc. 130 - 2nd Ave. S. Edmonds, WA 98020	DATE:	10/10/2016
		ALS SDG#:	EV16100003
		WDOE ACCREDITATION:	C601
CLIENT CONTACT:	Piper Roelen		
CLIENT PROJECT:	Transportation Corridor - 1148009.010.013		

LABORATORY CONTROL SAMPLE RESULTS

ALS Test Batch ID: 108429 - Soil by NWTPH-DX

SPIKED COMPOUND	METHOD	%REC	RPD	QUAL	LIMITS MIN	LIMITS MAX	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range (C12-C24) - BS	NWTPH-DX	**94.5**			75.5	122.1	09/27/2016	EBS
TPH-Diesel Range (C12-C24) - BSD	NWTPH-DX	**99.7**	**5**		75.5	122.1	09/27/2016	EBS

APPROVED BY

Laboratory Director

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

ALS ENVIRONMENTAL

Sample Receiving Checklist

Client: Landau Associates ALS Job #: EV1610003

Project: Yakima, WA Transportation Corridor - 1148009.010.013

Received Date: 10/3/16 Received Time: 12:00 By: RB

Type of shipping container: Cooler X Box ____ Other ____

Shipped via: FedEx Ground ____ UPS ____ Mail ____ Courier ALS Hand Delivered ____
FedEx Express ____

	Yes	No	N/A
Were custody seals on outside of shipping container? If yes, how many? 2 Where? Top / Side Custody seal date: 10/2 Seal name: Landau Assoc.	X	____	____
Was Chain of Custody properly filled out (ink, signed, dated, etc.)?	X	____	____
Did all bottles have labels?	X	____	____
Did all bottle labels and tags agree with Chain of Custody?	X	____	____
Were samples received within hold time?	X	____	____
Did all bottles arrive in good condition (unbroken, etc.)?	X	____	____
Was sufficient amount of sample sent for the tests indicated?	X	____	____
Was correct preservation added to samples?	____	____	X

If no, Sample Control added preservative to the following:

Sample Number	Reagent	Analyte

Were VOA vials checked for absence of air bubbles? Bubbles present in sample #: ____	____	____	X

Temperature of cooler upon receipt: 6.8 °C on Ice (Cold) Cool Ambient N/A

Explain any discrepancies: ____

Was client contacted? ____ Who was called? ____ By whom? ____ Date: ____

Outcome of call: ____

LANDAU ASSOCIATES

☒ Seattle (Edmonds) (425) 778-0907
☐ Tacoma (253) 926-2493
☐ Spokane (509) 327-9737
☐ Portland (503) 542-1080
☐ _____

Chain-of-Custody Record

EV1610003

Date 9/30/16
Page 1 of 1

Project Name Transportation Corridor Project No. 1148009.010.013
Project Location/Event Yakima, WA
Sampler's Name Brian Christiansen
Project Contact Piper Roelen
Send Results To Piper Roelen

Testing Parameters

Turnaround Time
☒ Standard
☐ Accelerated
☐ _____

Sample I.D.	Date	Time	Matrix	No. of Containers	NWTPH-Dx	Observations/Comments
TP45-16(1.5-2)09072016	9/7/16	1045	Soil	1	☒	
TP16B-16(0-2)09082016	9/8/16	0955	Soil	1	☒	

☒ Allow water samples to settle, collect aliquot from clear portion

☒ NWTPH-Dx - run acid wash silica gel cleanup

☐ Analyze for EPH if no specific product identified

VOC/BTEX/VPH (soil):
☐ non-preserved
☐ preserved w/methanol
☐ preserved w/sodium bisulfate
☐ Freeze upon receipt
☐ Dissolved metal water samples field filtered

Other _____

Special Shipment/Handling or Storage Requirements Courier

Method of Shipment Courier

Relinquished by	Received by	Relinquished by	Received by
Signature [signature]	Signature [signature]	Signature	Signature
Printed Name Brian Christiansen	Printed Name Rick Bagan	Printed Name	Printed Name
Company Landau Associates	Company AES	Company	Company
Date 10/2/16 Time 1:30 PM	Date 10/3/16 Time 12:00	Date Time	Date Time

WHITE COPY - Project File YELLOW COPY - Laboratory PINK COPY - Client Representative

12/2014

November 4, 2016

Mr. Piper Roelen
Landau Associates, Inc.
130 - 2nd Ave. S.
Edmonds, WA 98020

Dear Mr. Roelen,

On October 14th, 20 samples were received by our laboratory and assigned our laboratory project number EV16100095. The project was identified as your Transportation Corridor - 1148009.010.013. The sample identification and requested analyses are outlined on the attached chain of custody record.

No abnormalities or nonconformances were observed during the analyses of the project samples.

Please do not hesitate to call me if you have any questions or if I can be of further assistance.

Sincerely,

ALS Laboratory Group

Rick Bagan
Laboratory Director

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 98208 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Landau Associates, Inc. 130 - 2nd Ave. S. Edmonds, WA 98020	DATE:	11/4/2016
		ALS JOB#:	EV16100095
		ALS SAMPLE#:	EV16100095-01
CLIENT CONTACT:	Piper Roelen	DATE RECEIVED:	10/14/2016
CLIENT PROJECT:	Transportation Corridor - 1148009.010.013	COLLECTION DATE:	9/26/2016
CLIENT SAMPLE ID	TP-1-16 S-1 (1-2)	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
Mercury (TCLP)	EPA-7470/1311	U	0.00020	1	MG/L	10/26/2016	RAL
Arsenic (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Barium (TCLP)	EPA-6020/1311	**3.0**	0.025	5	MG/L	10/26/2016	RAL
Cadmium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Chromium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Lead (TCLP)	EPA-6020/1311	**0.042**	0.025	5	MG/L	10/26/2016	RAL
Selenium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Silver (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Heating Value (Gross)	D5865	**7200**	0	1	BTU/lb	10/18/2016	ALTU

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 98208 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Landau Associates, Inc. 130 - 2nd Ave. S. Edmonds, WA 98020	DATE: ALS JOB#: ALS SAMPLE#:	11/4/2016 EV16100095 EV16100095-02
CLIENT CONTACT:	Piper Roelen	DATE RECEIVED:	10/14/2016
CLIENT PROJECT:	Transportation Corridor - 1148009.010.013	COLLECTION DATE:	9/26/2016
CLIENT SAMPLE ID	TP-6-16 S-2 (15-2)	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
Mercury (TCLP)	EPA-7470/1311	U	0.00020	1	MG/L	10/26/2016	RAL
Arsenic (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Barium (TCLP)	EPA-6020/1311	**0.25**	0.025	5	MG/L	10/26/2016	RAL
Cadmium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Chromium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Lead (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Selenium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Silver (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Heating Value (Gross)	D5865	**4600**	0	1	BTU/lb	10/18/2016	ALTU

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 98208 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Landau Associates, Inc. 130 - 2nd Ave. S. Edmonds, WA 98020	DATE: ALS JOB#: ALS SAMPLE#:	11/4/2016 EV16100095 EV16100095-03
CLIENT CONTACT:	Piper Roelen	DATE RECEIVED:	10/14/2016
CLIENT PROJECT:	Transportation Corridor - 1148009.010.013	COLLECTION DATE:	9/26/2016
CLIENT SAMPLE ID	TP-9-16 S-1 (0-1.5)	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
Mercury (TCLP)	EPA-7470/1311	U	0.00020	1	MG/L	10/26/2016	RAL
Arsenic (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Barium (TCLP)	EPA-6020/1311	**0.29**	0.025	5	MG/L	10/26/2016	RAL
Cadmium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Chromium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Lead (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Selenium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Silver (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Heating Value (Gross)	D5865	**6600**	0	1	BTU/lb	10/18/2016	ALTU

U - Analyte analyzed for but not detected at level above reporting limit.

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CERTIFICATE OF ANALYSIS

CLIENT:	Landau Associates, Inc. 130 - 2nd Ave. S. Edmonds, WA 98020	DATE: ALS JOB#: ALS SAMPLE#:	11/4/2016 EV16100095 EV16100095-04
CLIENT CONTACT:	Piper Roelen	DATE RECEIVED:	10/14/2016
CLIENT PROJECT:	Transportation Corridor - 1148009.010.013	COLLECTION DATE:	9/29/2016
CLIENT SAMPLE ID	TP-9B-16 S-4 (8-9)	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
Mercury (TCLP)	EPA-7470/1311	U	0.00020	1	MG/L	10/26/2016	RAL
Arsenic (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Barium (TCLP)	EPA-6020/1311	**0.24**	0.025	5	MG/L	10/26/2016	RAL
Cadmium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Chromium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Lead (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Selenium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Silver (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Heating Value (Gross)	D5865	**3500**	0	1	BTU/lb	10/18/2016	ALTU

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CERTIFICATE OF ANALYSIS

CLIENT:	Landau Associates, Inc. 130 - 2nd Ave. S. Edmonds, WA 98020	DATE: ALS JOB#: ALS SAMPLE#:	11/4/2016 EV16100095 EV16100095-05
CLIENT CONTACT:	Piper Roelen	DATE RECEIVED:	10/14/2016
CLIENT PROJECT:	Transportation Corridor - 1148009.010.013	COLLECTION DATE:	9/30/2016
CLIENT SAMPLE ID	TP-9C-16 S-3 (5-6)	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
Mercury (TCLP)	EPA-7470/1311	U	0.00020	1	MG/L	10/26/2016	RAL
Arsenic (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Barium (TCLP)	EPA-6020/1311	**0.23**	0.025	5	MG/L	10/26/2016	RAL
Cadmium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Chromium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Lead (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Selenium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Silver (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Heating Value (Gross)	D5865	**7300**	0	1	BTU/lb	10/18/2016	ALTU

U - Analyte analyzed for but not detected at level above reporting limit.

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CERTIFICATE OF ANALYSIS

CLIENT:	Landau Associates, Inc. 130 - 2nd Ave. S. Edmonds, WA 98020	DATE: ALS JOB#: ALS SAMPLE#:	11/4/2016 EV16100095 EV16100095-06
CLIENT CONTACT:	Piper Roelen	DATE RECEIVED:	10/14/2016
CLIENT PROJECT:	Transportation Corridor - 1148009.010.013	COLLECTION DATE:	9/26/2016
CLIENT SAMPLE ID	TP-10-16 S-2 (1-2)	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
Mercury (TCLP)	EPA-7470/1311	U	0.00020	1	MG/L	10/26/2016	RAL
Arsenic (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Barium (TCLP)	EPA-6020/1311	**0.31**	0.025	5	MG/L	10/26/2016	RAL
Cadmium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Chromium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Lead (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Selenium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Silver (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Heating Value (Gross)	D5865	**3100**	0	1	BTU/lb	10/18/2016	ALTU

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CERTIFICATE OF ANALYSIS

CLIENT:	Landau Associates, Inc. 130 - 2nd Ave. S. Edmonds, WA 98020	DATE: ALS JOB#: ALS SAMPLE#:	11/4/2016 EV16100095 EV16100095-07
CLIENT CONTACT:	Piper Roelen	DATE RECEIVED:	10/14/2016
CLIENT PROJECT:	Transportation Corridor - 1148009.010.013	COLLECTION DATE:	9/26/2016
CLIENT SAMPLE ID	TP-10-16 S-5 (10-12)	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
Mercury (TCLP)	EPA-7470/1311	U	0.00020	1	MG/L	10/26/2016	RAL
Arsenic (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Barium (TCLP)	EPA-6020/1311	**0.28**	0.025	5	MG/L	10/26/2016	RAL
Cadmium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Chromium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Lead (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Selenium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Silver (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Heating Value (Gross)	D5865	**6000**	0	1	BTU/lb	10/18/2016	ALTU

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CERTIFICATE OF ANALYSIS

CLIENT:	Landau Associates, Inc. 130 - 2nd Ave. S. Edmonds, WA 98020	DATE: ALS JOB#: ALS SAMPLE#:	11/4/2016 EV16100095 EV16100095-08
CLIENT CONTACT:	Piper Roelen	DATE RECEIVED:	10/14/2016
CLIENT PROJECT:	Transportation Corridor - 1148009.010.013	COLLECTION DATE:	9/29/2016
CLIENT SAMPLE ID	TP-10A-16 S-4 (6-7)	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
Mercury (TCLP)	EPA-7470/1311	U	0.00020	1	MG/L	10/26/2016	RAL
Arsenic (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Barium (TCLP)	EPA-6020/1311	**0.18**	0.025	5	MG/L	10/26/2016	RAL
Cadmium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Chromium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Lead (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Selenium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Silver (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Heating Value (Gross)	D5865	**8600**	0	1	BTU/lb	10/18/2016	ALTU
Chlorine	EPA-5050/9056	**56**	0	1	MG/KG	11/03/2016	ALTU

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CERTIFICATE OF ANALYSIS

CLIENT:	Landau Associates, Inc. 130 - 2nd Ave. S. Edmonds, WA 98020	DATE: ALS JOB#: ALS SAMPLE#:	11/4/2016 EV16100095 EV16100095-09
CLIENT CONTACT:	Piper Roelen	DATE RECEIVED:	10/14/2016
CLIENT PROJECT:	Transportation Corridor - 1148009.010.013	COLLECTION DATE:	9/29/2016
CLIENT SAMPLE ID	TP-10B-16 S-4 (5-5.5)	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
Mercury (TCLP)	EPA-7470/1311	U	0.00020	1	MG/L	10/26/2016	RAL
Arsenic (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Barium (TCLP)	EPA-6020/1311	**0.17**	0.025	5	MG/L	10/26/2016	RAL
Cadmium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Chromium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Lead (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Selenium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Silver (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Heating Value (Gross)	D5865	**5300**	0	1	BTU/lb	10/18/2016	ALTU

U - Analyte analyzed for but not detected at level above reporting limit.

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CERTIFICATE OF ANALYSIS

CLIENT:	Landau Associates, Inc. 130 - 2nd Ave. S. Edmonds, WA 98020	DATE: ALS JOB#: ALS SAMPLE#:	11/4/2016 EV16100095 EV16100095-10
CLIENT CONTACT:	Piper Roelen	DATE RECEIVED:	10/14/2016
CLIENT PROJECT:	Transportation Corridor - 1148009.010.013	COLLECTION DATE:	9/26/2016
CLIENT SAMPLE ID	TP-11-16 S-3 (3-3.5)	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
Mercury (TCLP)	EPA-7470/1311	U	0.00020	1	MG/L	10/26/2016	RAL
Arsenic (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Barium (TCLP)	EPA-6020/1311	**0.18**	0.025	5	MG/L	10/26/2016	RAL
Cadmium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Chromium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Lead (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Selenium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Silver (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/26/2016	RAL
Heating Value (Gross)	D5865	**9200**	0	1	BTU/lb	10/18/2016	ALTU
Chlorine	EPA-5050/9056	**41**	0	1	MG/KG	11/03/2016	ALTU

U - Analyte analyzed for but not detected at level above reporting limit.

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CERTIFICATE OF ANALYSIS

CLIENT:	Landau Associates, Inc. 130 - 2nd Ave. S. Edmonds, WA 98020	DATE: ALS JOB#: ALS SAMPLE#:	11/4/2016 EV16100095 EV16100095-11
CLIENT CONTACT:	Piper Roelen	DATE RECEIVED:	10/14/2016
CLIENT PROJECT:	Transportation Corridor - 1148009.010.013	COLLECTION DATE:	9/29/2016
CLIENT SAMPLE ID	TP-11A-16 S-3 (5-6)	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
Mercury (TCLP)	EPA-7470/1311	U	0.00020	1	MG/L	10/26/2016	RAL
Arsenic (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Barium (TCLP)	EPA-6020/1311	**0.27**	0.025	5	MG/L	10/28/2016	RAL
Cadmium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Chromium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Lead (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Selenium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Silver (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Heating Value (Gross)	D5865	**5500**	0	1	BTU/lb	10/18/2016	ALTU

U - Analyte analyzed for but not detected at level above reporting limit.

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CERTIFICATE OF ANALYSIS

CLIENT:	Landau Associates, Inc. 130 - 2nd Ave. S. Edmonds, WA 98020	DATE: ALS JOB#: ALS SAMPLE#:	11/4/2016 EV16100095 EV16100095-12
CLIENT CONTACT:	Piper Roelen	DATE RECEIVED:	10/14/2016
CLIENT PROJECT:	Transportation Corridor - 1148009.010.013	COLLECTION DATE:	9/29/2016
CLIENT SAMPLE ID	TP-11B-16 S-5 (8-9)	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
Mercury (TCLP)	EPA-7470/1311	U	0.00020	1	MG/L	10/26/2016	RAL
Arsenic (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Barium (TCLP)	EPA-6020/1311	**0.23**	0.025	5	MG/L	10/28/2016	RAL
Cadmium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Chromium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Lead (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Selenium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Silver (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Heating Value (Gross)	D5865	**4600**	0	1	BTU/lb	10/18/2016	ALTU

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CERTIFICATE OF ANALYSIS

CLIENT:	Landau Associates, Inc. 130 - 2nd Ave. S. Edmonds, WA 98020	DATE: ALS JOB#: ALS SAMPLE#:	11/4/2016 EV16100095 EV16100095-13
CLIENT CONTACT:	Piper Roelen	DATE RECEIVED:	10/14/2016
CLIENT PROJECT:	Transportation Corridor - 1148009.010.013	COLLECTION DATE:	9/28/2016
CLIENT SAMPLE ID	TP-25-16 S-5 (8-10)	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
Mercury (TCLP)	EPA-7470/1311	U	0.00020	1	MG/L	10/26/2016	RAL
Arsenic (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Barium (TCLP)	EPA-6020/1311	**0.19**	0.025	5	MG/L	10/28/2016	RAL
Cadmium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Chromium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Lead (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Selenium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Silver (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Heating Value (Gross)	D5865	**7300**	0	1	BTU/lb	10/18/2016	ALTU

U - Analyte analyzed for but not detected at level above reporting limit.

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CERTIFICATE OF ANALYSIS

CLIENT:	Landau Associates, Inc. 130 - 2nd Ave. S. Edmonds, WA 98020	DATE: ALS JOB#: ALS SAMPLE#:	11/4/2016 EV16100095 EV16100095-14
CLIENT CONTACT:	Piper Roelen	DATE RECEIVED:	10/14/2016
CLIENT PROJECT:	Transportation Corridor - 1148009.010.013	COLLECTION DATE:	9/28/2016
CLIENT SAMPLE ID	TP-26-16 S-3 (4-4.5)	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
Mercury (TCLP)	EPA-7470/1311	U	0.00020	1	MG/L	10/26/2016	RAL
Arsenic (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Barium (TCLP)	EPA-6020/1311	**0.21**	0.025	5	MG/L	10/28/2016	RAL
Cadmium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Chromium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Lead (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Selenium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Silver (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Heating Value (Gross)	D5865	**9000**	0	1	BTU/lb	10/18/2016	ALTU
Chlorine	EPA-5050/9056	**56**	0	1	MG/KG	11/03/2016	ALTU

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CERTIFICATE OF ANALYSIS

CLIENT:	Landau Associates, Inc. 130 - 2nd Ave. S. Edmonds, WA 98020	DATE: ALS JOB#: ALS SAMPLE#:	11/4/2016 EV16100095 EV16100095-15
CLIENT CONTACT:	Piper Roelen	DATE RECEIVED:	10/14/2016
CLIENT PROJECT:	Transportation Corridor - 1148009.010.013	COLLECTION DATE:	9/30/2016
CLIENT SAMPLE ID	TP-26A-16 S-3 (6-7)	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
Mercury (TCLP)	EPA-7470/1311	U	0.00020	1	MG/L	10/26/2016	RAL
Arsenic (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Barium (TCLP)	EPA-6020/1311	**0.27**	0.025	5	MG/L	10/28/2016	RAL
Cadmium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Chromium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Lead (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Selenium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Silver (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Heating Value (Gross)	D5865	**7100**	0	1	BTU/lb	10/18/2016	ALTU

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 98208 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Landau Associates, Inc. 130 - 2nd Ave. S. Edmonds, WA 98020	DATE: ALS JOB#: ALS SAMPLE#:	11/4/2016 EV16100095 EV16100095-16
CLIENT CONTACT:	Piper Roelen	DATE RECEIVED:	10/14/2016
CLIENT PROJECT:	Transportation Corridor - 1148009.010.013	COLLECTION DATE:	9/30/2016
CLIENT SAMPLE ID	TP-26B-16 S-3 (4-5)	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
Mercury (TCLP)	EPA-7470/1311	U	0.00020	1	MG/L	10/26/2016	RAL
Arsenic (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Barium (TCLP)	EPA-6020/1311	**0.33**	0.025	5	MG/L	10/28/2016	RAL
Cadmium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Chromium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Lead (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Selenium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Silver (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Heating Value (Gross)	D5865	**8500**	0	1	BTU/lb	10/18/2016	ALTU
Chlorine	EPA-5050/9056	**130**	0	1	MG/KG	11/03/2016	ALTU

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ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Landau Associates, Inc. 130 - 2nd Ave. S. Edmonds, WA 98020	DATE: ALS JOB#: ALS SAMPLE#:	11/4/2016 EV16100095 EV16100095-17
CLIENT CONTACT:	Piper Roelen	DATE RECEIVED:	10/14/2016
CLIENT PROJECT:	Transportation Corridor - 1148009.010.013	COLLECTION DATE:	9/28/2016
CLIENT SAMPLE ID	TP-28-16 S-1 (1-2)	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
Mercury (TCLP)	EPA-7470/1311	U	0.00020	1	MG/L	10/26/2016	RAL
Arsenic (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Barium (TCLP)	EPA-6020/1311	**0.20**	0.025	5	MG/L	10/28/2016	RAL
Cadmium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Chromium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Lead (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Selenium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Silver (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Heating Value (Gross)	D5865	**4400**	0	1	BTU/lb	10/18/2016	ALTU

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ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Landau Associates, Inc. 130 - 2nd Ave. S. Edmonds, WA 98020	DATE: ALS JOB#: ALS SAMPLE#:	11/4/2016 EV16100095 EV16100095-18
CLIENT CONTACT:	Piper Roelen	DATE RECEIVED:	10/14/2016
CLIENT PROJECT:	Transportation Corridor - 1148009.010.013	COLLECTION DATE:	9/30/2016
CLIENT SAMPLE ID	TP-34-16 S-4 (6-7)	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
Mercury (TCLP)	EPA-7470/1311	U	0.00020	1	MG/L	10/26/2016	RAL
Arsenic (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Barium (TCLP)	EPA-6020/1311	**0.28**	0.025	5	MG/L	10/28/2016	RAL
Cadmium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Chromium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Lead (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Selenium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Silver (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Heating Value (Gross)	D5865	**7000**	0	1	BTU/lb	10/18/2016	ALTU

U - Analyte analyzed for but not detected at level above reporting limit.

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ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Landau Associates, Inc. 130 - 2nd Ave. S. Edmonds, WA 98020	DATE: ALS JOB#: ALS SAMPLE#:	11/4/2016 EV16100095 EV16100095-19
CLIENT CONTACT:	Piper Roelen	DATE RECEIVED:	10/14/2016
CLIENT PROJECT:	Transportation Corridor - 1148009.010.013	COLLECTION DATE:	9/30/2016
CLIENT SAMPLE ID	TP-34-16 S-5 (10-11)	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
Mercury (TCLP)	EPA-7470/1311	U	0.00020	1	MG/L	10/26/2016	RAL
Arsenic (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Barium (TCLP)	EPA-6020/1311	**0.20**	0.025	5	MG/L	10/28/2016	RAL
Cadmium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Chromium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Lead (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Selenium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Silver (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Heating Value (Gross)	D5865	**9600**	0	1	BTU/lb	10/18/2016	ALTU
Chlorine	EPA-5050/9056	**53**	0	1	MG/KG	11/03/2016	ALTU

U - Analyte analyzed for but not detected at level above reporting limit.

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ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Landau Associates, Inc. 130 - 2nd Ave. S. Edmonds, WA 98020	DATE: ALS JOB#: ALS SAMPLE#:	11/4/2016 EV16100095 EV16100095-20
CLIENT CONTACT:	Piper Roelen	DATE RECEIVED:	10/14/2016
CLIENT PROJECT:	Transportation Corridor - 1148009.010.013	COLLECTION DATE:	9/30/2016
CLIENT SAMPLE ID	TP-34A-16 S-1 (0-3)	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
Mercury (TCLP)	EPA-7470/1311	U	0.00020	1	MG/L	10/26/2016	RAL
Arsenic (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Barium (TCLP)	EPA-6020/1311	**0.25**	0.025	5	MG/L	10/28/2016	RAL
Cadmium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Chromium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Lead (TCLP)	EPA-6020/1311	**0.025**	0.025	5	MG/L	10/28/2016	RAL
Selenium (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Silver (TCLP)	EPA-6020/1311	U	0.025	5	MG/L	10/28/2016	RAL
Heating Value (Gross)	D5865	**6600**	0	1	BTU/lb	10/18/2016	ALTU

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CERTIFICATE OF ANALYSIS

CLIENT:	Landau Associates, Inc. 130 - 2nd Ave. S. Edmonds, WA 98020	DATE:	11/4/2016
		ALS SDG#:	EV16100095
		WDOE ACCREDITATION:	C601
CLIENT CONTACT:	Piper Roelen		
CLIENT PROJECT:	Transportation Corridor - 1148009.010.013		

LABORATORY BLANK RESULTS

MBLK-283820 - Batch R283820 - TCLP Extract by EPA-7470

ANALYTE	METHOD	RESULTS	UNITS	REPORTING LIMITS	ANALYSIS DATE	ANALYSIS BY
Mercury (TCLP)	EPA-7470/1311	U	MG/L	0.00020	10/26/2016	RAL

U - Analyte analyzed for but not detected at level above reporting limit.

MBLK-283821 - Batch R283821 - TCLP Extract by EPA-6020

ANALYTE	METHOD	RESULTS	UNITS	REPORTING LIMITS	ANALYSIS DATE	ANALYSIS BY
Arsenic (TCLP)	EPA-6020/1311	U	MG/L	0.0050	10/26/2016	RAL
Barium (TCLP)	EPA-6020/1311	U	MG/L	0.0050	10/26/2016	RAL
Cadmium (TCLP)	EPA-6020/1311	U	MG/L	0.0050	10/26/2016	RAL
Chromium (TCLP)	EPA-6020/1311	U	MG/L	0.0050	10/26/2016	RAL
Lead (TCLP)	EPA-6020/1311	U	MG/L	0.0050	10/26/2016	RAL
Selenium (TCLP)	EPA-6020/1311	U	MG/L	0.0050	10/26/2016	RAL
Silver (TCLP)	EPA-6020/1311	U	MG/L	0.0050	10/26/2016	RAL

U - Analyte analyzed for but not detected at level above reporting limit.

MBLK-283823 - Batch R283823 - TCLP Extract by EPA-6020

ANALYTE	METHOD	RESULTS	UNITS	REPORTING LIMITS	ANALYSIS DATE	ANALYSIS BY
Arsenic (TCLP)	EPA-6020/1311	U	MG/L	0.0050	10/28/2016	RAL
Barium (TCLP)	EPA-6020/1311	U	MG/L	0.0050	10/28/2016	RAL
Cadmium (TCLP)	EPA-6020/1311	U	MG/L	0.0050	10/28/2016	RAL
Chromium (TCLP)	EPA-6020/1311	U	MG/L	0.0050	10/28/2016	RAL
Lead (TCLP)	EPA-6020/1311	U	MG/L	0.0050	10/28/2016	RAL
Selenium (TCLP)	EPA-6020/1311	U	MG/L	0.0050	10/28/2016	RAL
Silver (TCLP)	EPA-6020/1311	U	MG/L	0.0050	10/28/2016	RAL

U - Analyte analyzed for but not detected at level above reporting limit.

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ALS Group USA, Corp dba ALS Environmental

ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Landau Associates, Inc. 130 - 2nd Ave. S. Edmonds, WA 98020	DATE:	11/4/2016
		ALS SDG#:	EV16100095
		WDOE ACCREDITATION:	C601
CLIENT CONTACT:	Piper Roelen		
CLIENT PROJECT:	Transportation Corridor - 1148009.010.013		

LABORATORY CONTROL SAMPLE RESULTS

ALS Test Batch ID: R283820 - TCLP Extract by EPA-7470

SPIKED COMPOUND	METHOD	%REC	RPD	QUAL	LIMITS MIN	LIMITS MAX	ANALYSIS DATE	ANALYSIS BY
Mercury (TCLP) - BS	EPA-7470/1311	**94.0**			85	115	10/26/2016	RAL
Mercury (TCLP) - BSD	EPA-7470/1311	**91.0**	**3**		85	115	10/26/2016	RAL

ALS Test Batch ID: R283821 - TCLP Extract by EPA-6020

SPIKED COMPOUND	METHOD	%REC	RPD	QUAL	LIMITS MIN	LIMITS MAX	ANALYSIS DATE	ANALYSIS BY
Arsenic (TCLP) - BS	EPA-6020/1311	**99.0**			89.1	110	10/26/2016	RAL
Arsenic (TCLP) - BSD	EPA-6020/1311	**99.4**	**0**		89.1	110	10/26/2016	RAL
Barium (TCLP) - BS	EPA-6020/1311	**101**			88.5	108	10/26/2016	RAL
Barium (TCLP) - BSD	EPA-6020/1311	**100**	**0**		88.5	108	10/26/2016	RAL
Cadmium (TCLP) - BS	EPA-6020/1311	**101**			89.4	109	10/26/2016	RAL
Cadmium (TCLP) - BSD	EPA-6020/1311	**102**	**1**		89.4	109	10/26/2016	RAL
Chromium (TCLP) - BS	EPA-6020/1311	**102**			86.2	107	10/26/2016	RAL
Chromium (TCLP) - BSD	EPA-6020/1311	**102**	**0**		86.2	107	10/26/2016	RAL
Lead (TCLP) - BS	EPA-6020/1311	**99.5**			87.5	107	10/26/2016	RAL
Lead (TCLP) - BSD	EPA-6020/1311	**101**	**2**		87.5	107	10/26/2016	RAL
Selenium (TCLP) - BS	EPA-6020/1311	**102**			90.2	113	10/26/2016	RAL
Selenium (TCLP) - BSD	EPA-6020/1311	**102**	**0**		90.2	113	10/26/2016	RAL
Silver (TCLP) - BS	EPA-6020/1311	**101**			80	120	10/26/2016	RAL
Silver (TCLP) - BSD	EPA-6020/1311	**98.2**	**3**		80	120	10/26/2016	RAL

ALS Test Batch ID: R283823 - TCLP Extract by EPA-6020

SPIKED COMPOUND	METHOD	%REC	RPD	QUAL	LIMITS MIN	LIMITS MAX	ANALYSIS DATE	ANALYSIS BY
Arsenic (TCLP) - BS	EPA-6020/1311	**96.9**			89.1	110	10/28/2016	RAL
Arsenic (TCLP) - BSD	EPA-6020/1311	**97.6**	**1**		89.1	110	10/28/2016	RAL
Barium (TCLP) - BS	EPA-6020/1311	**99.6**			88.5	108	10/28/2016	RAL
Barium (TCLP) - BSD	EPA-6020/1311	**99.6**	**0**		88.5	108	10/28/2016	RAL
Cadmium (TCLP) - BS	EPA-6020/1311	**98.1**			89.4	109	10/28/2016	RAL
Cadmium (TCLP) - BSD	EPA-6020/1311	**99.5**	**1**		89.4	109	10/28/2016	RAL
Chromium (TCLP) - BS	EPA-6020/1311	**96.8**			86.2	107	10/28/2016	RAL
Chromium (TCLP) - BSD	EPA-6020/1311	**97.2**	**0**		86.2	107	10/28/2016	RAL
Lead (TCLP) - BS	EPA-6020/1311	**96.6**			87.5	107	10/28/2016	RAL
Lead (TCLP) - BSD	EPA-6020/1311	**97.5**	**1**		87.5	107	10/28/2016	RAL
Selenium (TCLP) - BS	EPA-6020/1311	**98.1**			90.2	113	10/28/2016	RAL
Selenium (TCLP) - BSD	EPA-6020/1311	**99.7**	**2**		90.2	113	10/28/2016	RAL
Silver (TCLP) - BS	EPA-6020/1311	**93.7**			80	120	10/28/2016	RAL
Silver (TCLP) - BSD	EPA-6020/1311	**92.2**	**2**		80	120	10/28/2016	RAL

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CERTIFICATE OF ANALYSIS

CLIENT:	Landau Associates, Inc. 130 - 2nd Ave. S. Edmonds, WA 98020	DATE:	11/4/2016
		ALS SDG#:	EV16100095
		WDOE ACCREDITATION:	C601
CLIENT CONTACT:	Piper Roelen		
CLIENT PROJECT:	Transportation Corridor - 1148009.010.013		

LABORATORY CONTROL SAMPLE RESULTS

SPIKED COMPOUND	METHOD	%REC	RPD	QUAL	LIMITS MIN	LIMITS MAX	ANALYSIS DATE	ANALYSIS BY

APPROVED BY

Laboratory Director

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ALS Group USA, Corp dba ALS Environmental

EV1610095

LANDAU ASSOCIATES

☒ Seattle/Edmonds (425) 778-0907
☐ Tacoma (253) 926-2493
☐ Spokane (509) 327-9737
☐ Portland (503) 542-1080
☐ _____

Chain-of-Custody Record

Date 10/17/2016
Page 1 of 2

Project Name Transportation Corridor Project No. 1148009.010.013
Project Location/Event Yakima, WA
Sampler's Name Brian Christianson
Project Contact Piper Roeler
Send Results To Piper Roeler

Testing Parameters

Turnaround Time
☒ Standard
☐ Accelerated
☐ _____

	Sample I.D.	Date	Time	Matrix	No. of Containers	TCLP (CrAl) 8 metals	BTU (ASTM D 2015)	Chlorine (EPA) 9056A*	Observations/Comments
1	TP-1-16 S-1 (1-2)	9/26/16		Solid	1	/	/		
2	TP-6-16 S-2 (1.5-2)	9/26/16			2	/	/		
3	TP-9-16 S-1 (0-1.5)	9/26/16			3	/	/		
4	TP-9B-16 S-4 (8-9)	9/29/16			4	/	/		
5	TP-9C-16 S-3 (5-6)	9/30/16			5	/	/		
6	TP-10-16 S-2 (1-2)	9/26/16			6	/	/		
7	TP-10-16 S-5 (10-12)	9/26/16			7	/	/		
8	TP-10A-16 S-4 (6-7)	9/29/16			8	/	/	⊗	
9	TP-10B-16 S-4 (5-5.5)	9/29/16			9	/	/		
10	TP-11-16 S-3 (3-3.5)	9/26/16			10	/	/	⊗	
11	TP-11A-16 S-3 (5-6)	9/29/16				/	/		
12	TP-11B-16 S-5 (8-9)	9/29/16				/	/		
13	TP-25-16 S-5 (8-10)	9/28/16				/	/		
14	TP-26-16 S-3 (4-4.5)	9/28/16				/	/	⊗	
15	TP-26A-16 S-3 (6-7)	9/30/16				/	/		
16	TP-26B-16 S-3 (4-5)	9/30/16				/	/	⊗	
17	TP-28-16 S-1 (1-2)	9/28/16				/	/		
18	TP-34-16 S-4 (6-7)	9/30/16				/	/		

☒ Allow water samples to settle, collect aliquot from clear portion
☐ NWTPH-Dx - run acid wash silica gel cleanup

☐ Analyze for EPH if no specific product identified

VOC/BTEX/VPH (soil):
☐ non-preserved
☐ preserved w/methanol
☐ preserved w/sodium bisulfate

☐ Freeze upon receipt
☐ Dissolved metal water samples field filtered

Other
*Chlorine Analysis on 5 samples with the highest BTU values

Special Shipment/Handling or Storage Requirements: Courier

Method of Shipment: Courier

Relinquished by	Received by	Relinquished by	Received by
Signature	Signature Shawn Robinson	Signature	Signature
Printed Name Brian E. Christianson	Printed Name Shawn Robinson	Printed Name	Printed Name
Company Landau Assoc.	Company ALS	Company	Company
Date 10/17/16 Time 3:30 PM	Date 10/14/16 Time 12:35 pm	Date Time	Date Time

WHITE COPY - Project File YELLOW COPY - Laboratory PINK COPY - Client Representative

12/2014

EV16100095

LANDAU ASSOCIATES

Seattle/Edmonds (425) 778-0907
Tacoma (253) 926-2493
Spokane (509) 327-9737
Portland (503) 542-1080

Chain-of-Custody Record

Date 10/13/2016
Page 2 of 2

Project Name Transportation Corridor Project No. 114EC09010.013
Project Location/Event Yakima, WA
Sampler's Name Brian Christianson
Project Contact Piper Roelen
Send Results To Piper Roelen

Testing Parameters

Turnaround Time
X Standard
☐ Accelerated
☐ _____

	Sample I.D.	Date	Time	Matrix	No. of Containers	TCLP (RCRA) Metals	BTU (ASTM D2015)	Chlorine (EPA 9056)*	Observations/Comments
19	TP-34-16 S-5 (10-11)	9/30/16		Solid				⊕	
20	TP-34A-16 S-1 (0-3)	9/30/16		↓				⊕	

X Allow water samples to settle, collect aliquot from clear portion

__ NWTPH-Dx - run acid wash silica gel cleanup

__ Analyze for EPH if no specific product identified

VOC/BTEX/VPH (soil):
__ non-preserved
__ preserved w/methanol
__ preserved w/sodium bisulfate

__ Freeze upon receipt

__ Dissolved metal water samples field filtered

Other
*Chlorine Analysis on 5 samples with the highest BTU values

Special Shipment/Handling or Storage Requirements Courier

Method of Shipment Courier

Relinquished by	Received by	Relinquished by	Received by
Signature [signature]	Signature Shawn Robinson	Signature	Signature
Printed Name Brian E Christianson	Printed Name Shawn Robinson	Printed Name	Printed Name
Company Landau Assoc.	Company ALS	Company	Company
Date 10/13/16 Time 3:30pm	Date 10/14/16 Time 12:35 pm	Date Time	Date Time

WHITE COPY - Project File YELLOW COPY - Laboratory PINK COPY - Client Representative

12/2014

ALS ENVIRONMENTAL

Sample Receiving Checklist

Client: Landau Associates ALS Job #: EV1610095

Project: Transportation Corridor - 1148009.010.013

Received Date: 10/14/16 Received Time: 12:35 pm By: Sn

Type of shipping container: Cooler X Box ____ Other ____

Shipped via: FedEx Ground ____ UPS ____ Mail ____ Courier X ALS Hand Delivered ____
FedEx Express ____

	Yes	No	N/A
Were custody seals on outside of shipping container?	X	____	____
If yes, how many? 2 Where? Top of each cooler			
Custody seal date: 10/13/16 Seal name: Landau			
Was Chain of Custody properly filled out (ink, signed, dated, etc.)?	X	____	____
Did all bottles have labels?	X	____	____
Did all bottle labels and tags agree with Chain of Custody?	X	____	____
Were samples received within hold time?	X	____	____
Did all bottles arrive in good condition (unbroken, etc.)?	X	____	____
Was sufficient amount of sample sent for the tests indicated?	X	____	____
Was correct preservation added to samples?	____	____	X

If no, Sample Control added preservative to the following:

Sample Number	Reagent	Analyte

Were VOA vials checked for absence of air bubbles?	____	____	X
Bubbles present in sample #: ____			

Temperature of cooler upon receipt: 19.6 °C each cooler Cold Cool (Ambient) N/A

Explain any discrepancies: ____

Was client contacted? ____ Who was called? ____ By whom? ____ Date: ____

Outcome of call: ____

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LABORATORY REPORT

December 7, 2016

Cody Johnson
Landau Associates, Inc.
130 2nd Ave. South
Edmonds, WA 98020

RE: Transportation Corridor Investigation / 1148009.010.014

Dear Cody:

Enclosed are the results of the samples submitted to our laboratory on November 21, 2016. For your reference, these analyses have been assigned our service request number P1605444.

All analyses were performed according to our laboratory's NELAP and DoD-ELAP-approved quality assurance program. The test results meet requirements of the current NELAP and DoD-ELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP and DoD-ELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. Results are intended to be considered in their entirety and apply only to the samples analyzed and reported herein.

If you have any questions, please call me at (805) 526-7161.

Respectfully submitted,

ALS | Environmental

Kate Kaneko
By Kate Kaneko at 11:24 am, 12/07/16

Kate Kaneko
Project Manager

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Client: Landau Associates, Inc. Service Request No: P1605444
Project: Transportation Corridor Investigation / 1148009.010.014

CASE NARRATIVE

The samples were received intact under chain of custody on November 21, 2016 and were stored in accordance with the analytical method requirements. Please refer to the sample acceptance check form for additional information. The results reported herein are applicable only to the condition of the samples at the time of sample receipt.

Fixed Gases Analysis

The samples were analyzed for fixed gases (oxygen, nitrogen, carbon monoxide, methane and carbon dioxide) according to ASTM D1946 (single injection) using a gas chromatograph equipped with a thermal conductivity detector (TCD). This procedure is described in laboratory SOP VOA-EPA3C. This method is included on the laboratory's DoD-ELAP scope of accreditation, however it is not part of the NELAP accreditation.

Sulfur Analysis

The samples were also analyzed for twenty sulfur compounds per ASTM D 5504-12 using a gas chromatograph equipped with a sulfur chemiluminescence detector (SCD). All compounds with the exception of hydrogen sulfide and carbonyl sulfide are quantitated against the initial calibration curve for methyl mercaptan. This method is included on the laboratory's NELAP scope of accreditation, however it is not part of the DoD-ELAP accreditation.

Total Gaseous Non-Methane Organics as Methane Analysis

The samples were also analyzed for total gaseous non-methane organics as methane according to modified EPA Method 25C. The analyses included a single sample injection (method modification) analyzed by gas chromatography using flame ionization detection/total combustion analysis. This method is not included on the laboratory's NELAP or DoD-ELAP scope of accreditation.

Volatile Organic Compound Analysis

The samples were also analyzed for volatile organic compounds in accordance with EPA Method TO-15 from the Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, Second Edition (EPA/625/R-96/010b), January, 1999. This procedure is described in laboratory SOP VOA-TO15. The analytical system was comprised of a gas chromatograph / mass spectrometer (GC/MS) interfaced to a whole-air preconcentrator. The method was

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Client: Landau Associates, Inc. Service Request No: P1605444
Project: Transportation Corridor Investigation / 1148009.010.014

CASE NARRATIVE

modified to include the use of helium as a diluent gas in place of zero-grade air for container pressurization. When necessary, analytical sample volumes were adjusted by a correction factor for containers pressurized with helium. A summary sheet has been included listing the affected samples. This method is included on the laboratory's NELAP and DoD-ELAP scope of accreditation. Any analytes flagged with an X are not included on the NELAP or DoD-ELAP accreditation.

The containers were cleaned, prior to sampling, down to the method reporting limit (MRL) reported for this project. Please note, projects which require reporting below the MRL could have results between the MRL and method detection limit (MDL) that are biased high.

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ALS Environmental – Simi Valley

CERTIFICATIONS, ACCREDITATIONS, AND REGISTRATIONS

Agency	Web Site	Number
Arizona DHS	http://www.azdhs.gov/preparedness/state-laboratory/lab-licensure-certification/index.php#laboratory-licensure-home	AZ0694
Florida DOH (NELAP)	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E871020
Louisiana DEQ (NELAP)	http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPermitSupport/LouisianaLaboratoryAccreditationProgram.aspx	05071
Maine DHHS	http://www.maine.gov/dhhs/mecdc/environmental-health/water/dwp-services/labcert/labcert.htm	2016036
Minnesota DOH (NELAP)	http://www.health.state.mn.us/accreditation	977273
New Jersey DEP (NELAP)	http://www.nj.gov/dep/oqa/	CA009
New York DOH (NELAP)	http://www.wadsworth.org/labcert/elap/elap.html	11221
Oregon PHD (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	4068-003
Pennsylvania DEP	http://www.depweb.state.pa.us/labs	68-03307 (Registration)
PJLA (DoD ELAP)	http://www.pjlabs.com/search-accredited-labs	65818 (Testing)
Texas CEQ (NELAP)	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704413-16-7
Utah DOH (NELAP)	http://health.utah.gov/lab/environmental-lab-certification/	CA016272016-6
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C946

Analyses were performed according to our laboratory's NELAP and DoD-ELAP approved quality assurance program. A complete listing of specific NELAP and DoD-ELAP certified analytes can be found in the certifications section at www.alsglobal.com, or at the accreditation body's website.

Each of the certifications listed above have an explicit Scope of Accreditation that applies to specific matrices/methods/analytes; therefore, please contact the laboratory for information corresponding to a particular certification.

ALS ENVIRONMENTAL

DETAIL SUMMARY REPORT

Client: Landau Associates, Inc. Service Request: P1605444

Project ID: Transportation Corridor Investigation / 1148009.010.014

Date Received: 11/21/2016

Time Received: 10:15

Client Sample ID	Lab Code	Matrix	Date Collected	Time Collected	Container ID	Pi1 (psig)	Pf1 (psig)	ASTM D1946-90(2006) - Fxd Gases Can	ASTM D5504-08 - Sulfur Can	25C Modified - TGNMO+ 1X Can	TO-15 - VOC Cans
GP-43-11162016	P1605444-001	Air	11/16/2016	16:24	SSC00302	-1.61	3.31	X	X	X	X
GP-41-11162016	P1605444-002	Air	11/16/2016	16:32	SSC00106	-2.49	3.27	X	X	X	X
Ambient-11162016	P1605444-003	Air	11/16/2016	17:00	SSC00078	0.54	3.47	X	X	X	X
GP-39-11162016	P1605444-004	Air	11/16/2016	16:48	SSC00347	-1.25	3.36	X	X	X	X
GP-38-11162016	P1605444-005	Air	11/16/2016	17:33	SSC00127	-2.22	3.48	X	X	X	X

ALS ENVIRONMENTAL

Sample Volume Correction for Helium Pressurization for SCAN Analysis

Sample ID	Pi	Pf	Sample Volume (L)	Adjusted Volume (L)
P1605444-003	0.54	3.47	0.930	1.00
P1605444-005	-2.22	3.48	0.018	0.0200

Validation Date: 10/13/09

Template Name: MFC_GCF_backfill.xls

Air - Chain of Custody Record & Analytical Service Request

Page 1 of 1

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Requested Turnaround Time in Business Days (Surcharges) please circle
1 Day (100%) 2 Day (75%) 3 Day (50%) 4 Day (35%) 5 Day (25%) 10-Day-Standard

ALS Project No. R1605444

Company Name & Address (Reporting Information)
LANDAU ASSOCIATES
130 2nd Avenue South
Edmonds, WA 98020

Project Name: Transportation Corridor Investigation

Project Number: 1148009.010.014

Project Manager: Piper Roelen

P.O. # / Billing Information: 1148009.010.014 / CLOSED - City of Yakima Landfill Site Project
Invoice through LAI

Phone: (425) 778-0907

Fax: —

Email Address for Result Reporting: proelen@landauinc.com; jdavis@landauinc.com

Sampler (Print & Sign): Stephanie Renando

ALS Contact:

Analysis Method

Client Sample ID	Laboratory ID Number	Date Collected	Time Collected	Canister ID (Bar code # - AC, SC, etc.)	Flow Controller ID (Bar code # - FC #)	Canister Start Pressure "Hg	Canister End Pressure "Hg/psig	Sample Volume	Total Reduced Sulfur ASTM D-5504	Fixed gases ASTM D-1945	NMOC's (EPA 25C)	VOC's (TO-15)	Comments e.g. Actual Preservative or specific instructions
GP-43-11162016		11/16/16	1624	SSC00302	SFC00113	-29.09	-5	6L	X	X	X	X	*methane, CO_2, CO, O_2, nitrogen
GP-41-11162016		11/16/16	1632	SSC00106	SFC00026	-29.00	-5	6L	X	X	X	X	
Ambient-11162016		11/16/16	1700	SSC00078	SFC00144	-28.94	-7	6L	X	X	X	X	
GP-39-11162016		11/16/16	1648	SSC00347	SFC00135	-29.24	-4	6L	X	X	X	X	
GP-38-11162016		11/16/16	1733	SSC00127	SFC00095	-29.27	-5	6L	X	X	X	X	

7 of 53

Report Tier Levels - please select

Tier I - Results (Default in not specified) _____
Tier II (Results + QC Summaries _____
Tier III (Results + QC & Calibration Summaries) _____
Tier IV (Date Validation Package) 10% Surcharge _____

EDD required YES / No
Type: _____ Units: _____

Chain of Custody Seal: (Circle)
INTACT / BROKEN / ABSENT

Project Requirements (MRLs, QAPP)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Stephanie Renando	11/17/16	1615			
FEDEX	Date:	Time:	Received by: (Signature)	Date: 11/21/16	Time: 10:00

Cooler / Blank Temperature _____ °C

ALS Environmental
Sample Acceptance Check Form

Client: Landau Associates, Inc. Work order: P1605444

Project: Transportation Corridor Investigation / 1148009.010.014

Sample(s) received on: 11/21/16 Date opened: 11/21/16 by: ADAVID

Note: This form is used for all samples received by ALS. The use of this form for custody seals is strictly meant to indicate presence/absence and not as an indication of compliance or nonconformity. Thermal preservation and pH will only be evaluated either at the request of the client and/or as required by the method/SOP.

		Yes	No	N/A
1	Were **sample containers** properly marked with client sample ID?	☒	☐	☐
2	Did **sample containers** arrive in good condition?	☒	☐	☐
3	Were **chain-of-custody** papers used and filled out?	☒	☐	☐
4	Did **sample container labels** and/or tags agree with custody papers?	☒	☐	☐
5	Was **sample volume** received adequate for analysis?	☒	☐	☐
6	Are samples within specified holding times?	☒	☐	☐
7	Was proper **temperature** (thermal preservation) of cooler at receipt adhered to?	☐	☐	☒
8	Were **custody seals** on outside of cooler/Box/Container?	☒	☐	☐
	Location of seal(s)? _____ Sealing Lid?	☒	☐	☐
	Were signature and date included?	☒	☐	☐
	Were seals intact?	☒	☐	☐
9	Do containers have appropriate **preservation**, according to method/SOP or Client specified information?	☐	☐	☒
	Is there a client indication that the submitted samples are **pH** preserved?	☐	☐	☒
	Were **VOA vials** checked for presence/absence of air bubbles?	☐	☐	☒
	Does the client/method/SOP require that the analyst check the sample pH and if necessary alter it?	☐	☐	☒
10	**Tubes:** Are the tubes capped and intact?	☐	☐	☒
11	**Badges:** Are the badges properly capped and intact?	☐	☐	☒
	Are dual bed badges separated and individually capped and intact?	☐	☐	☒

Lab Sample ID	Container Description	Required pH *	Received pH	Adjusted pH	VOA Headspace (Presence/Absence)	Receipt / Preservation Comments
P1605444-001.01	6.0 L Silonite Can					
P1605444-002.01	6.0 L Silonite Can					
P1605444-003.01	6.0 L Silonite Can					
P1605444-004.01	6.0 L Silonite Can					
P1605444-005.01	6.0 L Silonite Can					

Explain any discrepancies: (include lab sample ID numbers): _____

RSK - MEEPP, HCL (pH<2); RSK - CO2, (pH 5-8); Sulfur (pH>4)

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Landau Associates, Inc.**
Client Sample ID: **GP-43-11162016** ALS Project ID: P1605444
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P1605444-001

Test Code: ASTM D1946 Date Collected: 11/16/16
Instrument ID: HP5890 II/GC1/TCD Date Received: 11/21/16
Analyst: Adam McAfee Date Analyzed: 11/29/16
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.10 ml(s)
Test Notes:
Container ID: SSC00302

Initial Pressure (psig): -1.61 Final Pressure (psig): 3.31

Canister Dilution Factor: 1.38

CAS #	Compound	Result %, v/v	MRL %, v/v	Data Qualifier
7782-44-7	**Oxygen***	**7.30**	0.14	
7727-37-9	**Nitrogen**	**26.2**	0.14	
630-08-0	Carbon Monoxide	ND	0.14	
74-82-8	**Methane**	**42.6**	0.14	
124-38-9	**Carbon Dioxide**	**23.9**	0.14	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
* = The oxygen result may include argon due to coelution. Ambient air includes 0.93% argon.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Landau Associates, Inc.**
Client Sample ID: **GP-41-11162016** ALS Project ID: P1605444
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P1605444-002

Test Code: ASTM D1946 Date Collected: 11/16/16
Instrument ID: HP5890 II/GC1/TCD Date Received: 11/21/16
Analyst: Adam McAfee Date Analyzed: 11/29/16
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.10 ml(s)
Test Notes:
Container ID: SSC00106

Initial Pressure (psig): -2.49 Final Pressure (psig): 3.27

Canister Dilution Factor: 1.47

CAS #	Compound	Result %, v/v	MRL %, v/v	Data Qualifier
7782-44-7	**Oxygen***	**0.254**	0.15	
7727-37-9	**Nitrogen**	**10.2**	0.15	
630-08-0	Carbon Monoxide	ND	0.15	
74-82-8	**Methane**	**57.5**	0.15	
124-38-9	**Carbon Dioxide**	**32.0**	0.15	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
* = The oxygen result may include argon due to coelution. Ambient air includes 0.93% argon.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Landau Associates, Inc.**
Client Sample ID: **Ambient-11162016** ALS Project ID: P1605444
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P1605444-003

Test Code: ASTM D1946 Date Collected: 11/16/16
Instrument ID: HP5890 II/GC1/TCD Date Received: 11/21/16
Analyst: Adam McAfee Date Analyzed: 11/29/16
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.10 ml(s)
Test Notes:
Container ID: SSC00078

Initial Pressure (psig): 0.54 Final Pressure (psig): 3.47

Canister Dilution Factor: 1.19

CAS #	Compound	Result %, v/v	MRL %, v/v	Data Qualifier
7782-44-7	**Oxygen***	**22.0**	0.12	
7727-37-9	**Nitrogen**	**77.9**	0.12	
630-08-0	Carbon Monoxide	ND	0.12	
74-82-8	Methane	ND	0.12	
124-38-9	Carbon Dioxide	ND	0.12	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
* = The oxygen result may include argon due to coelution. Ambient air includes 0.93% argon.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Landau Associates, Inc.**
Client Sample ID: **GP-39-11162016** ALS Project ID: P1605444
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P1605444-004

Test Code: ASTM D1946 Date Collected: 11/16/16
Instrument ID: HP5890 II/GC1/TCD Date Received: 11/21/16
Analyst: Adam McAfee Date Analyzed: 11/29/16
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.10 ml(s)
Test Notes:
Container ID: SSC00347

Initial Pressure (psig): -1.25 Final Pressure (psig): 3.36

Canister Dilution Factor: 1.34

CAS #	Compound	Result %, v/v	MRL %, v/v	Data Qualifier
7782-44-7	Oxygen*	ND	0.13	
7727-37-9	**Nitrogen**	**0.668**	0.13	
630-08-0	Carbon Monoxide	ND	0.13	
74-82-8	**Methane**	**64.0**	0.13	
124-38-9	**Carbon Dioxide**	**35.2**	0.13	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
* = The oxygen result may include argon due to coelution. Ambient air includes 0.93% argon.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Landau Associates, Inc.**
Client Sample ID: **GP-38-11162016** ALS Project ID: P1605444
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P1605444-005

Test Code: ASTM D1946 Date Collected: 11/16/16
Instrument ID: HP5890 II/GC1/TCD Date Received: 11/21/16
Analyst: Adam McAfee Date Analyzed: 11/29/16
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.10 ml(s)
Test Notes:
Container ID: SSC00127

Initial Pressure (psig): -2.22 Final Pressure (psig): 3.48

Canister Dilution Factor: 1.46

CAS #	Compound	Result %, v/v	MRL %, v/v	Data Qualifier
7782-44-7	**Oxygen***	**1.72**	0.15	
7727-37-9	**Nitrogen**	**8.71**	0.15	
630-08-0	Carbon Monoxide	ND	0.15	
74-82-8	**Methane**	**55.1**	0.15	
124-38-9	**Carbon Dioxide**	**34.4**	0.15	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
* = The oxygen result may include argon due to coelution. Ambient air includes 0.93% argon.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Landau Associates, Inc.**
Client Sample ID: **Method Blank** ALS Project ID: P1605444
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P161129-MB

Test Code: ASTM D1946 Date Collected: NA
Instrument ID: HP5890 II/GC1/TCD Date Received: NA
Analyst: Adam McAfee Date Analyzed: 11/29/16
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.10 ml(s)
Test Notes:

CAS #	Compound	Result %, v/v	MRL %, v/v	Data Qualifier
7782-44-7	Oxygen*	ND	0.10	
7727-37-9	Nitrogen	ND	0.10	
630-08-0	Carbon Monoxide	ND	0.10	
74-82-8	Methane	ND	0.10	
124-38-9	Carbon Dioxide	ND	0.10	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
* = The oxygen result may include argon due to coelution. Ambient air includes 0.93% argon.

ALS ENVIRONMENTAL

LABORATORY CONTROL SAMPLE SUMMARY

Client: **Landau Associates, Inc.**
Client Sample ID: **Lab Control Sample** ALS Project ID: P1605444
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P161129-LCS

Test Code: ASTM D1946 Date Collected: NA
Instrument ID: HP5890 II/GC1/TCD Date Received: NA
Analyst: Adam McAfee Date Analyzed: 11/29/16
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: NA ml(s)
Test Notes:

CAS #	Compound	Spike Amount ppmV	**Result ppmV**	**% Recovery**	ALS Acceptance Limits	Data Qualifier
7782-44-7	Oxygen*	50,000	**52,000**	**104**	97-108	
7727-37-9	Nitrogen	50,000	**51,700**	**103**	89-113	
630-08-0	Carbon Monoxide	50,000	**51,400**	**103**	98-108	
74-82-8	Methane	50,000	**49,600**	**99**	94-111	
124-38-9	Carbon Dioxide	50,000	**49,600**	**99**	94-104	

* = The oxygen result may include argon due to coelution. Ambient air includes 0.93% argon.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Landau Associates, Inc.**
Client Sample ID: **GP-43-11162016** ALS Project ID: P1605444
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P1605444-001

Test Code:	ASTM D 5504-12	Date Collected:	11/16/16
Instrument ID:	Agilent 6890A/GC13/SCD	Time Collected:	16:24
Analyst:	Mike Conejo	Date Received:	11/21/16
Sample Type:	6.0 L Silonite Canister	Date Analyzed:	11/23/16
Test Notes:		Time Analyzed:	07:45
Container ID:	SSC00302	Volume(s) Analyzed:	1.0 ml(s)

Initial Pressure (psig): -1.61 Final Pressure (psig): 3.31

Canister Dilution Factor: 1.38

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
7783-06-4	Hydrogen Sulfide	**10,000**	9.6	**7,200**	6.9	
463-58-1	Carbonyl Sulfide	ND	17	ND	6.9	
74-93-1	Methyl Mercaptan	**59**	14	**30**	6.9	
75-08-1	Ethyl Mercaptan	**45**	18	**18**	6.9	
75-18-3	Dimethyl Sulfide	**47**	18	**19**	6.9	
75-15-0	Carbon Disulfide	ND	11	ND	3.5	
75-33-2	Isopropyl Mercaptan	ND	21	ND	6.9	
75-66-1	tert-Butyl Mercaptan	ND	25	ND	6.9	
107-03-9	n-Propyl Mercaptan	ND	21	ND	6.9	
624-89-5	Ethyl Methyl Sulfide	ND	21	ND	6.9	
110-02-1	Thiophene	ND	24	ND	6.9	
513-44-0	Isobutyl Mercaptan	ND	25	ND	6.9	
352-93-2	Diethyl Sulfide	ND	25	ND	6.9	
109-79-5	n-Butyl Mercaptan	ND	25	ND	6.9	
624-92-0	Dimethyl Disulfide	ND	13	ND	3.5	
616-44-4	3-Methylthiophene	ND	28	ND	6.9	
110-01-0	Tetrahydrothiophene	ND	25	ND	6.9	
638-02-8	2,5-Dimethylthiophene	ND	32	ND	6.9	
872-55-9	2-Ethylthiophene	ND	32	ND	6.9	
110-81-6	Diethyl Disulfide	ND	17	ND	3.5	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Landau Associates, Inc.**
Client Sample ID: **GP-41-11162016** ALS Project ID: P1605444
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P1605444-002

Test Code:	ASTM D 5504-12	Date Collected:	11/16/16
Instrument ID:	Agilent 6890A/GC13/SCD	Time Collected:	16:32
Analyst:	Mike Conejo	Date Received:	11/21/16
Sample Type:	6.0 L Silonite Canister	Date Analyzed:	11/23/16
Test Notes:		Time Analyzed:	07:58
Container ID:	SSC00106	Volume(s) Analyzed:	1.0 ml(s)

Initial Pressure (psig): -2.49 Final Pressure (psig): 3.27

Canister Dilution Factor: 1.47

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
7783-06-4	Hydrogen Sulfide	ND	10	ND	7.4	
463-58-1	Carbonyl Sulfide	ND	18	ND	7.4	
74-93-1	Methyl Mercaptan	ND	14	ND	7.4	
75-08-1	Ethyl Mercaptan	ND	19	ND	7.4	
75-18-3	Dimethyl Sulfide	ND	19	ND	7.4	
75-15-0	Carbon Disulfide	ND	11	ND	3.7	
75-33-2	Isopropyl Mercaptan	ND	23	ND	7.4	
75-66-1	tert-Butyl Mercaptan	ND	27	ND	7.4	
107-03-9	n-Propyl Mercaptan	ND	23	ND	7.4	
624-89-5	Ethyl Methyl Sulfide	ND	23	ND	7.4	
110-02-1	Thiophene	ND	25	ND	7.4	
513-44-0	Isobutyl Mercaptan	ND	27	ND	7.4	
352-93-2	Diethyl Sulfide	ND	27	ND	7.4	
109-79-5	n-Butyl Mercaptan	ND	27	ND	7.4	
624-92-0	Dimethyl Disulfide	ND	14	ND	3.7	
616-44-4	3-Methylthiophene	ND	29	ND	7.4	
110-01-0	Tetrahydrothiophene	ND	26	ND	7.4	
638-02-8	2,5-Dimethylthiophene	ND	34	ND	7.4	
872-55-9	2-Ethylthiophene	ND	34	ND	7.4	
110-81-6	Diethyl Disulfide	ND	18	ND	3.7	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Landau Associates, Inc.**
Client Sample ID: **Ambient-11162016** ALS Project ID: P1605444
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P1605444-003

Test Code:	ASTM D 5504-12	Date Collected:	11/16/16
Instrument ID:	Agilent 6890A/GC13/SCD	Time Collected:	17:00
Analyst:	Mike Conejo	Date Received:	11/21/16
Sample Type:	6.0 L Silonite Canister	Date Analyzed:	11/23/16
Test Notes:		Time Analyzed:	08:10
Container ID:	SSC00078	Volume(s) Analyzed:	1.0 ml(s)

Initial Pressure (psig): 0.54 Final Pressure (psig): 3.47

Canister Dilution Factor: 1.19

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
7783-06-4	Hydrogen Sulfide	ND	8.3	ND	6.0	
463-58-1	Carbonyl Sulfide	ND	15	ND	6.0	
74-93-1	Methyl Mercaptan	ND	12	ND	6.0	
75-08-1	Ethyl Mercaptan	ND	15	ND	6.0	
75-18-3	Dimethyl Sulfide	ND	15	ND	6.0	
75-15-0	Carbon Disulfide	ND	9.3	ND	3.0	
75-33-2	Isopropyl Mercaptan	ND	19	ND	6.0	
75-66-1	tert-Butyl Mercaptan	ND	22	ND	6.0	
107-03-9	n-Propyl Mercaptan	ND	19	ND	6.0	
624-89-5	Ethyl Methyl Sulfide	ND	19	ND	6.0	
110-02-1	Thiophene	ND	20	ND	6.0	
513-44-0	Isobutyl Mercaptan	ND	22	ND	6.0	
352-93-2	Diethyl Sulfide	ND	22	ND	6.0	
109-79-5	n-Butyl Mercaptan	ND	22	ND	6.0	
624-92-0	Dimethyl Disulfide	ND	11	ND	3.0	
616-44-4	3-Methylthiophene	ND	24	ND	6.0	
110-01-0	Tetrahydrothiophene	ND	21	ND	6.0	
638-02-8	2,5-Dimethylthiophene	ND	27	ND	6.0	
872-55-9	2-Ethylthiophene	ND	27	ND	6.0	
110-81-6	Diethyl Disulfide	ND	15	ND	3.0	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Landau Associates, Inc.**
Client Sample ID: **GP-39-11162016** ALS Project ID: P1605444
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P1605444-004

Test Code:	ASTM D 5504-12	Date Collected:	11/16/16
Instrument ID:	Agilent 6890A/GC13/SCD	Time Collected:	16:48
Analyst:	Mike Conejo	Date Received:	11/21/16
Sample Type:	6.0 L Silonite Canister	Date Analyzed:	11/23/16
Test Notes:		Time Analyzed:	08:24
Container ID:	SSC00347	Volume(s) Analyzed:	1.0 ml(s)

Initial Pressure (psig): -1.25 Final Pressure (psig): 3.36

Canister Dilution Factor: 1.34

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
7783-06-4	Hydrogen Sulfide	**14,000**	9.3	**10,000**	6.7	
463-58-1	Carbonyl Sulfide	ND	16	ND	6.7	
74-93-1	Methyl Mercaptan	**37**	13	**19**	6.7	
75-08-1	Ethyl Mercaptan	**39**	17	**15**	6.7	
75-18-3	Dimethyl Sulfide	ND	17	ND	6.7	
75-15-0	Carbon Disulfide	ND	10	ND	3.4	
75-33-2	Isopropyl Mercaptan	ND	21	ND	6.7	
75-66-1	tert-Butyl Mercaptan	ND	25	ND	6.7	
107-03-9	n-Propyl Mercaptan	ND	21	ND	6.7	
624-89-5	Ethyl Methyl Sulfide	ND	21	ND	6.7	
110-02-1	Thiophene	ND	23	ND	6.7	
513-44-0	Isobutyl Mercaptan	ND	25	ND	6.7	
352-93-2	Diethyl Sulfide	ND	25	ND	6.7	
109-79-5	n-Butyl Mercaptan	ND	25	ND	6.7	
624-92-0	Dimethyl Disulfide	ND	13	ND	3.4	
616-44-4	3-Methylthiophene	ND	27	ND	6.7	
110-01-0	Tetrahydrothiophene	ND	24	ND	6.7	
638-02-8	2,5-Dimethylthiophene	ND	31	ND	6.7	
872-55-9	2-Ethylthiophene	ND	31	ND	6.7	
110-81-6	Diethyl Disulfide	ND	17	ND	3.4	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Landau Associates, Inc.**
Client Sample ID: **GP-38-11162016** ALS Project ID: P1605444
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P1605444-005

Test Code:	ASTM D 5504-12	Date Collected:	11/16/16
Instrument ID:	Agilent 6890A/GC13/SCD	Time Collected:	17:33
Analyst:	Mike Conejo	Date Received:	11/21/16
Sample Type:	6.0 L Silonite Canister	Date Analyzed:	11/23/16
Test Notes:		Time Analyzed:	08:37
Container ID:	SSC00127	Volume(s) Analyzed:	1.0 ml(s)

Initial Pressure (psig): -2.22 Final Pressure (psig): 3.48

Canister Dilution Factor: 1.46

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
7783-06-4	Hydrogen Sulfide	ND	10	ND	7.3	
463-58-1	Carbonyl Sulfide	**63**	18	**26**	7.3	
74-93-1	Methyl Mercaptan	ND	14	ND	7.3	
75-08-1	Ethyl Mercaptan	ND	19	ND	7.3	
75-18-3	Dimethyl Sulfide	ND	19	ND	7.3	
75-15-0	Carbon Disulfide	ND	11	ND	3.7	
75-33-2	Isopropyl Mercaptan	ND	23	ND	7.3	
75-66-1	tert-Butyl Mercaptan	ND	27	ND	7.3	
107-03-9	n-Propyl Mercaptan	ND	23	ND	7.3	
624-89-5	Ethyl Methyl Sulfide	ND	23	ND	7.3	
110-02-1	Thiophene	ND	25	ND	7.3	
513-44-0	Isobutyl Mercaptan	ND	27	ND	7.3	
352-93-2	Diethyl Sulfide	ND	27	ND	7.3	
109-79-5	n-Butyl Mercaptan	ND	27	ND	7.3	
624-92-0	Dimethyl Disulfide	ND	14	ND	3.7	
616-44-4	3-Methylthiophene	ND	29	ND	7.3	
110-01-0	Tetrahydrothiophene	ND	26	ND	7.3	
638-02-8	2,5-Dimethylthiophene	ND	33	ND	7.3	
872-55-9	2-Ethylthiophene	ND	33	ND	7.3	
110-81-6	Diethyl Disulfide	ND	18	ND	3.7	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Landau Associates, Inc.**
Client Sample ID: **Method Blank** ALS Project ID: P1605444
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P161123-MB

Test Code: ASTM D 5504-12 Date Collected: NA
Instrument ID: Agilent 6890A/GC13/SCD Time Collected: NA
Analyst: Mike Conejo Date Received: NA
Sample Type: 6.0 L Silonite Canister Date Analyzed: 11/23/16
Test Notes: Time Analyzed: 07:26
Volume(s) Analyzed: 1.0 ml(s)

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
7783-06-4	Hydrogen Sulfide	ND	7.0	ND	5.0	
463-58-1	Carbonyl Sulfide	ND	12	ND	5.0	
74-93-1	Methyl Mercaptan	ND	9.8	ND	5.0	
75-08-1	Ethyl Mercaptan	ND	13	ND	5.0	
75-18-3	Dimethyl Sulfide	ND	13	ND	5.0	
75-15-0	Carbon Disulfide	ND	7.8	ND	2.5	
75-33-2	Isopropyl Mercaptan	ND	16	ND	5.0	
75-66-1	tert-Butyl Mercaptan	ND	18	ND	5.0	
107-03-9	n-Propyl Mercaptan	ND	16	ND	5.0	
624-89-5	Ethyl Methyl Sulfide	ND	16	ND	5.0	
110-02-1	Thiophene	ND	17	ND	5.0	
513-44-0	Isobutyl Mercaptan	ND	18	ND	5.0	
352-93-2	Diethyl Sulfide	ND	18	ND	5.0	
109-79-5	n-Butyl Mercaptan	ND	18	ND	5.0	
624-92-0	Dimethyl Disulfide	ND	9.6	ND	2.5	
616-44-4	3-Methylthiophene	ND	20	ND	5.0	
110-01-0	Tetrahydrothiophene	ND	18	ND	5.0	
638-02-8	2,5-Dimethylthiophene	ND	23	ND	5.0	
872-55-9	2-Ethylthiophene	ND	23	ND	5.0	
110-81-6	Diethyl Disulfide	ND	12	ND	2.5	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

LABORATORY CONTROL SAMPLE SUMMARY

Client: **Landau Associates, Inc.**
Client Sample ID: **Lab Control Sample** ALS Project ID: P1605444
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P161123-LCS

Test Code: ASTM D 5504-12 Date Collected: NA
Instrument ID: Agilent 6890A/GC13/SCD Date Received: NA
Analyst: Mike Conejo Date Analyzed: 11/23/16
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: NA ml(s)
Test Notes:

CAS #	Compound	Spike Amount ppbV	Result ppbV	% Recovery	ALS Acceptance Limits	Data Qualifier
7783-06-4	Hydrogen Sulfide	1,000	**1,080**	**108**	75-148	
463-58-1	Carbonyl Sulfide	1,000	**1,050**	**105**	70-137	
74-93-1	Methyl Mercaptan	1,000	**1,040**	**104**	72-139	

Client: **Landau Associates, Inc.**

Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Project ID: P1605444

Total Gaseous Nonmethane Organics (TGNMO) as Methane

Test Code: EPA Method 25C Modified
Instrument ID: HP5890 II/GC1/FID/TCA
Analyst: Adam McAfee
Sampling Media: 6.0 L Silonite Canister(s)
Test Notes:

Date(s) Collected: 11/16/16
Date Received: 11/21/16
Date Analyzed: #N/A

Client Sample ID	ALS Sample ID	Canister Dilution Factor	Injection Volume ml(s)	**Result ppmV**	MRL ppmV	Data Qualifier
GP-43-11162016	P1605444-001	1.38	0.50	**350**	1.4	
GP-41-11162016	P1605444-002	1.47	0.50	**640**	1.5	
Ambient-11162016	P1605444-003	1.19	0.50	ND	1.2	
GP-39-11162016	P1605444-004	1.34	0.50	**630**	1.3	
GP-38-11162016	P1605444-005	1.46	0.50	**220**	1.5	
Method Blank	P161129-MB	1.00	0.50	ND	1.0	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

LABORATORY CONTROL SAMPLE SUMMARY

Client: **Landau Associates, Inc.**
Client Sample ID: **Lab Control Sample** ALS Project ID: P1605444
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P161129-LCS

Test Code: EPA Method 25C Modified Date Collected: NA
Instrument ID: HP5890 II/GC1/FID/TCA Date Received: NA
Analyst: Adam McAfee Date Analyzed: 11/29/16
Sampling Media: 6.0 L Silonite Canister Volume(s) Analyzed: NA ml(s)
Test Notes:

Compound	Spike Amount ppmV	**Result ppmV**	**% Recovery**	ALS Acceptance Limits
Total Gaseous Nonmethane Organics (TGNMO) as Methane	300	**266**	**89**	85-121

Data Qualifier

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Landau Associates, Inc.**
Client Sample ID: **GP-43-11162016** ALS Project ID: P1605444
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P1605444-001

Test Code: EPA TO-15 Modified Date Collected: 11/16/16
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: 11/21/16
Analyst: Lusine Hakobyan Date Analyzed: 11/30/16
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.010 Liter(s)
Test Notes:
Container ID: SSC00302

Initial Pressure (psig): -1.61 Final Pressure (psig): 3.31

Canister Dilution Factor: 1.38

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
115-07-1	Propene	**800**	69	**470**	40	
75-71-8	Dichlorodifluoromethane (CFC 12)	**1,600**	69	**330**	14	
74-87-3	Chloromethane	ND	69	ND	33	
76-14-2	1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)	**980**	69	**140**	9.9	
75-01-4	Vinyl Chloride	**3,900**	69	**1,500**	27	
106-99-0	1,3-Butadiene	ND	69	ND	31	
74-83-9	Bromomethane	ND	69	ND	18	
75-00-3	Chloroethane	ND	69	ND	26	
64-17-5	Ethanol	ND	690	ND	370	
75-05-8	Acetonitrile	ND	69	ND	41	
107-02-8	Acrolein	ND	280	ND	120	
67-64-1	Acetone	**4,200**	690	**1,800**	290	
75-69-4	Trichlorofluoromethane	**510**	69	**91**	12	
67-63-0	2-Propanol (Isopropyl Alcohol)	**1,700**	690	**690**	280	
107-13-1	Acrylonitrile	ND	69	ND	32	
75-35-4	1,1-Dichloroethene	**99**	69	**25**	17	
75-09-2	Methylene Chloride	**110**	69	**32**	20	
107-05-1	3-Chloro-1-propene (Allyl Chloride)	ND	69	ND	22	
76-13-1	Trichlorotrifluoroethane	ND	69	ND	9.0	
75-15-0	Carbon Disulfide	ND	690	ND	220	
156-60-5	trans-1,2-Dichloroethene	**150**	69	**38**	17	
75-34-3	1,1-Dichloroethane	ND	69	ND	17	
1634-04-4	Methyl tert-Butyl Ether	ND	69	ND	19	
108-05-4	Vinyl Acetate	ND	690	ND	200	
78-93-3	2-Butanone (MEK)	**5,500**	690	**1,900**	230	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

Client: **Landau Associates, Inc.**

Client Sample ID: **GP-43-11162016** ALS Project ID: P1605444

Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P1605444-001

Test Code: EPA TO-15 Modified Date Collected: 11/16/16

Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: 11/21/16

Analyst: Lusine Hakobyan Date Analyzed: 11/30/16

Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.010 Liter(s)

Test Notes:

Container ID: SSC00302

Initial Pressure (psig): -1.61 Final Pressure (psig): 3.31

Canister Dilution Factor: 1.38

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
156-59-2	cis-1,2-Dichloroethene	**5,100**	69	**1,300**	17	
141-78-6	Ethyl Acetate	ND	140	ND	38	
110-54-3	n-Hexane	**660**	69	**190**	20	
67-66-3	Chloroform	ND	69	ND	14	
109-99-9	Tetrahydrofuran (THF)	**1,100**	69	**360**	23	
107-06-2	1,2-Dichloroethane	ND	69	ND	17	
71-55-6	1,1,1-Trichloroethane	ND	69	ND	13	
71-43-2	Benzene	**370**	69	**120**	22	
56-23-5	Carbon Tetrachloride	ND	69	ND	11	
110-82-7	Cyclohexane	**580**	140	**170**	40	
78-87-5	1,2-Dichloropropane	ND	69	ND	15	
75-27-4	Bromodichloromethane	ND	69	ND	10	
79-01-6	Trichloroethene	**460**	69	**86**	13	
123-91-1	1,4-Dioxane	ND	69	ND	19	
80-62-6	Methyl Methacrylate	ND	140	ND	34	
142-82-5	n-Heptane	**2,000**	69	**500**	17	
10061-01-5	cis-1,3-Dichloropropene	ND	69	ND	15	
108-10-1	4-Methyl-2-pentanone	**1,000**	69	**240**	17	
10061-02-6	trans-1,3-Dichloropropene	ND	69	ND	15	
79-00-5	1,1,2-Trichloroethane	ND	69	ND	13	
108-88-3	Toluene	**8,400**	69	**2,200**	18	
591-78-6	2-Hexanone	ND	69	ND	17	
124-48-1	Dibromochloromethane	ND	69	ND	8.1	
106-93-4	1,2-Dibromoethane	ND	69	ND	9.0	
123-86-4	n-Butyl Acetate	ND	69	ND	15	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

Client: **Landau Associates, Inc.**
Client Sample ID: **GP-43-11162016** ALS Project ID: P1605444
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P1605444-001

Test Code: EPA TO-15 Modified Date Collected: 11/16/16
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: 11/21/16
Analyst: Lusine Hakobyan Date Analyzed: 11/30/16
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.010 Liter(s)
Test Notes:
Container ID: SSC00302

Initial Pressure (psig): -1.61 Final Pressure (psig): 3.31

Canister Dilution Factor: 1.38

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
111-65-9	n-Octane	**1,800**	69	**380**	15	
127-18-4	Tetrachloroethene	**810**	69	**120**	10	
108-90-7	Chlorobenzene	**96**	69	**21**	15	
100-41-4	Ethylbenzene	**4,500**	69	**1,000**	16	
179601-23-1	m,p-Xylenes	**8,600**	140	**2,000**	32	
75-25-2	Bromoform	ND	69	ND	6.7	
100-42-5	Styrene	**160**	69	**38**	16	
95-47-6	o-Xylene	**2,200**	69	**510**	16	
111-84-2	n-Nonane	**3,200**	69	**610**	13	
79-34-5	1,1,2,2-Tetrachloroethane	ND	69	ND	10	
98-82-8	Cumene	**750**	69	**150**	14	
80-56-8	alpha-Pinene	**4,100**	69	**730**	12	
103-65-1	n-Propylbenzene	**690**	69	**140**	14	
622-96-8	4-Ethyltoluene	**290**	69	**59**	14	
108-67-8	1,3,5-Trimethylbenzene	**550**	69	**110**	14	
95-63-6	1,2,4-Trimethylbenzene	**1,500**	69	**310**	14	
100-44-7	Benzyl Chloride	ND	69	ND	13	
541-73-1	1,3-Dichlorobenzene	ND	69	ND	11	
106-46-7	1,4-Dichlorobenzene	ND	69	ND	11	
95-50-1	1,2-Dichlorobenzene	ND	69	ND	11	
5989-27-5	d-Limonene	**8,000**	69	**1,400**	12	
96-12-8	1,2-Dibromo-3-chloropropane	ND	69	ND	7.1	
120-82-1	1,2,4-Trichlorobenzene	ND	69	ND	9.3	
91-20-3	Naphthalene	ND	69	ND	13	
87-68-3	Hexachlorobutadiene	ND	69	ND	6.5	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Landau Associates, Inc.**
Client Sample ID: **GP-41-11162016** ALS Project ID: P1605444
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P1605444-002

Test Code: EPA TO-15 Modified Date Collected: 11/16/16
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: 11/21/16
Analyst: Lusine Hakobyan Date Analyzed: 11/30/16
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.0050 Liter(s)
Test Notes:
Container ID: SSC00106

Initial Pressure (psig): -2.49 Final Pressure (psig): 3.27

Canister Dilution Factor: 1.47

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
115-07-1	Propene	**500**	150	**290**	85	
75-71-8	Dichlorodifluoromethane (CFC 12)	**1,100**	150	**210**	30	
74-87-3	Chloromethane	ND	150	ND	71	
76-14-2	1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)	**980**	150	**140**	21	
75-01-4	Vinyl Chloride	**3,700**	150	**1,500**	58	
106-99-0	1,3-Butadiene	ND	150	ND	66	
74-83-9	Bromomethane	ND	150	ND	38	
75-00-3	Chloroethane	ND	150	ND	56	
64-17-5	Ethanol	ND	1,500	ND	780	
75-05-8	Acetonitrile	ND	150	ND	88	
107-02-8	Acrolein	ND	590	ND	260	
67-64-1	Acetone	ND	1,500	ND	620	
75-69-4	Trichlorofluoromethane	ND	150	ND	26	
67-63-0	2-Propanol (Isopropyl Alcohol)	ND	1,500	ND	600	
107-13-1	Acrylonitrile	ND	150	ND	68	
75-35-4	1,1-Dichloroethene	ND	150	ND	37	
75-09-2	Methylene Chloride	ND	150	ND	42	
107-05-1	3-Chloro-1-propene (Allyl Chloride)	ND	150	ND	47	
76-13-1	Trichlorotrifluoroethane	ND	150	ND	19	
75-15-0	Carbon Disulfide	ND	1,500	ND	470	
156-60-5	trans-1,2-Dichloroethene	ND	150	ND	37	
75-34-3	1,1-Dichloroethane	ND	150	ND	36	
1634-04-4	Methyl tert-Butyl Ether	ND	150	ND	41	
108-05-4	Vinyl Acetate	ND	1,500	ND	420	
78-93-3	2-Butanone (MEK)	ND	1,500	ND	500	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Landau Associates, Inc.**
Client Sample ID: **GP-41-11162016** ALS Project ID: P1605444
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P1605444-002

Test Code: EPA TO-15 Modified Date Collected: 11/16/16
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: 11/21/16
Analyst: Lusine Hakobyan Date Analyzed: 11/30/16
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.0050 Liter(s)
Test Notes:
Container ID: SSC00106

Initial Pressure (psig): -2.49 Final Pressure (psig): 3.27

Canister Dilution Factor: 1.47

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
156-59-2	cis-1,2-Dichloroethene	**970**	150	**250**	37	
141-78-6	Ethyl Acetate	ND	290	ND	82	
110-54-3	n-Hexane	**400**	150	**110**	42	
67-66-3	Chloroform	ND	150	ND	30	
109-99-9	Tetrahydrofuran (THF)	ND	150	ND	50	
107-06-2	1,2-Dichloroethane	ND	150	ND	36	
71-55-6	1,1,1-Trichloroethane	ND	150	ND	27	
71-43-2	Benzene	**220**	150	**69**	46	
56-23-5	Carbon Tetrachloride	ND	150	ND	23	
110-82-7	Cyclohexane	**320**	290	**93**	85	
78-87-5	1,2-Dichloropropane	ND	150	ND	32	
75-27-4	Bromodichloromethane	ND	150	ND	22	
79-01-6	Trichloroethene	ND	150	ND	27	
123-91-1	1,4-Dioxane	ND	150	ND	41	
80-62-6	Methyl Methacrylate	ND	290	ND	72	
142-82-5	n-Heptane	**490**	150	**120**	36	
10061-01-5	cis-1,3-Dichloropropene	ND	150	ND	32	
108-10-1	4-Methyl-2-pentanone	ND	150	ND	36	
10061-02-6	trans-1,3-Dichloropropene	ND	150	ND	32	
79-00-5	1,1,2-Trichloroethane	ND	150	ND	27	
108-88-3	Toluene	**260**	150	**70**	39	
591-78-6	2-Hexanone	ND	150	ND	36	
124-48-1	Dibromochloromethane	ND	150	ND	17	
106-93-4	1,2-Dibromoethane	ND	150	ND	19	
123-86-4	n-Butyl Acetate	ND	150	ND	31	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

Client: **Landau Associates, Inc.**
Client Sample ID: **GP-41-11162016** ALS Project ID: P1605444
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P1605444-002

Test Code: EPA TO-15 Modified Date Collected: 11/16/16
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: 11/21/16
Analyst: Lusine Hakobyan Date Analyzed: 11/30/16
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.0050 Liter(s)
Test Notes:
Container ID: SSC00106

Initial Pressure (psig): -2.49 Final Pressure (psig): 3.27

Canister Dilution Factor: 1.47

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
111-65-9	n-Octane	**320**	150	**69**	31	
127-18-4	Tetrachloroethene	**230**	150	**34**	22	
108-90-7	Chlorobenzene	ND	150	ND	32	
100-41-4	Ethylbenzene	ND	150	ND	34	
179601-23-1	m,p-Xylenes	ND	290	ND	68	
75-25-2	Bromoform	ND	150	ND	14	
100-42-5	Styrene	ND	150	ND	35	
95-47-6	o-Xylene	ND	150	ND	34	
111-84-2	n-Nonane	**480**	150	**91**	28	
79-34-5	1,1,2,2-Tetrachloroethane	ND	150	ND	21	
98-82-8	Cumene	ND	150	ND	30	
80-56-8	alpha-Pinene	ND	150	ND	26	
103-65-1	n-Propylbenzene	ND	150	ND	30	
622-96-8	4-Ethyltoluene	ND	150	ND	30	
108-67-8	1,3,5-Trimethylbenzene	ND	150	ND	30	
95-63-6	1,2,4-Trimethylbenzene	ND	150	ND	30	
100-44-7	Benzyl Chloride	ND	150	ND	28	
541-73-1	1,3-Dichlorobenzene	ND	150	ND	24	
106-46-7	1,4-Dichlorobenzene	ND	150	ND	24	
95-50-1	1,2-Dichlorobenzene	ND	150	ND	24	
5989-27-5	d-Limonene	ND	150	ND	26	
96-12-8	1,2-Dibromo-3-chloropropane	ND	150	ND	15	
120-82-1	1,2,4-Trichlorobenzene	ND	150	ND	20	
91-20-3	Naphthalene	ND	150	ND	28	
87-68-3	Hexachlorobutadiene	ND	150	ND	14	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Landau Associates, Inc.**
Client Sample ID: **Ambient-11162016** ALS Project ID: P1605444
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P1605444-003

Test Code: EPA TO-15 Modified Date Collected: 11/16/16
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: 11/21/16
Analyst: Lusine Hakobyan Date Analyzed: 12/5/16
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 1.00 Liter(s)
Test Notes:
Container ID: SSC00078

Initial Pressure (psig): 0.54 Final Pressure (psig): 3.47

Canister Dilution Factor: 1.19

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
115-07-1	Propene	**1.3**	0.60	**0.78**	0.35	
75-71-8	Dichlorodifluoromethane (CFC 12)	**2.2**	0.60	**0.45**	0.12	
74-87-3	Chloromethane	ND	0.60	ND	0.29	
76-14-2	1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)	ND	0.60	ND	0.085	
75-01-4	Vinyl Chloride	ND	0.60	ND	0.23	
106-99-0	1,3-Butadiene	ND	0.60	ND	0.27	
74-83-9	Bromomethane	ND	0.60	ND	0.15	
75-00-3	Chloroethane	ND	0.60	ND	0.23	
64-17-5	Ethanol	ND	6.0	ND	3.2	
75-05-8	Acetonitrile	ND	0.60	ND	0.35	
107-02-8	Acrolein	ND	2.4	ND	1.0	
67-64-1	Acetone	ND	6.0	ND	2.5	
75-69-4	Trichlorofluoromethane	**1.1**	0.60	**0.20**	0.11	
67-63-0	2-Propanol (Isopropyl Alcohol)	ND	6.0	ND	2.4	
107-13-1	Acrylonitrile	ND	0.60	ND	0.27	
75-35-4	1,1-Dichloroethene	ND	0.60	ND	0.15	
75-09-2	Methylene Chloride	ND	0.60	ND	0.17	
107-05-1	3-Chloro-1-propene (Allyl Chloride)	ND	0.60	ND	0.19	
76-13-1	Trichlorotrifluoroethane	ND	0.60	ND	0.078	
75-15-0	Carbon Disulfide	ND	6.0	ND	1.9	
156-60-5	trans-1,2-Dichloroethene	ND	0.60	ND	0.15	
75-34-3	1,1-Dichloroethane	ND	0.60	ND	0.15	
1634-04-4	Methyl tert-Butyl Ether	ND	0.60	ND	0.17	
108-05-4	Vinyl Acetate	ND	6.0	ND	1.7	
78-93-3	2-Butanone (MEK)	ND	6.0	ND	2.0	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

Client: **Landau Associates, Inc.**
Client Sample ID: **Ambient-11162016** ALS Project ID: P1605444
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P1605444-003

Test Code: EPA TO-15 Modified Date Collected: 11/16/16
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: 11/21/16
Analyst: Lusine Hakobyan Date Analyzed: 12/5/16
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 1.00 Liter(s)
Test Notes:
Container ID: SSC00078

Initial Pressure (psig): 0.54 Final Pressure (psig): 3.47

Canister Dilution Factor: 1.19

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
156-59-2	cis-1,2-Dichloroethene	ND	0.60	ND	0.15	
141-78-6	Ethyl Acetate	ND	1.2	ND	0.33	
110-54-3	n-Hexane	ND	0.60	ND	0.17	
67-66-3	Chloroform	ND	0.60	ND	0.12	
109-99-9	Tetrahydrofuran (THF)	ND	0.60	ND	0.20	
107-06-2	1,2-Dichloroethane	ND	0.60	ND	0.15	
71-55-6	1,1,1-Trichloroethane	ND	0.60	ND	0.11	
71-43-2	Benzene	**0.60**	0.60	**0.19**	0.19	
56-23-5	Carbon Tetrachloride	ND	0.60	ND	0.095	
110-82-7	Cyclohexane	ND	1.2	ND	0.35	
78-87-5	1,2-Dichloropropane	ND	0.60	ND	0.13	
75-27-4	Bromodichloromethane	ND	0.60	ND	0.089	
79-01-6	Trichloroethene	ND	0.60	ND	0.11	
123-91-1	1,4-Dioxane	ND	0.60	ND	0.17	
80-62-6	Methyl Methacrylate	ND	1.2	ND	0.29	
142-82-5	n-Heptane	ND	0.60	ND	0.15	
10061-01-5	cis-1,3-Dichloropropene	ND	0.60	ND	0.13	
108-10-1	4-Methyl-2-pentanone	ND	0.60	ND	0.15	
10061-02-6	trans-1,3-Dichloropropene	ND	0.60	ND	0.13	
79-00-5	1,1,2-Trichloroethane	ND	0.60	ND	0.11	
108-88-3	Toluene	**2.2**	0.60	**0.59**	0.16	
591-78-6	2-Hexanone	ND	0.60	ND	0.15	
124-48-1	Dibromochloromethane	ND	0.60	ND	0.070	
106-93-4	1,2-Dibromoethane	ND	0.60	ND	0.077	
123-86-4	n-Butyl Acetate	ND	0.60	ND	0.13	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

Client: **Landau Associates, Inc.**
Client Sample ID: **Ambient-11162016** ALS Project ID: P1605444
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P1605444-003

Test Code: EPA TO-15 Modified Date Collected: 11/16/16
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: 11/21/16
Analyst: Lusine Hakobyan Date Analyzed: 12/5/16
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 1.00 Liter(s)
Test Notes:
Container ID: SSC00078

Initial Pressure (psig): 0.54 Final Pressure (psig): 3.47

Canister Dilution Factor: 1.19

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
111-65-9	n-Octane	ND	0.60	ND	0.13	
127-18-4	Tetrachloroethene	ND	0.60	ND	0.088	
108-90-7	Chlorobenzene	ND	0.60	ND	0.13	
100-41-4	Ethylbenzene	ND	0.60	ND	0.14	
179601-23-1	m,p-Xylenes	ND	1.2	ND	0.27	
75-25-2	Bromoform	ND	0.60	ND	0.058	
100-42-5	Styrene	ND	0.60	ND	0.14	
95-47-6	o-Xylene	ND	0.60	ND	0.14	
111-84-2	n-Nonane	ND	0.60	ND	0.11	
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.60	ND	0.087	
98-82-8	Cumene	ND	0.60	ND	0.12	
80-56-8	alpha-Pinene	ND	0.60	ND	0.11	
103-65-1	n-Propylbenzene	ND	0.60	ND	0.12	
622-96-8	4-Ethyltoluene	ND	0.60	ND	0.12	
108-67-8	1,3,5-Trimethylbenzene	ND	0.60	ND	0.12	
95-63-6	1,2,4-Trimethylbenzene	ND	0.60	ND	0.12	
100-44-7	Benzyl Chloride	ND	0.60	ND	0.11	
541-73-1	1,3-Dichlorobenzene	ND	0.60	ND	0.099	
106-46-7	1,4-Dichlorobenzene	ND	0.60	ND	0.099	
95-50-1	1,2-Dichlorobenzene	ND	0.60	ND	0.099	
5989-27-5	d-Limonene	ND	0.60	ND	0.11	
96-12-8	1,2-Dibromo-3-chloropropane	ND	0.60	ND	0.062	
120-82-1	1,2,4-Trichlorobenzene	ND	0.60	ND	0.080	
91-20-3	Naphthalene	ND	0.60	ND	0.11	
87-68-3	Hexachlorobutadiene	ND	0.60	ND	0.056	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Landau Associates, Inc.**
Client Sample ID: **GP-39-11162016** ALS Project ID: P1605444
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P1605444-004

Test Code: EPA TO-15 Modified Date Collected: 11/16/16
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: 11/21/16
Analyst: Lusine Hakobyan Date Analyzed: 11/30/16
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.0040 Liter(s)
Test Notes:
Container ID: SSC00347

Initial Pressure (psig): -1.25 Final Pressure (psig): 3.36

Canister Dilution Factor: 1.34

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
115-07-1	Propene	**800**	170	**460**	97	
75-71-8	Dichlorodifluoromethane (CFC 12)	**970**	170	**200**	34	
74-87-3	Chloromethane	ND	170	ND	81	
76-14-2	1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)	**1,100**	170	**150**	24	
75-01-4	Vinyl Chloride	**6,600**	170	**2,600**	66	
106-99-0	1,3-Butadiene	ND	170	ND	76	
74-83-9	Bromomethane	ND	170	ND	43	
75-00-3	Chloroethane	ND	170	ND	64	
64-17-5	Ethanol	ND	1,700	ND	890	
75-05-8	Acetonitrile	ND	170	ND	100	
107-02-8	Acrolein	ND	670	ND	290	
67-64-1	Acetone	ND	1,700	ND	710	
75-69-4	Trichlorofluoromethane	ND	170	ND	30	
67-63-0	2-Propanol (Isopropyl Alcohol)	ND	1,700	ND	680	
107-13-1	Acrylonitrile	ND	170	ND	77	
75-35-4	1,1-Dichloroethene	ND	170	ND	42	
75-09-2	Methylene Chloride	ND	170	ND	48	
107-05-1	3-Chloro-1-propene (Allyl Chloride)	ND	170	ND	54	
76-13-1	Trichlorotrifluoroethane	ND	170	ND	22	
75-15-0	Carbon Disulfide	ND	1,700	ND	540	
156-60-5	trans-1,2-Dichloroethene	ND	170	ND	42	
75-34-3	1,1-Dichloroethane	ND	170	ND	41	
1634-04-4	Methyl tert-Butyl Ether	ND	170	ND	46	
108-05-4	Vinyl Acetate	ND	1,700	ND	480	
78-93-3	2-Butanone (MEK)	ND	1,700	ND	570	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Landau Associates, Inc.**
Client Sample ID: **GP-39-11162016** ALS Project ID: P1605444
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P1605444-004

Test Code: EPA TO-15 Modified Date Collected: 11/16/16
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: 11/21/16
Analyst: Lusine Hakobyan Date Analyzed: 11/30/16
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.0040 Liter(s)
Test Notes:
Container ID: SSC00347

Initial Pressure (psig): -1.25 Final Pressure (psig): 3.36

Canister Dilution Factor: 1.34

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
156-59-2	cis-1,2-Dichloroethene	**1,500**	170	**380**	42	
141-78-6	Ethyl Acetate	ND	340	ND	93	
110-54-3	n-Hexane	**820**	170	**230**	48	
67-66-3	Chloroform	ND	170	ND	34	
109-99-9	Tetrahydrofuran (THF)	ND	170	ND	57	
107-06-2	1,2-Dichloroethane	ND	170	ND	41	
71-55-6	1,1,1-Trichloroethane	ND	170	ND	31	
71-43-2	Benzene	**410**	170	**130**	52	
56-23-5	Carbon Tetrachloride	ND	170	ND	27	
110-82-7	Cyclohexane	**2,800**	340	**820**	97	
78-87-5	1,2-Dichloropropane	ND	170	ND	36	
75-27-4	Bromodichloromethane	ND	170	ND	25	
79-01-6	Trichloroethene	ND	170	ND	31	
123-91-1	1,4-Dioxane	ND	170	ND	46	
80-62-6	Methyl Methacrylate	ND	340	ND	82	
142-82-5	n-Heptane	**2,000**	170	**490**	41	
10061-01-5	cis-1,3-Dichloropropene	ND	170	ND	37	
108-10-1	4-Methyl-2-pentanone	ND	170	ND	41	
10061-02-6	trans-1,3-Dichloropropene	ND	170	ND	37	
79-00-5	1,1,2-Trichloroethane	ND	170	ND	31	
108-88-3	Toluene	**1,900**	170	**500**	44	
591-78-6	2-Hexanone	ND	170	ND	41	
124-48-1	Dibromochloromethane	ND	170	ND	20	
106-93-4	1,2-Dibromoethane	ND	170	ND	22	
123-86-4	n-Butyl Acetate	ND	170	ND	35	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

Client: **Landau Associates, Inc.**
Client Sample ID: **GP-39-11162016** ALS Project ID: P1605444
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P1605444-004

Test Code: EPA TO-15 Modified Date Collected: 11/16/16
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: 11/21/16
Analyst: Lusine Hakobyan Date Analyzed: 11/30/16
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.0040 Liter(s)
Test Notes:
Container ID: SSC00347

Initial Pressure (psig): -1.25 Final Pressure (psig): 3.36

Canister Dilution Factor: 1.34

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
111-65-9	n-Octane	**1,700**	170	**360**	36	
127-18-4	Tetrachloroethene	ND	170	ND	25	
108-90-7	Chlorobenzene	ND	170	ND	36	
100-41-4	Ethylbenzene	**3,800**	170	**870**	39	
179601-23-1	m,p-Xylenes	**7,600**	340	**1,700**	77	
75-25-2	Bromoform	ND	170	ND	16	
100-42-5	Styrene	ND	170	ND	39	
95-47-6	o-Xylene	**2,800**	170	**640**	39	
111-84-2	n-Nonane	**13,000**	170	**2,500**	32	
79-34-5	1,1,2,2-Tetrachloroethane	ND	170	ND	24	
98-82-8	Cumene	**690**	170	**140**	34	
80-56-8	alpha-Pinene	**1,200**	170	**220**	30	
103-65-1	n-Propylbenzene	**1,000**	170	**210**	34	
622-96-8	4-Ethyltoluene	**470**	170	**95**	34	
108-67-8	1,3,5-Trimethylbenzene	**1,500**	170	**310**	34	
95-63-6	1,2,4-Trimethylbenzene	**3,400**	170	**700**	34	
100-44-7	Benzyl Chloride	ND	170	ND	32	
541-73-1	1,3-Dichlorobenzene	ND	170	ND	28	
106-46-7	1,4-Dichlorobenzene	ND	170	ND	28	
95-50-1	1,2-Dichlorobenzene	ND	170	ND	28	
5989-27-5	d-Limonene	**620**	170	**110**	30	
96-12-8	1,2-Dibromo-3-chloropropane	ND	170	ND	17	
120-82-1	1,2,4-Trichlorobenzene	ND	170	ND	23	
91-20-3	Naphthalene	ND	170	ND	32	
87-68-3	Hexachlorobutadiene	ND	170	ND	16	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Landau Associates, Inc.**
Client Sample ID: **GP-38-11162016** ALS Project ID: P1605444
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P1605444-005

Test Code: EPA TO-15 Modified Date Collected: 11/16/16
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: 11/21/16
Analyst: Lusine Hakobyan Date Analyzed: 11/30/16
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.020 Liter(s)
Test Notes:
Container ID: SSC00127

Initial Pressure (psig): -2.22 Final Pressure (psig): 3.48

Canister Dilution Factor: 1.46

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
115-07-1	Propene	**800**	37	**460**	21	
75-71-8	Dichlorodifluoromethane (CFC 12)	**110**	37	**23**	7.4	
74-87-3	Chloromethane	ND	37	ND	18	
76-14-2	1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)	**1,400**	37	**190**	5.2	
75-01-4	Vinyl Chloride	**90**	37	**35**	14	
106-99-0	1,3-Butadiene	ND	37	ND	17	
74-83-9	Bromomethane	ND	37	ND	9.4	
75-00-3	Chloroethane	ND	37	ND	14	
64-17-5	Ethanol	ND	370	ND	190	
75-05-8	Acetonitrile	ND	37	ND	22	
107-02-8	Acrolein	ND	150	ND	64	
67-64-1	Acetone	ND	370	ND	150	
75-69-4	Trichlorofluoromethane	ND	37	ND	6.5	
67-63-0	2-Propanol (Isopropyl Alcohol)	ND	370	ND	150	
107-13-1	Acrylonitrile	ND	37	ND	17	
75-35-4	1,1-Dichloroethene	ND	37	ND	9.2	
75-09-2	Methylene Chloride	ND	37	ND	11	
107-05-1	3-Chloro-1-propene (Allyl Chloride)	ND	37	ND	12	
76-13-1	Trichlorotrifluoroethane	ND	37	ND	4.8	
75-15-0	Carbon Disulfide	ND	370	ND	120	
156-60-5	trans-1,2-Dichloroethene	ND	37	ND	9.2	
75-34-3	1,1-Dichloroethane	ND	37	ND	9.0	
1634-04-4	Methyl tert-Butyl Ether	ND	37	ND	10	
108-05-4	Vinyl Acetate	ND	370	ND	100	
78-93-3	2-Butanone (MEK)	ND	370	ND	120	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Landau Associates, Inc.**
Client Sample ID: **GP-38-11162016** ALS Project ID: P1605444
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P1605444-005

Test Code: EPA TO-15 Modified Date Collected: 11/16/16
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: 11/21/16
Analyst: Lusine Hakobyan Date Analyzed: 11/30/16
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.020 Liter(s)
Test Notes:
Container ID: SSC00127

Initial Pressure (psig): -2.22 Final Pressure (psig): 3.48

Canister Dilution Factor: 1.46

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
156-59-2	cis-1,2-Dichloroethene	ND	37	ND	9.2	
141-78-6	Ethyl Acetate	ND	73	ND	20	
110-54-3	n-Hexane	**830**	37	**240**	10	
67-66-3	Chloroform	ND	37	ND	7.5	
109-99-9	Tetrahydrofuran (THF)	ND	37	ND	12	
107-06-2	1,2-Dichloroethane	ND	37	ND	9.0	
71-55-6	1,1,1-Trichloroethane	ND	37	ND	6.7	
71-43-2	Benzene	**78**	37	**25**	11	
56-23-5	Carbon Tetrachloride	ND	37	ND	5.8	
110-82-7	Cyclohexane	**1,800**	73	**530**	21	
78-87-5	1,2-Dichloropropane	ND	37	ND	7.9	
75-27-4	Bromodichloromethane	ND	37	ND	5.5	
79-01-6	Trichloroethene	ND	37	ND	6.8	
123-91-1	1,4-Dioxane	ND	37	ND	10	
80-62-6	Methyl Methacrylate	ND	73	ND	18	
142-82-5	n-Heptane	**2,200**	37	**540**	8.9	
10061-01-5	cis-1,3-Dichloropropene	ND	37	ND	8.0	
108-10-1	4-Methyl-2-pentanone	ND	37	ND	8.9	
10061-02-6	trans-1,3-Dichloropropene	ND	37	ND	8.0	
79-00-5	1,1,2-Trichloroethane	ND	37	ND	6.7	
108-88-3	Toluene	**110**	37	**30**	9.7	
591-78-6	2-Hexanone	ND	37	ND	8.9	
124-48-1	Dibromochloromethane	ND	37	ND	4.3	
106-93-4	1,2-Dibromoethane	ND	37	ND	4.8	
123-86-4	n-Butyl Acetate	ND	37	ND	7.7	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

Client: **Landau Associates, Inc.**
Client Sample ID: **GP-38-11162016** ALS Project ID: P1605444
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P1605444-005

Test Code: EPA TO-15 Modified Date Collected: 11/16/16
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: 11/21/16
Analyst: Lusine Hakobyan Date Analyzed: 11/30/16
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.020 Liter(s)
Test Notes:
Container ID: SSC00127

Initial Pressure (psig): -2.22 Final Pressure (psig): 3.48

Canister Dilution Factor: 1.46

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
111-65-9	n-Octane	**490**	37	**100**	7.8	
127-18-4	Tetrachloroethene	ND	37	ND	5.4	
108-90-7	Chlorobenzene	ND	37	ND	7.9	
100-41-4	Ethylbenzene	**38**	37	**8.8**	8.4	
179601-23-1	m,p-Xylenes	**1,200**	73	**280**	17	
75-25-2	Bromoform	ND	37	ND	3.5	
100-42-5	Styrene	ND	37	ND	8.6	
95-47-6	o-Xylene	**430**	37	**98**	8.4	
111-84-2	n-Nonane	**140**	37	**26**	7.0	
79-34-5	1,1,2,2-Tetrachloroethane	ND	37	ND	5.3	
98-82-8	Cumene	ND	37	ND	7.4	
80-56-8	alpha-Pinene	**110**	37	**21**	6.6	
103-65-1	n-Propylbenzene	ND	37	ND	7.4	
622-96-8	4-Ethyltoluene	**51**	37	**10**	7.4	
108-67-8	1,3,5-Trimethylbenzene	**220**	37	**46**	7.4	
95-63-6	1,2,4-Trimethylbenzene	**260**	37	**53**	7.4	
100-44-7	Benzyl Chloride	ND	37	ND	7.1	
541-73-1	1,3-Dichlorobenzene	ND	37	ND	6.1	
106-46-7	1,4-Dichlorobenzene	**61**	37	**10**	6.1	
95-50-1	1,2-Dichlorobenzene	ND	37	ND	6.1	
5989-27-5	d-Limonene	ND	37	ND	6.6	
96-12-8	1,2-Dibromo-3-chloropropane	ND	37	ND	3.8	
120-82-1	1,2,4-Trichlorobenzene	ND	37	ND	4.9	
91-20-3	Naphthalene	ND	37	ND	7.0	
87-68-3	Hexachlorobutadiene	ND	37	ND	3.4	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

Client: **Landau Associates, Inc.**

Client Sample ID: **Method Blank** ALS Project ID: P1605444

Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P161130-MB

Test Code: EPA TO-15 Modified Date Collected: NA

Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: NA

Analyst: Lusine Hakobyan Date Analyzed: 11/30/16

Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 1.00 Liter(s)

Test Notes:

Canister Dilution Factor: 1.00

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
115-07-1	Propene	ND	0.50	ND	0.29	
75-71-8	Dichlorodifluoromethane (CFC 12)	ND	0.50	ND	0.10	
74-87-3	Chloromethane	ND	0.50	ND	0.24	
76-14-2	1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)	ND	0.50	ND	0.072	
75-01-4	Vinyl Chloride	ND	0.50	ND	0.20	
106-99-0	1,3-Butadiene	ND	0.50	ND	0.23	
74-83-9	Bromomethane	ND	0.50	ND	0.13	
75-00-3	Chloroethane	ND	0.50	ND	0.19	
64-17-5	Ethanol	ND	5.0	ND	2.7	
75-05-8	Acetonitrile	ND	0.50	ND	0.30	
107-02-8	Acrolein	ND	2.0	ND	0.87	
67-64-1	Acetone	ND	5.0	ND	2.1	
75-69-4	Trichlorofluoromethane	ND	0.50	ND	0.089	
67-63-0	2-Propanol (Isopropyl Alcohol)	ND	5.0	ND	2.0	
107-13-1	Acrylonitrile	ND	0.50	ND	0.23	
75-35-4	1,1-Dichloroethene	ND	0.50	ND	0.13	
75-09-2	Methylene Chloride	ND	0.50	ND	0.14	
107-05-1	3-Chloro-1-propene (Allyl Chloride)	ND	0.50	ND	0.16	
76-13-1	Trichlorotrifluoroethane	ND	0.50	ND	0.065	
75-15-0	Carbon Disulfide	ND	5.0	ND	1.6	
156-60-5	trans-1,2-Dichloroethene	ND	0.50	ND	0.13	
75-34-3	1,1-Dichloroethane	ND	0.50	ND	0.12	
1634-04-4	Methyl tert-Butyl Ether	ND	0.50	ND	0.14	
108-05-4	Vinyl Acetate	ND	5.0	ND	1.4	
78-93-3	2-Butanone (MEK)	ND	5.0	ND	1.7	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

Client: **Landau Associates, Inc.**

Client Sample ID: **Method Blank** ALS Project ID: P1605444

Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P161130-MB

Test Code: EPA TO-15 Modified Date Collected: NA

Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: NA

Analyst: Lusine Hakobyan Date Analyzed: 11/30/16

Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 1.00 Liter(s)

Test Notes:

Canister Dilution Factor: 1.00

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
156-59-2	cis-1,2-Dichloroethene	ND	0.50	ND	0.13	
141-78-6	Ethyl Acetate	ND	1.0	ND	0.28	
110-54-3	n-Hexane	ND	0.50	ND	0.14	
67-66-3	Chloroform	ND	0.50	ND	0.10	
109-99-9	Tetrahydrofuran (THF)	ND	0.50	ND	0.17	
107-06-2	1,2-Dichloroethane	ND	0.50	ND	0.12	
71-55-6	1,1,1-Trichloroethane	ND	0.50	ND	0.092	
71-43-2	Benzene	ND	0.50	ND	0.16	
56-23-5	Carbon Tetrachloride	ND	0.50	ND	0.080	
110-82-7	Cyclohexane	ND	1.0	ND	0.29	
78-87-5	1,2-Dichloropropane	ND	0.50	ND	0.11	
75-27-4	Bromodichloromethane	ND	0.50	ND	0.075	
79-01-6	Trichloroethene	ND	0.50	ND	0.093	
123-91-1	1,4-Dioxane	ND	0.50	ND	0.14	
80-62-6	Methyl Methacrylate	ND	1.0	ND	0.24	
142-82-5	n-Heptane	ND	0.50	ND	0.12	
10061-01-5	cis-1,3-Dichloropropene	ND	0.50	ND	0.11	
108-10-1	4-Methyl-2-pentanone	ND	0.50	ND	0.12	
10061-02-6	trans-1,3-Dichloropropene	ND	0.50	ND	0.11	
79-00-5	1,1,2-Trichloroethane	ND	0.50	ND	0.092	
108-88-3	Toluene	ND	0.50	ND	0.13	
591-78-6	2-Hexanone	ND	0.50	ND	0.12	
124-48-1	Dibromochloromethane	ND	0.50	ND	0.059	
106-93-4	1,2-Dibromoethane	ND	0.50	ND	0.065	
123-86-4	n-Butyl Acetate	ND	0.50	ND	0.11	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

Client: **Landau Associates, Inc.**

Client Sample ID: **Method Blank** ALS Project ID: P1605444

Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P161130-MB

Test Code: EPA TO-15 Modified Date Collected: NA

Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: NA

Analyst: Lusine Hakobyan Date Analyzed: 11/30/16

Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 1.00 Liter(s)

Test Notes:

Canister Dilution Factor: 1.00

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
111-65-9	n-Octane	ND	0.50	ND	0.11	
127-18-4	Tetrachloroethene	ND	0.50	ND	0.074	
108-90-7	Chlorobenzene	ND	0.50	ND	0.11	
100-41-4	Ethylbenzene	ND	0.50	ND	0.12	
179601-23-1	m,p-Xylenes	ND	1.0	ND	0.23	
75-25-2	Bromoform	ND	0.50	ND	0.048	
100-42-5	Styrene	ND	0.50	ND	0.12	
95-47-6	o-Xylene	ND	0.50	ND	0.12	
111-84-2	n-Nonane	ND	0.50	ND	0.095	
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.50	ND	0.073	
98-82-8	Cumene	ND	0.50	ND	0.10	
80-56-8	alpha-Pinene	ND	0.50	ND	0.090	
103-65-1	n-Propylbenzene	ND	0.50	ND	0.10	
622-96-8	4-Ethyltoluene	ND	0.50	ND	0.10	
108-67-8	1,3,5-Trimethylbenzene	ND	0.50	ND	0.10	
95-63-6	1,2,4-Trimethylbenzene	ND	0.50	ND	0.10	
100-44-7	Benzyl Chloride	ND	0.50	ND	0.097	
541-73-1	1,3-Dichlorobenzene	ND	0.50	ND	0.083	
106-46-7	1,4-Dichlorobenzene	ND	0.50	ND	0.083	
95-50-1	1,2-Dichlorobenzene	ND	0.50	ND	0.083	
5989-27-5	d-Limonene	ND	0.50	ND	0.090	
96-12-8	1,2-Dibromo-3-chloropropane	ND	0.50	ND	0.052	
120-82-1	1,2,4-Trichlorobenzene	ND	0.50	ND	0.067	
91-20-3	Naphthalene	ND	0.50	ND	0.095	
87-68-3	Hexachlorobutadiene	ND	0.50	ND	0.047	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

Client: **Landau Associates, Inc.**

Client Sample ID: **Method Blank** ALS Project ID: P1605444

Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P161205-MB

Test Code: EPA TO-15 Modified Date Collected: NA

Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: NA

Analyst: Lusine Hakobyan Date Analyzed: 12/5/16

Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 1.00 Liter(s)

Test Notes:

Canister Dilution Factor: 1.00

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
115-07-1	Propene	ND	0.50	ND	0.29	
75-71-8	Dichlorodifluoromethane (CFC 12)	ND	0.50	ND	0.10	
74-87-3	Chloromethane	ND	0.50	ND	0.24	
76-14-2	1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)	ND	0.50	ND	0.072	
75-01-4	Vinyl Chloride	ND	0.50	ND	0.20	
106-99-0	1,3-Butadiene	ND	0.50	ND	0.23	
74-83-9	Bromomethane	ND	0.50	ND	0.13	
75-00-3	Chloroethane	ND	0.50	ND	0.19	
64-17-5	Ethanol	ND	5.0	ND	2.7	
75-05-8	Acetonitrile	ND	0.50	ND	0.30	
107-02-8	Acrolein	ND	2.0	ND	0.87	
67-64-1	Acetone	ND	5.0	ND	2.1	
75-69-4	Trichlorofluoromethane	ND	0.50	ND	0.089	
67-63-0	2-Propanol (Isopropyl Alcohol)	ND	5.0	ND	2.0	
107-13-1	Acrylonitrile	ND	0.50	ND	0.23	
75-35-4	1,1-Dichloroethene	ND	0.50	ND	0.13	
75-09-2	Methylene Chloride	ND	0.50	ND	0.14	
107-05-1	3-Chloro-1-propene (Allyl Chloride)	ND	0.50	ND	0.16	
76-13-1	Trichlorotrifluoroethane	ND	0.50	ND	0.065	
75-15-0	Carbon Disulfide	ND	5.0	ND	1.6	
156-60-5	trans-1,2-Dichloroethene	ND	0.50	ND	0.13	
75-34-3	1,1-Dichloroethane	ND	0.50	ND	0.12	
1634-04-4	Methyl tert-Butyl Ether	ND	0.50	ND	0.14	
108-05-4	Vinyl Acetate	ND	5.0	ND	1.4	
78-93-3	2-Butanone (MEK)	ND	5.0	ND	1.7	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

Client: **Landau Associates, Inc.**

Client Sample ID: **Method Blank** ALS Project ID: P1605444

Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P161205-MB

Test Code: EPA TO-15 Modified Date Collected: NA

Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: NA

Analyst: Lusine Hakobyan Date Analyzed: 12/5/16

Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 1.00 Liter(s)

Test Notes:

Canister Dilution Factor: 1.00

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
156-59-2	cis-1,2-Dichloroethene	ND	0.50	ND	0.13	
141-78-6	Ethyl Acetate	ND	1.0	ND	0.28	
110-54-3	n-Hexane	ND	0.50	ND	0.14	
67-66-3	Chloroform	ND	0.50	ND	0.10	
109-99-9	Tetrahydrofuran (THF)	ND	0.50	ND	0.17	
107-06-2	1,2-Dichloroethane	ND	0.50	ND	0.12	
71-55-6	1,1,1-Trichloroethane	ND	0.50	ND	0.092	
71-43-2	Benzene	ND	0.50	ND	0.16	
56-23-5	Carbon Tetrachloride	ND	0.50	ND	0.080	
110-82-7	Cyclohexane	ND	1.0	ND	0.29	
78-87-5	1,2-Dichloropropane	ND	0.50	ND	0.11	
75-27-4	Bromodichloromethane	ND	0.50	ND	0.075	
79-01-6	Trichloroethene	ND	0.50	ND	0.093	
123-91-1	1,4-Dioxane	ND	0.50	ND	0.14	
80-62-6	Methyl Methacrylate	ND	1.0	ND	0.24	
142-82-5	n-Heptane	ND	0.50	ND	0.12	
10061-01-5	cis-1,3-Dichloropropene	ND	0.50	ND	0.11	
108-10-1	4-Methyl-2-pentanone	ND	0.50	ND	0.12	
10061-02-6	trans-1,3-Dichloropropene	ND	0.50	ND	0.11	
79-00-5	1,1,2-Trichloroethane	ND	0.50	ND	0.092	
108-88-3	Toluene	ND	0.50	ND	0.13	
591-78-6	2-Hexanone	ND	0.50	ND	0.12	
124-48-1	Dibromochloromethane	ND	0.50	ND	0.059	
106-93-4	1,2-Dibromoethane	ND	0.50	ND	0.065	
123-86-4	n-Butyl Acetate	ND	0.50	ND	0.11	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

Client: **Landau Associates, Inc.**

Client Sample ID: **Method Blank** ALS Project ID: P1605444

Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P161205-MB

Test Code: EPA TO-15 Modified Date Collected: NA

Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: NA

Analyst: Lusine Hakobyan Date Analyzed: 12/5/16

Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 1.00 Liter(s)

Test Notes:

Canister Dilution Factor: 1.00

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
111-65-9	n-Octane	ND	0.50	ND	0.11	
127-18-4	Tetrachloroethene	ND	0.50	ND	0.074	
108-90-7	Chlorobenzene	ND	0.50	ND	0.11	
100-41-4	Ethylbenzene	ND	0.50	ND	0.12	
179601-23-1	m,p-Xylenes	ND	1.0	ND	0.23	
75-25-2	Bromoform	ND	0.50	ND	0.048	
100-42-5	Styrene	ND	0.50	ND	0.12	
95-47-6	o-Xylene	ND	0.50	ND	0.12	
111-84-2	n-Nonane	ND	0.50	ND	0.095	
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.50	ND	0.073	
98-82-8	Cumene	ND	0.50	ND	0.10	
80-56-8	alpha-Pinene	ND	0.50	ND	0.090	
103-65-1	n-Propylbenzene	ND	0.50	ND	0.10	
622-96-8	4-Ethyltoluene	ND	0.50	ND	0.10	
108-67-8	1,3,5-Trimethylbenzene	ND	0.50	ND	0.10	
95-63-6	1,2,4-Trimethylbenzene	ND	0.50	ND	0.10	
100-44-7	Benzyl Chloride	ND	0.50	ND	0.097	
541-73-1	1,3-Dichlorobenzene	ND	0.50	ND	0.083	
106-46-7	1,4-Dichlorobenzene	ND	0.50	ND	0.083	
95-50-1	1,2-Dichlorobenzene	ND	0.50	ND	0.083	
5989-27-5	d-Limonene	ND	0.50	ND	0.090	
96-12-8	1,2-Dibromo-3-chloropropane	ND	0.50	ND	0.052	
120-82-1	1,2,4-Trichlorobenzene	ND	0.50	ND	0.067	
91-20-3	Naphthalene	ND	0.50	ND	0.095	
87-68-3	Hexachlorobutadiene	ND	0.50	ND	0.047	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

SURROGATE SPIKE RECOVERY RESULTS

Client: **Landau Associates, Inc.**
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Project ID: P1605444

Test Code: EPA TO-15 Modified
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date(s) Collected: 11/16/16
Analyst: Lusine Hakobyan Date(s) Received: 11/21/16
Sample Type: 6.0 L Silonite Canister(s) Date(s) Analyzed: 11/30 - 12/5/16
Test Notes:

Client Sample ID	ALS Sample ID	1,2-Dichloroethane-d4 Percent Recovered	Toluene-d8 Percent Recovered	Bromofluorobenzene Percent Recovered	Acceptance Limits	Data Qualifier
Method Blank	P161130-MB	**97**	**103**	**102**	70-130	
Method Blank	P161205-MB	**91**	**104**	**108**	70-130	
Lab Control Sample	P161130-LCS	**93**	**100**	**107**	70-130	
Lab Control Sample	P161205-LCS	**89**	**102**	**112**	70-130	
GP-43-11162016	P1605444-001	**94**	**98**	**108**	70-130	
GP-41-11162016	P1605444-002	**94**	**97**	**106**	70-130	
Ambient-11162016	P1605444-003	**92**	**102**	**111**	70-130	
GP-39-11162016	P1605444-004	**94**	**98**	**107**	70-130	
GP-38-11162016	P1605444-005	**93**	**96**	**104**	70-130	

Surrogate percent recovery is verified and accepted based on the on-column result.
Reported results are shown in concentration units and as a result of the calculation, may vary slightly from the on-column percent recovery.

ALS ENVIRONMENTAL

LABORATORY CONTROL SAMPLE SUMMARY

Client: **Landau Associates, Inc.**
Client Sample ID: **Lab Control Sample** ALS Project ID: P1605444
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P161130-LCS

Test Code: EPA TO-15 Modified Date Collected: NA
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: NA
Analyst: Lusine Hakobyan Date Analyzed: 11/30/16
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.125 Liter(s)
Test Notes:

CAS #	Compound	Spike Amount µg/m³	**Result µg/m³**	**% Recovery**	ALS Acceptance Limits	**Data Qualifier**
115-07-1	Propene	210	**191**	**91**	52-127	
75-71-8	Dichlorodifluoromethane (CFC 12)	210	**197**	**94**	68-109	
74-87-3	Chloromethane	210	**195**	**93**	51-130	
76-14-2	1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)	211	**188**	**89**	66-114	
75-01-4	Vinyl Chloride	210	**200**	**95**	61-125	
106-99-0	1,3-Butadiene	210	**223**	**106**	62-144	
74-83-9	Bromomethane	210	**204**	**97**	73-123	
75-00-3	Chloroethane	210	**210**	**100**	69-122	
64-17-5	Ethanol	1,060	**996**	**94**	62-124	
75-05-8	Acetonitrile	213	**206**	**97**	57-114	
107-02-8	Acrolein	212	**172**	**81**	62-116	
67-64-1	Acetone	1,060	**967**	**91**	57-117	
75-69-4	Trichlorofluoromethane	210	**191**	**91**	63-98	
67-63-0	2-Propanol (Isopropyl Alcohol)	424	**406**	**96**	66-121	
107-13-1	Acrylonitrile	213	**210**	**99**	68-123	
75-35-4	1,1-Dichloroethene	213	**217**	**102**	76-118	
75-09-2	Methylene Chloride	212	**193**	**91**	60-118	
107-05-1	3-Chloro-1-propene (Allyl Chloride)	212	**203**	**96**	65-126	
76-13-1	Trichlorotrifluoroethane	212	**204**	**96**	73-114	
75-15-0	Carbon Disulfide	213	**212**	**100**	57-102	
156-60-5	trans-1,2-Dichloroethene	213	**207**	**97**	74-123	
75-34-3	1,1-Dichloroethane	212	**199**	**94**	69-111	
1634-04-4	Methyl tert-Butyl Ether	213	**195**	**92**	69-113	
108-05-4	Vinyl Acetate	1,060	**1060**	**100**	76-128	
78-93-3	2-Butanone (MEK)	212	**198**	**93**	63-127	

Laboratory Control Sample percent recovery is verified and accepted based on the on-column result.
Reported results are shown in concentration units and as a result of the calculation, may vary slightly.

Client: **Landau Associates, Inc.**
Client Sample ID: **Lab Control Sample** ALS Project ID: P1605444
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P161130-LCS

Test Code: EPA TO-15 Modified Date Collected: NA
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: NA
Analyst: Lusine Hakobyan Date Analyzed: 11/30/16
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.125 Liter(s)
Test Notes:

CAS #	Compound	Spike Amount µg/m³	**Result µg/m³**	**% Recovery**	ALS Acceptance Limits	**Data Qualifier**
156-59-2	cis-1,2-Dichloroethene	212	**200**	**94**	72-117	
141-78-6	Ethyl Acetate	426	**417**	**98**	68-127	
110-54-3	n-Hexane	213	**190**	**89**	55-116	
67-66-3	Chloroform	212	**193**	**91**	70-109	
109-99-9	Tetrahydrofuran (THF)	213	**192**	**90**	72-113	
107-06-2	1,2-Dichloroethane	212	**188**	**89**	69-113	
71-55-6	1,1,1-Trichloroethane	212	**200**	**94**	72-115	
71-43-2	Benzene	212	**180**	**85**	65-107	
56-23-5	Carbon Tetrachloride	213	**208**	**98**	71-113	
110-82-7	Cyclohexane	425	**400**	**94**	71-115	
78-87-5	1,2-Dichloropropane	212	**198**	**93**	71-115	
75-27-4	Bromodichloromethane	214	**214**	**100**	75-118	
79-01-6	Trichloroethene	212	**205**	**97**	68-114	
123-91-1	1,4-Dioxane	213	**200**	**94**	81-131	
80-62-6	Methyl Methacrylate	424	**425**	**100**	72-130	
142-82-5	n-Heptane	213	**194**	**91**	68-116	
10061-01-5	cis-1,3-Dichloropropene	210	**216**	**103**	77-126	
108-10-1	4-Methyl-2-pentanone	213	**212**	**100**	69-126	
10061-02-6	trans-1,3-Dichloropropene	213	**224**	**105**	79-125	
79-00-5	1,1,2-Trichloroethane	212	**207**	**98**	75-119	
108-88-3	Toluene	212	**203**	**96**	59-118	
591-78-6	2-Hexanone	213	**201**	**94**	69-129	
124-48-1	Dibromochloromethane	213	**227**	**107**	74-136	
106-93-4	1,2-Dibromoethane	212	**212**	**100**	73-131	
123-86-4	n-Butyl Acetate	216	**198**	**92**	69-130	

Laboratory Control Sample percent recovery is verified and accepted based on the on-column result.
Reported results are shown in concentration units and as a result of the calculation, may vary slightly.

Client: **Landau Associates, Inc.**
Client Sample ID: **Lab Control Sample** ALS Project ID: P1605444
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P161130-LCS

Test Code: EPA TO-15 Modified Date Collected: NA
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: NA
Analyst: Lusine Hakobyan Date Analyzed: 11/30/16
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.125 Liter(s)
Test Notes:

CAS #	Compound	Spike Amount µg/m³	Result µg/m³	% Recovery	ALS Acceptance Limits	Data Qualifier
111-65-9	n-Octane	212	**198**	**93**	66-120	
127-18-4	Tetrachloroethene	213	**208**	**98**	65-130	
108-90-7	Chlorobenzene	212	**201**	**95**	68-120	
100-41-4	Ethylbenzene	212	**197**	**93**	68-122	
179601-23-1	m,p-Xylenes	424	**393**	**93**	68-123	
75-25-2	Bromoform	212	**250**	**118**	69-130	
100-42-5	Styrene	212	**207**	**98**	71-133	
95-47-6	o-Xylene	212	**199**	**94**	68-122	
111-84-2	n-Nonane	212	**192**	**91**	65-120	
79-34-5	1,1,2,2-Tetrachloroethane	212	**218**	**103**	69-130	
98-82-8	Cumene	212	**211**	**100**	70-123	
80-56-8	alpha-Pinene	213	**204**	**96**	70-128	
103-65-1	n-Propylbenzene	214	**206**	**96**	69-125	
622-96-8	4-Ethyltoluene	212	**206**	**97**	67-130	
108-67-8	1,3,5-Trimethylbenzene	212	**196**	**92**	67-124	
95-63-6	1,2,4-Trimethylbenzene	212	**201**	**95**	67-129	
100-44-7	Benzyl Chloride	212	**244**	**115**	79-138	
541-73-1	1,3-Dichlorobenzene	212	**227**	**107**	65-136	
106-46-7	1,4-Dichlorobenzene	213	**200**	**94**	66-141	
95-50-1	1,2-Dichlorobenzene	212	**214**	**101**	67-136	
5989-27-5	d-Limonene	212	**208**	**98**	71-134	
96-12-8	1,2-Dibromo-3-chloropropane	212	**259**	**122**	73-136	
120-82-1	1,2,4-Trichlorobenzene	212	**258**	**122**	64-134	
91-20-3	Naphthalene	214	**266**	**124**	62-136	
87-68-3	Hexachlorobutadiene	213	**247**	**116**	60-133	

Laboratory Control Sample percent recovery is verified and accepted based on the on-column result.
Reported results are shown in concentration units and as a result of the calculation, may vary slightly.

ALS ENVIRONMENTAL

LABORATORY CONTROL SAMPLE SUMMARY

Client: **Landau Associates, Inc.**
Client Sample ID: **Lab Control Sample** ALS Project ID: P1605444
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P161205-LCS

Test Code: EPA TO-15 Modified Date Collected: NA
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: NA
Analyst: Lusine Hakobyan Date Analyzed: 12/5/16
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.125 Liter(s)
Test Notes:

CAS #	Compound	Spike Amount µg/m³	**Result µg/m³**	**% Recovery**	ALS Acceptance Limits	**Data Qualifier**
115-07-1	Propene	210	**179**	**85**	52-127	
75-71-8	Dichlorodifluoromethane (CFC 12)	210	**185**	**88**	68-109	
74-87-3	Chloromethane	210	**173**	**82**	51-130	
76-14-2	1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)	211	**184**	**87**	66-114	
75-01-4	Vinyl Chloride	210	**184**	**88**	61-125	
106-99-0	1,3-Butadiene	210	**221**	**105**	62-144	
74-83-9	Bromomethane	210	**203**	**97**	73-123	
75-00-3	Chloroethane	210	**203**	**97**	69-122	
64-17-5	Ethanol	1,060	**930**	**88**	62-124	
75-05-8	Acetonitrile	213	**193**	**91**	57-114	
107-02-8	Acrolein	212	**164**	**77**	62-116	
67-64-1	Acetone	1,060	**908**	**86**	57-117	
75-69-4	Trichlorofluoromethane	210	**181**	**86**	63-98	
67-63-0	2-Propanol (Isopropyl Alcohol)	424	**369**	**87**	66-121	
107-13-1	Acrylonitrile	213	**199**	**93**	68-123	
75-35-4	1,1-Dichloroethene	213	**210**	**99**	76-118	
75-09-2	Methylene Chloride	212	**186**	**88**	60-118	
107-05-1	3-Chloro-1-propene (Allyl Chloride)	212	**188**	**89**	65-126	
76-13-1	Trichlorotrifluoroethane	212	**199**	**94**	73-114	
75-15-0	Carbon Disulfide	213	**205**	**96**	57-102	
156-60-5	trans-1,2-Dichloroethene	213	**196**	**92**	74-123	
75-34-3	1,1-Dichloroethane	212	**189**	**89**	69-111	
1634-04-4	Methyl tert-Butyl Ether	213	**187**	**88**	69-113	
108-05-4	Vinyl Acetate	1,060	**1000**	**94**	76-128	
78-93-3	2-Butanone (MEK)	212	**190**	**90**	63-127	

Laboratory Control Sample percent recovery is verified and accepted based on the on-column result.
Reported results are shown in concentration units and as a result of the calculation, may vary slightly.

Client: **Landau Associates, Inc.**
Client Sample ID: **Lab Control Sample** ALS Project ID: P1605444
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P161205-LCS

Test Code: EPA TO-15 Modified Date Collected: NA
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: NA
Analyst: Lusine Hakobyan Date Analyzed: 12/5/16
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.125 Liter(s)
Test Notes:

CAS #	Compound	Spike Amount µg/m³	**Result µg/m³**	**% Recovery**	ALS Acceptance Limits	**Data Qualifier**
156-59-2	cis-1,2-Dichloroethene	212	**189**	**89**	72-117	
141-78-6	Ethyl Acetate	426	**389**	**91**	68-127	
110-54-3	n-Hexane	213	**176**	**83**	55-116	
67-66-3	Chloroform	212	**184**	**87**	70-109	
109-99-9	Tetrahydrofuran (THF)	213	**184**	**86**	72-113	
107-06-2	1,2-Dichloroethane	212	**175**	**83**	69-113	
71-55-6	1,1,1-Trichloroethane	212	**189**	**89**	72-115	
71-43-2	Benzene	212	**172**	**81**	65-107	
56-23-5	Carbon Tetrachloride	213	**198**	**93**	71-113	
110-82-7	Cyclohexane	425	**385**	**91**	71-115	
78-87-5	1,2-Dichloropropane	212	**189**	**89**	71-115	
75-27-4	Bromodichloromethane	214	**200**	**93**	75-118	
79-01-6	Trichloroethene	212	**201**	**95**	68-114	
123-91-1	1,4-Dioxane	213	**192**	**90**	81-131	
80-62-6	Methyl Methacrylate	424	**408**	**96**	72-130	
142-82-5	n-Heptane	213	**187**	**88**	68-116	
10061-01-5	cis-1,3-Dichloropropene	210	**204**	**97**	77-126	
108-10-1	4-Methyl-2-pentanone	213	**199**	**93**	69-126	
10061-02-6	trans-1,3-Dichloropropene	213	**211**	**99**	79-125	
79-00-5	1,1,2-Trichloroethane	212	**199**	**94**	75-119	
108-88-3	Toluene	212	**198**	**93**	59-118	
591-78-6	2-Hexanone	213	**186**	**87**	69-129	
124-48-1	Dibromochloromethane	213	**224**	**105**	74-136	
106-93-4	1,2-Dibromoethane	212	**208**	**98**	73-131	
123-86-4	n-Butyl Acetate	216	**185**	**86**	69-130	

Laboratory Control Sample percent recovery is verified and accepted based on the on-column result.
Reported results are shown in concentration units and as a result of the calculation, may vary slightly.

ALS ENVIRONMENTAL

LABORATORY CONTROL SAMPLE SUMMARY

Client: **Landau Associates, Inc.**
Client Sample ID: **Lab Control Sample** ALS Project ID: P1605444
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P161205-LCS

Test Code: EPA TO-15 Modified Date Collected: NA
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: NA
Analyst: Lusine Hakobyan Date Analyzed: 12/5/16
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.125 Liter(s)
Test Notes:

CAS #	Compound	Spike Amount µg/m³	Result µg/m³	% Recovery	ALS Acceptance Limits	Data Qualifier
111-65-9	n-Octane	212	**190**	**90**	66-120	
127-18-4	Tetrachloroethene	213	**207**	**97**	65-130	
108-90-7	Chlorobenzene	212	**198**	**93**	68-120	
100-41-4	Ethylbenzene	212	**192**	**91**	68-122	
179601-23-1	m,p-Xylenes	424	**378**	**89**	68-123	
75-25-2	Bromoform	212	**248**	**117**	69-130	
100-42-5	Styrene	212	**203**	**96**	71-133	
95-47-6	o-Xylene	212	**193**	**91**	68-122	
111-84-2	n-Nonane	212	**179**	**84**	65-120	
79-34-5	1,1,2,2-Tetrachloroethane	212	**210**	**99**	69-130	
98-82-8	Cumene	212	**206**	**97**	70-123	
80-56-8	alpha-Pinene	213	**197**	**92**	70-128	
103-65-1	n-Propylbenzene	214	**198**	**93**	69-125	
622-96-8	4-Ethyltoluene	212	**194**	**92**	67-130	
108-67-8	1,3,5-Trimethylbenzene	212	**187**	**88**	67-124	
95-63-6	1,2,4-Trimethylbenzene	212	**186**	**88**	67-129	
100-44-7	Benzyl Chloride	212	**225**	**106**	79-138	
541-73-1	1,3-Dichlorobenzene	212	**219**	**103**	65-136	
106-46-7	1,4-Dichlorobenzene	213	**195**	**92**	66-141	
95-50-1	1,2-Dichlorobenzene	212	**206**	**97**	67-136	
5989-27-5	d-Limonene	212	**181**	**85**	71-134	
96-12-8	1,2-Dibromo-3-chloropropane	212	**257**	**121**	73-136	
120-82-1	1,2,4-Trichlorobenzene	212	**256**	**121**	64-134	
91-20-3	Naphthalene	214	**258**	**121**	62-136	
87-68-3	Hexachlorobutadiene	213	**248**	**116**	60-133	

Laboratory Control Sample percent recovery is verified and accepted based on the on-column result.
Reported results are shown in concentration units and as a result of the calculation, may vary slightly.

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LABORATORY REPORT

January 17, 2017

Piper Roelen
Landau Associates,Inc.
130 2nd Ave. South
Edmonds, WA 98020

RE: Transportation Corridor Investigation / 1148009.010.014

Dear Piper:

Enclosed are the results of the samples submitted to our laboratory on January 3, 2017. For your reference, these analyses have been assigned our service request number P1700001.

All analyses were performed according to our laboratory's NELAP and DoD-ELAP-approved quality assurance program. The test results meet requirements of the current NELAP and DoD-ELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP and DoD-ELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. Results are intended to be considered in their entirety and apply only to the samples analyzed and reported herein.

If you have any questions, please call me at (805) 526-7161.

Respectfully submitted,

ALS | Environmental

Kate Kaneko
By Kate Kaneko at 7:43 am, 01/17/17
Kate Kaneko
Project Manager

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Client: Landau Associates,Inc. Service Request No: P1700001
Project: Transportation Corridor Investigation / 1148009.010.014

CASE NARRATIVE

The samples were received intact under chain of custody on January 3, 2017 and were stored in accordance with the analytical method requirements. Please refer to the sample acceptance check form for additional information. The results reported herein are applicable only to the condition of the samples at the time of sample receipt.

Fixed Gases Analysis

The samples were analyzed for fixed gases (oxygen, nitrogen, carbon monoxide, methane and carbon dioxide) according to modified EPA Method 3C (single injection) using a gas chromatograph equipped with a thermal conductivity detector (TCD). This procedure is described in laboratory SOP VOA-EPA3C. This method is included on the laboratory's DoD-ELAP scope of accreditation, however it is not part of the NELAP accreditation.

Sulfur Analysis

The samples were also analyzed for twenty sulfur compounds per ASTM D 5504-12 using a gas chromatograph equipped with a sulfur chemiluminescence detector (SCD). All compounds with the exception of hydrogen sulfide and carbonyl sulfide are quantitated against the initial calibration curve for methyl mercaptan. This method is included on the laboratory's NELAP scope of accreditation, however it is not part of the DoD-ELAP accreditation.

Total Gaseous Non-Methane Organics as Methane Analysis

The samples were also analyzed for total gaseous non-methane organics as methane according to modified EPA Method 25C. The analyses included a single sample injection (method modification) analyzed by gas chromatography using flame ionization detection/total combustion analysis. This method is not included on the laboratory's NELAP or DoD-ELAP scope of accreditation.

Volatile Organic Compound Analysis

The samples were also analyzed for volatile organic compounds in accordance with EPA Method TO-15 from the Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, Second Edition (EPA/625/R-96/010b), January, 1999. This procedure is described in laboratory SOP VOA-TO15. The analytical system was comprised of a gas chromatograph / mass spectrometer (GC/MS) interfaced to a whole-air preconcentrator. The method was modified to include the use of helium as a diluent gas in place of zero-grade air for container pressurization. When necessary, analytical sample volumes were adjusted by a correction factor

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www.alsglobal.com

Client: Landau Associates,Inc. Service Request No: P1700001
Project: Transportation Corridor Investigation / 1148009.010.014

CASE NARRATIVE

for containers pressurized with helium. A summary sheet has been included listing the affected samples. This method is included on the laboratory's NELAP and DoD-ELAP scope of accreditation. Any analytes flagged with an X are not included on the NELAP or DoD-ELAP accreditation.

The containers were cleaned, prior to sampling, down to the method reporting limit (MRL) reported for this project. Please note, projects which require reporting below the MRL could have results between the MRL and method detection limit (MDL) that are biased high.

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ALS Environmental – Simi Valley

CERTIFICATIONS, ACCREDITATIONS, AND REGISTRATIONS

Agency	Web Site	Number
Arizona DHS	http://www.azdhs.gov/preparedness/state-laboratory/lab-licensure-certification/index.php#laboratory-licensure-home	AZ0694
Florida DOH (NELAP)	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E871020
Louisiana DEQ (NELAP)	http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPermitSupport/LouisianaLaboratoryAccreditationProgram.aspx	05071
Maine DHHS	http://www.maine.gov/dhhs/mecdc/environmental-health/water/dwp-services/labcert/labcert.htm	2016036
Minnesota DOH (NELAP)	http://www.health.state.mn.us/accreditation	1177034
New Jersey DEP (NELAP)	http://www.nj.gov/dep/oqa/	CA009
New York DOH (NELAP)	http://www.wadsworth.org/labcert/elap/elap.html	11221
Oregon PHD (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	4068-003
Pennsylvania DEP	http://www.depweb.state.pa.us/labs	68-03307 (Registration)
PJLA (DoD ELAP)	http://www.pjlabs.com/search-accredited-labs	65818 (Testing)
Texas CEQ (NELAP)	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704413-16-7
Utah DOH (NELAP)	http://health.utah.gov/lab/environmental-lab-certification/	CA016272016-6
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C946

Analyses were performed according to our laboratory's NELAP and DoD-ELAP approved quality assurance program. A complete listing of specific NELAP and DoD-ELAP certified analytes can be found in the certifications section at www.alsglobal.com, or at the accreditation body's website.

Each of the certifications listed above have an explicit Scope of Accreditation that applies to specific matrices/methods/analytes; therefore, please contact the laboratory for information corresponding to a particular certification.

ALS ENVIRONMENTAL

DETAIL SUMMARY REPORT

Client: Landau Associates,Inc. Service Request: P1700001

Project ID: Transportation Corridor Investigation / 1148009.010.014

Date Received: 1/3/2017

Time Received: 09:15

Client Sample ID	Lab Code	Matrix	Date Collected	Time Collected	Container ID	Pi1 (psig)	Pf1 (psig)	ASTM D1946-90(2006) - Fxd Gases Can	ASTM D 5504-12 - Sulfur Can	25C Modified - TGNMO+ 1X Can	TO-15 Modified - VOC Cans
Ambient-12292016	P1700001-001	Air	12/29/2016	13:07	SSC00151	0.05	3.91	X	X	X	X
GP-38-12292016	P1700001-002	Air	12/29/2016	13:30	SSC00258	0.22	3.92	X	X	X	X
GP-39-12292016	P1700001-003	Air	12/29/2016	14:15	SSC00120	0.04	3.81	X	X	X	X
GP-43-12292016	P1700001-004	Air	12/29/2016	14:30	SSC00277	0.11	4.07	X	X	X	X
GP-41-12292016	P1700001-005	Air	12/29/2016	14:45	SSC00402	-0.33	3.74	X	X	X	X

Air - Chain of Custody Record & Analytical Service Request

Page 1 of 1

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Requested Turnaround Time in Business Days (Surcharges) please circle
1 Day (100%) 2 Day (75%) 3 Day (50%) 4 Day (35%) 5 Day (25%) 10-Day-Standard

ALS Project No. A160P170000

Company Name & Address (Reporting Information)
Landau Associates
130 2nd Ave. South
Edmonds, WA 98026

Project Name: Transportation Corridor Investigation
Project Number: 1148009.010.014

Project Manager: Piper Roelen

P.O. # / Billing Information: 1148009.010.014 Closed City of Yakima Landfill Site Project
Invoice through LAI

Phone: (425) 778-0907 Fax: —

Email Address for Result Reporting: proelen@landauinc.com, cjohnson@landauinc.com jdavis@landauinc.com

Sampler (Print & Sign): Stephanie Rosado

ALS Contact:

Analysis Method

Client Sample ID	Laboratory ID Number	Date Collected	Time Collected	Canister ID (Bar code # - AC, SC, etc.)	Flow Controller ID (Bar code # - FC #)	Canister Start Pressure "Hg	Canister End Pressure "Hg/psig	Sample Volume	Total Reduced Sulfur ASTM D-5504	Fixed Gases & TO-15 ASTM D-1945	NMOC's (EPA 25C)	VOC's (TO-15)	Comments e.g. Actual Preservative or specific instructions
Ambient-12292016	1	12/29/16	1307	SSC00151	SFC00105	-17.49	-4	6L	X	X	X	X	*methane, CO_2, CO, O_2, Nitrogen
GP-38-12292016	2	12/29/16	1330	SSC00258	SFC00095	-17.58	-0.09	6L	X	X	X	X	
GP-39-12292016	3	12/29/16	1415	SSC00120	SFC00144	-17.64	-7	6L	X	X	X	X	
GP-43-12292016	4	12/29/16	1430	SSC00277	SFC00113	-17.64	-0.70	6L	X	X	X	X	
GP-41-12292016	5	12/29/16	1445	SSC00402	SFC00161	-17.67	-4	6L	X	X	X	X	

Report Tier Levels - please select

Tier I - Results (Default in not specified) _____ Tier III (Results + QC & Calibration Summaries) _____
Tier II (Results + QC Summaries _____ Tier IV (Date Validation Package) 10% Surcharge _____

EDD required YES / No
Type: _____ Units: _____

Chain of Custody Seal: (Circle)
INTACT BROKEN ABSENT

Project Requirements (MRLs, QAPP)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Stephanie Rosado	12/29/16	1600			
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
[illegible]			[illegible]	1/3/17	0915

Cooler / Blank Temperature _____ °C

ALS Environmental
Sample Acceptance Check Form

Client: Landau Associates, Inc. Work order: P1700001

Project: Transportation Corridor Investigation / 1148009.010.014

Sample(s) received on: 1/3/17 Date opened: 1/3/17 by: ADAVID

Note: This form is used for all samples received by ALS. The use of this form for custody seals is strictly meant to indicate presence/absence and not as an indication of compliance or nonconformity. Thermal preservation and pH will only be evaluated either at the request of the client and/or as required by the method/SOP.

		Yes	No	N/A
1	Were **sample containers** properly marked with client sample ID?	☒	☐	☐
2	Did **sample containers** arrive in good condition?	☒	☐	☐
3	Were **chain-of-custody** papers used and filled out?	☒	☐	☐
4	Did **sample container labels** and/or tags agree with custody papers?	☒	☐	☐
5	Was **sample volume** received adequate for analysis?	☒	☐	☐
6	Are samples within specified holding times?	☒	☐	☐
7	Was proper **temperature** (thermal preservation) of cooler at receipt adhered to?	☐	☐	☒
8	Were **custody seals** on outside of cooler/Box/Container?	☐	☒	☐
	Location of seal(s)? _____ Sealing Lid?	☐	☐	☒
	Were signature and date included?	☐	☐	☒
	Were seals intact?	☐	☐	☒
9	Do containers have appropriate **preservation**, according to method/SOP or Client specified information?	☐	☐	☒
	Is there a client indication that the submitted samples are **pH** preserved?	☐	☐	☒
	Were **VOA vials** checked for presence/absence of air bubbles?	☐	☐	☒
	Does the client/method/SOP require that the analyst check the sample pH and if necessary alter it?	☐	☐	☒
10	**Tubes:** Are the tubes capped and intact?	☐	☐	☒
11	**Badges:** Are the badges properly capped and intact?	☐	☐	☒
	Are dual bed badges separated and individually capped and intact?	☐	☐	☒

Lab Sample ID	Container Description	Required pH *	Received pH	Adjusted pH	VOA Headspace (Presence/Absence)	Receipt / Preservation Comments
P1700001-001.01	6.0 L Silonite Can					
P1700001-002.01	6.0 L Silonite Can					
P1700001-003.01	6.0 L Silonite Can					
P1700001-004.01	6.0 L Silonite Can					
P1700001-005.01	6.0 L Silonite Can					

Explain any discrepancies: (include lab sample ID numbers): _____

RSK - MEEPP, HCL (pH<2); RSK - CO2, (pH 5-8); Sulfur (pH>4)

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Landau Associates,Inc.**
Client Sample ID: **Ambient-12292016** ALS Project ID: P1700001
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P1700001-001

Test Code: ASTM D1946 Date Collected: 12/29/16
Instrument ID: HP5890 II/GC1/TCD Date Received: 1/3/17
Analyst: Mike Conejo Date Analyzed: 1/3/17
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.10 ml(s)
Test Notes:
Container ID: SSC00151

Canister Dilution Factor: 2.20

CAS #	Compound	Result %, v/v	MRL %, v/v	Data Qualifier
7782-44-7	**Oxygen***	**22.2**	0.22	
7727-37-9	**Nitrogen**	**77.8**	0.22	
630-08-0	Carbon Monoxide	ND	0.22	
74-82-8	Methane	ND	0.22	
124-38-9	Carbon Dioxide	ND	0.22	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
* = The oxygen result may include argon due to coelution. Ambient air includes 0.93% argon.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Landau Associates,Inc.**
Client Sample ID: **GP-38-12292016** ALS Project ID: P1700001
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P1700001-002

Test Code: ASTM D1946 Date Collected: 12/29/16
Instrument ID: HP5890 II/GC1/TCD Date Received: 1/3/17
Analyst: Mike Conejo Date Analyzed: 1/3/17
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.10 ml(s)
Test Notes:
Container ID: SSC00258

Canister Dilution Factor: 2.16

CAS #	Compound	Result %, v/v	MRL %, v/v	Data Qualifier
7782-44-7	**Oxygen***	**0.286**	0.22	
7727-37-9	**Nitrogen**	**5.76**	0.22	
630-08-0	Carbon Monoxide	ND	0.22	
74-82-8	**Methane**	**57.9**	0.22	
124-38-9	**Carbon Dioxide**	**36.0**	0.22	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
* = The oxygen result may include argon due to coelution. Ambient air includes 0.93% argon.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Landau Associates,Inc.**
Client Sample ID: **GP-39-12292016** ALS Project ID: P1700001
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P1700001-003

Test Code: ASTM D1946 Date Collected: 12/29/16
Instrument ID: HP5890 II/GC1/TCD Date Received: 1/3/17
Analyst: Mike Conejo Date Analyzed: 1/3/17
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.10 ml(s)
Test Notes:
Container ID: SSC00120

Canister Dilution Factor: 2.19

CAS #	Compound	Result %, v/v	MRL %, v/v	Data Qualifier
7782-44-7	Oxygen*	ND	0.22	
7727-37-9	**Nitrogen**	**1.18**	0.22	
630-08-0	Carbon Monoxide	ND	0.22	
74-82-8	**Methane**	**66.0**	0.22	
124-38-9	**Carbon Dioxide**	**32.6**	0.22	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
* = The oxygen result may include argon due to coelution. Ambient air includes 0.93% argon.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Landau Associates,Inc.**
Client Sample ID: **GP-43-12292016** ALS Project ID: P1700001
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P1700001-004

Test Code: ASTM D1946 Date Collected: 12/29/16
Instrument ID: HP5890 II/GC1/TCD Date Received: 1/3/17
Analyst: Mike Conejo Date Analyzed: 1/4/17
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.10 ml(s)
Test Notes:
Container ID: SSC00277

Canister Dilution Factor: 2.21

CAS #	Compound	Result %, v/v	MRL %, v/v	Data Qualifier
7782-44-7	**Oxygen***	**0.380**	0.22	
7727-37-9	**Nitrogen**	**2.82**	0.22	
630-08-0	Carbon Monoxide	ND	0.22	
74-82-8	**Methane**	**65.9**	0.22	
124-38-9	**Carbon Dioxide**	**30.8**	0.22	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
* = The oxygen result may include argon due to coelution. Ambient air includes 0.93% argon.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Landau Associates,Inc.**
Client Sample ID: **GP-41-12292016** ALS Project ID: P1700001
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P1700001-005

Test Code: ASTM D1946 Date Collected: 12/29/16
Instrument ID: HP5890 II/GC1/TCD Date Received: 1/3/17
Analyst: Mike Conejo Date Analyzed: 1/4/17
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.10 ml(s)
Test Notes:
Container ID: SSC00402

Canister Dilution Factor: 2.29

CAS #	Compound	Result %, v/v	MRL %, v/v	Data Qualifier
7782-44-7	**Oxygen***	**0.376**	0.23	
7727-37-9	**Nitrogen**	**4.02**	0.23	
630-08-0	Carbon Monoxide	ND	0.23	
74-82-8	**Methane**	**70.5**	0.23	
124-38-9	**Carbon Dioxide**	**25.1**	0.23	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
* = The oxygen result may include argon due to coelution. Ambient air includes 0.93% argon.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Landau Associates,Inc.**
Client Sample ID: **Method Blank** ALS Project ID: P1700001
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P170103-MB

Test Code: ASTM D1946 Date Collected: NA
Instrument ID: HP5890 II/GC1/TCD Date Received: NA
Analyst: Mike Conejo Date Analyzed: 1/03/17
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.10 ml(s)
Test Notes:

CAS #	Compound	Result %, v/v	MRL %, v/v	Data Qualifier
7782-44-7	Oxygen*	ND	0.10	
7727-37-9	Nitrogen	ND	0.10	
630-08-0	Carbon Monoxide	ND	0.10	
74-82-8	Methane	ND	0.10	
124-38-9	Carbon Dioxide	ND	0.10	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
* = The oxygen result may include argon due to coelution. Ambient air includes 0.93% argon.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Landau Associates,Inc.**
Client Sample ID: **Method Blank** ALS Project ID: P1700001
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P170104-MB

Test Code: ASTM D1946 Date Collected: NA
Instrument ID: HP5890 II/GC1/TCD Date Received: NA
Analyst: Mike Conejo Date Analyzed: 1/04/17
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.10 ml(s)
Test Notes:

CAS #	Compound	Result %, v/v	MRL %, v/v	Data Qualifier
7782-44-7	Oxygen*	ND	0.10	
7727-37-9	Nitrogen	ND	0.10	
630-08-0	Carbon Monoxide	ND	0.10	
74-82-8	Methane	ND	0.10	
124-38-9	Carbon Dioxide	ND	0.10	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
* = The oxygen result may include argon due to coelution. Ambient air includes 0.93% argon.

ALS ENVIRONMENTAL

LABORATORY CONTROL SAMPLE SUMMARY

Client: **Landau Associates,Inc.**
Client Sample ID: **Lab Control Sample** ALS Project ID: P1700001
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P170103-LCS

Test Code: ASTM D1946 Date Collected: NA
Instrument ID: HP5890 II/GC1/TCD Date Received: NA
Analyst: Mike Conejo Date Analyzed: 1/03/17
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: NA ml(s)
Test Notes:

CAS #	Compound	Spike Amount ppmV	Result ppmV	% Recovery	ALS Acceptance Limits	Data Qualifier
7782-44-7	Oxygen*	50,000	**53,000**	**106**	97-108	
7727-37-9	Nitrogen	50,000	**52,900**	**106**	89-113	
630-08-0	Carbon Monoxide	50,000	**52,200**	**104**	98-108	
74-82-8	Methane	50,000	**50,300**	**101**	94-111	
124-38-9	Carbon Dioxide	50,000	**50,200**	**100**	94-104	

* = The oxygen result may include argon due to coelution. Ambient air includes 0.93% argon.

ALS ENVIRONMENTAL

LABORATORY CONTROL SAMPLE SUMMARY

Client: **Landau Associates,Inc.**
Client Sample ID: **Lab Control Sample** ALS Project ID: P1700001
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P170104-LCS

Test Code: ASTM D1946 Date Collected: NA
Instrument ID: HP5890 II/GC1/TCD Date Received: NA
Analyst: Mike Conejo Date Analyzed: 1/04/17
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: NA ml(s)
Test Notes:

CAS #	Compound	Spike Amount ppmV	Result ppmV	% Recovery	ALS Acceptance Limits	Data Qualifier
7782-44-7	Oxygen*	50,000	**53,000**	**106**	97-108	
7727-37-9	Nitrogen	50,000	**53,800**	**108**	89-113	
630-08-0	Carbon Monoxide	50,000	**51,800**	**104**	98-108	
74-82-8	Methane	50,000	**50,000**	**100**	94-111	
124-38-9	Carbon Dioxide	50,000	**49,800**	**100**	94-104	

* = The oxygen result may include argon due to coelution. Ambient air includes 0.93% argon.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Landau Associates,Inc.**
Client Sample ID: **Ambient-12292016** ALS Project ID: P1700001
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P1700001-001

Test Code:	ASTM D 5504-12	Date Collected:	12/29/16
Instrument ID:	Agilent 6890A/GC13/SCD	Time Collected:	13:07
Analyst:	Mike Conejo	Date Received:	1/3/17
Sample Type:	6.0 L Silonite Canister	Date Analyzed:	1/3/17
Test Notes:		Time Analyzed:	15:18
Container ID:	SSC00151	Volume(s) Analyzed:	1.0 ml(s)

Canister Dilution Factor: 2.20

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
7783-06-4	Hydrogen Sulfide	ND	15	ND	11	
463-58-1	Carbonyl Sulfide	ND	27	ND	11	
74-93-1	Methyl Mercaptan	ND	22	ND	11	
75-08-1	Ethyl Mercaptan	ND	28	ND	11	
75-18-3	Dimethyl Sulfide	ND	28	ND	11	
75-15-0	Carbon Disulfide	ND	17	ND	5.5	
75-33-2	Isopropyl Mercaptan	ND	34	ND	11	
75-66-1	tert-Butyl Mercaptan	ND	41	ND	11	
107-03-9	n-Propyl Mercaptan	ND	34	ND	11	
624-89-5	Ethyl Methyl Sulfide	ND	34	ND	11	
110-02-1	Thiophene	ND	38	ND	11	
513-44-0	Isobutyl Mercaptan	ND	41	ND	11	
352-93-2	Diethyl Sulfide	ND	41	ND	11	
109-79-5	n-Butyl Mercaptan	ND	41	ND	11	
624-92-0	Dimethyl Disulfide	ND	21	ND	5.5	
616-44-4	3-Methylthiophene	ND	44	ND	11	
110-01-0	Tetrahydrothiophene	ND	40	ND	11	
638-02-8	2,5-Dimethylthiophene	ND	50	ND	11	
872-55-9	2-Ethylthiophene	ND	50	ND	11	
110-81-6	Diethyl Disulfide	ND	27	ND	5.5	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Landau Associates,Inc.**
Client Sample ID: **GP-38-12292016** ALS Project ID: P1700001
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P1700001-002

Test Code:	ASTM D 5504-12	Date Collected:	12/29/16
Instrument ID:	Agilent 6890A/GC13/SCD	Time Collected:	13:30
Analyst:	Mike Conejo	Date Received:	1/3/17
Sample Type:	6.0 L Silonite Canister	Date Analyzed:	1/3/17
Test Notes:		Time Analyzed:	15:42
Container ID:	SSC00258	Volume(s) Analyzed:	1.0 ml(s)

Canister Dilution Factor: 2.16

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
7783-06-4	Hydrogen Sulfide	**3,400**	15	**2,400**	11	
463-58-1	Carbonyl Sulfide	ND	27	ND	11	
74-93-1	Methyl Mercaptan	**38**	21	**19**	11	
75-08-1	Ethyl Mercaptan	ND	27	ND	11	
75-18-3	Dimethyl Sulfide	ND	27	ND	11	
75-15-0	Carbon Disulfide	ND	17	ND	5.4	
75-33-2	Isopropyl Mercaptan	ND	34	ND	11	
75-66-1	tert-Butyl Mercaptan	ND	40	ND	11	
107-03-9	n-Propyl Mercaptan	ND	34	ND	11	
624-89-5	Ethyl Methyl Sulfide	ND	34	ND	11	
110-02-1	Thiophene	ND	37	ND	11	
513-44-0	Isobutyl Mercaptan	ND	40	ND	11	
352-93-2	Diethyl Sulfide	ND	40	ND	11	
109-79-5	n-Butyl Mercaptan	ND	40	ND	11	
624-92-0	Dimethyl Disulfide	ND	21	ND	5.4	
616-44-4	3-Methylthiophene	ND	43	ND	11	
110-01-0	Tetrahydrothiophene	ND	39	ND	11	
638-02-8	2,5-Dimethylthiophene	ND	50	ND	11	
872-55-9	2-Ethylthiophene	ND	50	ND	11	
110-81-6	Diethyl Disulfide	ND	27	ND	5.4	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Landau Associates,Inc.**
Client Sample ID: **GP-39-12292016** ALS Project ID: P1700001
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P1700001-003

Test Code:	ASTM D 5504-12	Date Collected:	12/29/16
Instrument ID:	Agilent 6890A/GC13/SCD	Time Collected:	14:15
Analyst:	Mike Conejo	Date Received:	1/3/17
Sample Type:	6.0 L Silonite Canister	Date Analyzed:	1/3/17
Test Notes:		Time Analyzed:	16:00
Container ID:	SSC00120	Volume(s) Analyzed:	1.0 ml(s)

Canister Dilution Factor: 2.19

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
7783-06-4	Hydrogen Sulfide	**12,000**	15	**8,800**	11	
463-58-1	Carbonyl Sulfide	ND	27	ND	11	
74-93-1	Methyl Mercaptan	ND	22	ND	11	
75-08-1	Ethyl Mercaptan	**28**	28	**11**	11	
75-18-3	Dimethyl Sulfide	ND	28	ND	11	
75-15-0	Carbon Disulfide	ND	17	ND	5.5	
75-33-2	Isopropyl Mercaptan	ND	34	ND	11	
75-66-1	tert-Butyl Mercaptan	ND	40	ND	11	
107-03-9	n-Propyl Mercaptan	ND	34	ND	11	
624-89-5	Ethyl Methyl Sulfide	ND	34	ND	11	
110-02-1	Thiophene	ND	38	ND	11	
513-44-0	Isobutyl Mercaptan	ND	40	ND	11	
352-93-2	Diethyl Sulfide	ND	40	ND	11	
109-79-5	n-Butyl Mercaptan	ND	40	ND	11	
624-92-0	Dimethyl Disulfide	ND	21	ND	5.5	
616-44-4	3-Methylthiophene	ND	44	ND	11	
110-01-0	Tetrahydrothiophene	ND	39	ND	11	
638-02-8	2,5-Dimethylthiophene	ND	50	ND	11	
872-55-9	2-Ethylthiophene	ND	50	ND	11	
110-81-6	Diethyl Disulfide	ND	27	ND	5.5	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Landau Associates,Inc.**
Client Sample ID: **GP-43-12292016** ALS Project ID: P1700001
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P1700001-004

Test Code:	ASTM D 5504-12	Date Collected:	12/29/16
Instrument ID:	Agilent 6890A/GC13/SCD	Time Collected:	14:30
Analyst:	Mike Conejo	Date Received:	1/3/17
Sample Type:	6.0 L Silonite Canister	Date Analyzed:	1/3/17
Test Notes:		Time Analyzed:	16:18
Container ID:	SSC00277	Volume(s) Analyzed:	1.0 ml(s)

Canister Dilution Factor: 2.21

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
7783-06-4	Hydrogen Sulfide	**5,100**	15	**3,600**	11	
463-58-1	Carbonyl Sulfide	ND	27	ND	11	
74-93-1	Methyl Mercaptan	**30**	22	**15**	11	
75-08-1	Ethyl Mercaptan	ND	28	ND	11	
75-18-3	Dimethyl Sulfide	**110**	28	**42**	11	
75-15-0	Carbon Disulfide	ND	17	ND	5.5	
75-33-2	Isopropyl Mercaptan	ND	34	ND	11	
75-66-1	tert-Butyl Mercaptan	ND	41	ND	11	
107-03-9	n-Propyl Mercaptan	ND	34	ND	11	
624-89-5	Ethyl Methyl Sulfide	ND	34	ND	11	
110-02-1	Thiophene	ND	38	ND	11	
513-44-0	Isobutyl Mercaptan	ND	41	ND	11	
352-93-2	Diethyl Sulfide	ND	41	ND	11	
109-79-5	n-Butyl Mercaptan	ND	41	ND	11	
624-92-0	Dimethyl Disulfide	ND	21	ND	5.5	
616-44-4	3-Methylthiophene	ND	44	ND	11	
110-01-0	Tetrahydrothiophene	ND	40	ND	11	
638-02-8	2,5-Dimethylthiophene	ND	51	ND	11	
872-55-9	2-Ethylthiophene	ND	51	ND	11	
110-81-6	Diethyl Disulfide	ND	28	ND	5.5	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Landau Associates,Inc.**
Client Sample ID: **GP-41-12292016** ALS Project ID: P1700001
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P1700001-005

Test Code:	ASTM D 5504-12	Date Collected:	12/29/16
Instrument ID:	Agilent 6890A/GC13/SCD	Time Collected:	14:45
Analyst:	Mike Conejo	Date Received:	1/3/17
Sample Type:	6.0 L Silonite Canister	Date Analyzed:	1/3/17
Test Notes:		Time Analyzed:	16:36
Container ID:	SSC00402	Volume(s) Analyzed:	1.0 ml(s)

Canister Dilution Factor: 2.29

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
7783-06-4	Hydrogen Sulfide	**640**	16	**460**	11	
463-58-1	Carbonyl Sulfide	ND	28	ND	11	
74-93-1	Methyl Mercaptan	ND	23	ND	11	
75-08-1	Ethyl Mercaptan	ND	29	ND	11	
75-18-3	Dimethyl Sulfide	ND	29	ND	11	
75-15-0	Carbon Disulfide	**110**	18	**34**	5.7	
75-33-2	Isopropyl Mercaptan	ND	36	ND	11	
75-66-1	tert-Butyl Mercaptan	ND	42	ND	11	
107-03-9	n-Propyl Mercaptan	ND	36	ND	11	
624-89-5	Ethyl Methyl Sulfide	ND	36	ND	11	
110-02-1	Thiophene	ND	39	ND	11	
513-44-0	Isobutyl Mercaptan	ND	42	ND	11	
352-93-2	Diethyl Sulfide	ND	42	ND	11	
109-79-5	n-Butyl Mercaptan	ND	42	ND	11	
624-92-0	Dimethyl Disulfide	ND	22	ND	5.7	
616-44-4	3-Methylthiophene	ND	46	ND	11	
110-01-0	Tetrahydrothiophene	ND	41	ND	11	
638-02-8	2,5-Dimethylthiophene	ND	53	ND	11	
872-55-9	2-Ethylthiophene	ND	53	ND	11	
110-81-6	Diethyl Disulfide	ND	29	ND	5.7	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Landau Associates,Inc.**
Client Sample ID: **Method Blank** ALS Project ID: P1700001
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P170103-MB

Test Code: ASTM D 5504-12 Date Collected: NA
Instrument ID: Agilent 6890A/GC13/SCD Time Collected: NA
Analyst: Mike Conejo Date Received: NA
Sample Type: 6.0 L Silonite Canister Date Analyzed: 1/03/17
Test Notes: Time Analyzed: 08:21
Volume(s) Analyzed: 1.0 ml(s)

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
7783-06-4	Hydrogen Sulfide	ND	7.0	ND	5.0	
463-58-1	Carbonyl Sulfide	ND	12	ND	5.0	
74-93-1	Methyl Mercaptan	ND	9.8	ND	5.0	
75-08-1	Ethyl Mercaptan	ND	13	ND	5.0	
75-18-3	Dimethyl Sulfide	ND	13	ND	5.0	
75-15-0	Carbon Disulfide	ND	7.8	ND	2.5	
75-33-2	Isopropyl Mercaptan	ND	16	ND	5.0	
75-66-1	tert-Butyl Mercaptan	ND	18	ND	5.0	
107-03-9	n-Propyl Mercaptan	ND	16	ND	5.0	
624-89-5	Ethyl Methyl Sulfide	ND	16	ND	5.0	
110-02-1	Thiophene	ND	17	ND	5.0	
513-44-0	Isobutyl Mercaptan	ND	18	ND	5.0	
352-93-2	Diethyl Sulfide	ND	18	ND	5.0	
109-79-5	n-Butyl Mercaptan	ND	18	ND	5.0	
624-92-0	Dimethyl Disulfide	ND	9.6	ND	2.5	
616-44-4	3-Methylthiophene	ND	20	ND	5.0	
110-01-0	Tetrahydrothiophene	ND	18	ND	5.0	
638-02-8	2,5-Dimethylthiophene	ND	23	ND	5.0	
872-55-9	2-Ethylthiophene	ND	23	ND	5.0	
110-81-6	Diethyl Disulfide	ND	12	ND	2.5	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

LABORATORY CONTROL SAMPLE SUMMARY

Client: **Landau Associates,Inc.**
Client Sample ID: **Lab Control Sample** ALS Project ID: P1700001
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P170103-LCS

Test Code: ASTM D 5504-12 Date Collected: NA
Instrument ID: Agilent 6890A/GC13/SCD Date Received: NA
Analyst: Mike Conejo Date Analyzed: 1/03/17
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: NA ml(s)
Test Notes:

CAS #	Compound	Spike Amount ppbV	Result ppbV	% Recovery	ALS Acceptance Limits	Data Qualifier
7783-06-4	Hydrogen Sulfide	1,000	**1,040**	**104**	75-148	
463-58-1	Carbonyl Sulfide	1,000	**1,060**	**106**	70-137	
74-93-1	Methyl Mercaptan	1,000	**1,050**	**105**	72-139	

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Landau Associates,Inc.**
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Project ID: P1700001

Total Gaseous Nonmethane Organics (TGNMO) as Methane

Test Code: EPA Method 25C Modified
Instrument ID: HP5890 II/GC1/FID/TCA Date(s) Collected: 12/29/16
Analyst: Mike Conejo Date Received: 1/3/17
Sampling Media: 6.0 L Silonite Canister(s) Date Analyzed: 1/5/17
Test Notes:

Client Sample ID	ALS Sample ID	Canister Dilution Factor	Injection Volume ml(s)	**Result ppmV**	MRL ppmV	Data Qualifier
Ambient-12292016	P1700001-001	2.20	0.50	ND	2.2	
GP-38-12292016	P1700001-002	2.16	0.50	**250**	2.2	
GP-39-12292016	P1700001-003	2.19	0.50	**600**	2.2	
GP-43-12292016	P1700001-004	2.21	0.50	**230**	2.2	
GP-41-12292016	P1700001-005	2.29	0.50	**310**	2.3	
Method Blank	P170105-MB	1.00	0.50	ND	1.0	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

LABORATORY CONTROL SAMPLE SUMMARY

Client: **Landau Associates,Inc.**
Client Sample ID: **Lab Control Sample** ALS Project ID: P1700001
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P170105-LCS

Test Code: EPA Method 25C Modified Date Collected: NA
Instrument ID: HP5890 II/GC1/FID/TCA Date Received: NA
Analyst: Mike Conejo Date Analyzed: 1/05/17
Sampling Media: 6.0 L Silonite Canister Volume(s) Analyzed: NA ml(s)
Test Notes:

Compound	Spike Amount ppmV	**Result ppmV**	**% Recovery**	ALS Acceptance Limits	Data Qualifier
Total Gaseous Nonmethane Organics (TGNMO) as Methane	1,000	**902**	**90**	85-121	

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Landau Associates,Inc.**
Client Sample ID: **Ambient-12292016** ALS Project ID: P1700001
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P1700001-001

Test Code: EPA TO-15 Modified Date Collected: 12/29/16
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: 1/3/17
Analyst: Lusine Hakobyan Date Analyzed: 1/4/17
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 1.00 Liter(s)
Test Notes:
Container ID: SSC00151

Canister Dilution Factor: 2.20

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
115-07-1	Propene	**3.4**	1.1	**2.0**	0.64	
75-71-8	Dichlorodifluoromethane (CFC 12)	**2.1**	1.1	**0.42**	0.22	
74-87-3	Chloromethane	ND	1.1	ND	0.53	
76-14-2	1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)	ND	1.1	ND	0.16	
75-01-4	Vinyl Chloride	ND	1.1	ND	0.43	
106-99-0	1,3-Butadiene	ND	1.1	ND	0.50	
74-83-9	Bromomethane	ND	1.1	ND	0.28	
75-00-3	Chloroethane	ND	1.1	ND	0.42	
64-17-5	Ethanol	ND	11	ND	5.8	
75-05-8	Acetonitrile	ND	1.1	ND	0.66	
107-02-8	Acrolein	ND	4.4	ND	1.9	
67-64-1	Acetone	ND	11	ND	4.6	
75-69-4	Trichlorofluoromethane	ND	1.1	ND	0.20	
67-63-0	2-Propanol (Isopropyl Alcohol)	ND	11	ND	4.5	
107-13-1	Acrylonitrile	ND	1.1	ND	0.51	
75-35-4	1,1-Dichloroethene	ND	1.1	ND	0.28	
75-09-2	Methylene Chloride	ND	1.1	ND	0.32	
107-05-1	3-Chloro-1-propene (Allyl Chloride)	ND	1.1	ND	0.35	
76-13-1	Trichlorotrifluoroethane	ND	1.1	ND	0.14	
75-15-0	Carbon Disulfide	ND	11	ND	3.5	
156-60-5	trans-1,2-Dichloroethene	ND	1.1	ND	0.28	
75-34-3	1,1-Dichloroethane	ND	1.1	ND	0.27	
1634-04-4	Methyl tert-Butyl Ether	ND	1.1	ND	0.31	
108-05-4	Vinyl Acetate	ND	11	ND	3.1	
78-93-3	2-Butanone (MEK)	ND	11	ND	3.7	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Landau Associates,Inc.**
Client Sample ID: **Ambient-12292016** ALS Project ID: P1700001
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P1700001-001

Test Code: EPA TO-15 Modified Date Collected: 12/29/16
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: 1/3/17
Analyst: Lusine Hakobyan Date Analyzed: 1/4/17
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 1.00 Liter(s)
Test Notes:
Container ID: SSC00151

Canister Dilution Factor: 2.20

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
156-59-2	cis-1,2-Dichloroethene	ND	1.1	ND	0.28	
141-78-6	Ethyl Acetate	**3.3**	2.2	**0.92**	0.61	
110-54-3	n-Hexane	ND	1.1	ND	0.31	
67-66-3	Chloroform	ND	1.1	ND	0.23	
109-99-9	Tetrahydrofuran (THF)	ND	1.1	ND	0.37	
107-06-2	1,2-Dichloroethane	ND	1.1	ND	0.27	
71-55-6	1,1,1-Trichloroethane	ND	1.1	ND	0.20	
71-43-2	Benzene	ND	1.1	ND	0.34	
56-23-5	Carbon Tetrachloride	ND	1.1	ND	0.17	
110-82-7	Cyclohexane	ND	2.2	ND	0.64	
78-87-5	1,2-Dichloropropane	ND	1.1	ND	0.24	
75-27-4	Bromodichloromethane	ND	1.1	ND	0.16	
79-01-6	Trichloroethene	ND	1.1	ND	0.20	
123-91-1	1,4-Dioxane	ND	1.1	ND	0.31	
80-62-6	Methyl Methacrylate	ND	2.2	ND	0.54	
142-82-5	n-Heptane	ND	1.1	ND	0.27	
10061-01-5	cis-1,3-Dichloropropene	ND	1.1	ND	0.24	
108-10-1	4-Methyl-2-pentanone	ND	1.1	ND	0.27	
10061-02-6	trans-1,3-Dichloropropene	ND	1.1	ND	0.24	
79-00-5	1,1,2-Trichloroethane	ND	1.1	ND	0.20	
108-88-3	Toluene	ND	1.1	ND	0.29	
591-78-6	2-Hexanone	ND	1.1	ND	0.27	
124-48-1	Dibromochloromethane	ND	1.1	ND	0.13	
106-93-4	1,2-Dibromoethane	ND	1.1	ND	0.14	
123-86-4	n-Butyl Acetate	ND	1.1	ND	0.23	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

Client: **Landau Associates,Inc.**

Client Sample ID: **Ambient-12292016** ALS Project ID: P1700001

Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P1700001-001

Test Code: EPA TO-15 Modified Date Collected: 12/29/16

Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: 1/3/17

Analyst: Lusine Hakobyan Date Analyzed: 1/4/17

Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 1.00 Liter(s)

Test Notes:

Container ID: SSC00151

Canister Dilution Factor: 2.20

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
111-65-9	n-Octane	ND	1.1	ND	0.24	
127-18-4	Tetrachloroethene	ND	1.1	ND	0.16	
108-90-7	Chlorobenzene	ND	1.1	ND	0.24	
100-41-4	Ethylbenzene	ND	1.1	ND	0.25	
179601-23-1	m,p-Xylenes	ND	2.2	ND	0.51	
75-25-2	Bromoform	ND	1.1	ND	0.11	
100-42-5	Styrene	ND	1.1	ND	0.26	
95-47-6	o-Xylene	ND	1.1	ND	0.25	
111-84-2	n-Nonane	ND	1.1	ND	0.21	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.1	ND	0.16	
98-82-8	Cumene	ND	1.1	ND	0.22	
80-56-8	alpha-Pinene	ND	1.1	ND	0.20	
103-65-1	n-Propylbenzene	ND	1.1	ND	0.22	
622-96-8	4-Ethyltoluene	ND	1.1	ND	0.22	
108-67-8	1,3,5-Trimethylbenzene	ND	1.1	ND	0.22	
95-63-6	1,2,4-Trimethylbenzene	ND	1.1	ND	0.22	
100-44-7	Benzyl Chloride	ND	1.1	ND	0.21	
541-73-1	1,3-Dichlorobenzene	ND	1.1	ND	0.18	
106-46-7	1,4-Dichlorobenzene	ND	1.1	ND	0.18	
95-50-1	1,2-Dichlorobenzene	ND	1.1	ND	0.18	
5989-27-5	d-Limonene	ND	1.1	ND	0.20	
96-12-8	1,2-Dibromo-3-chloropropane	ND	1.1	ND	0.11	
120-82-1	1,2,4-Trichlorobenzene	ND	1.1	ND	0.15	
91-20-3	Naphthalene	ND	1.1	ND	0.21	
87-68-3	Hexachlorobutadiene	ND	1.1	ND	0.10	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Landau Associates,Inc.**
Client Sample ID: **GP-38-12292016** ALS Project ID: P1700001
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P1700001-002

Test Code: EPA TO-15 Modified Date Collected: 12/29/16
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: 1/3/17
Analyst: Lusine Hakobyan Date Analyzed: 1/4 - 1/5/17
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.10 Liter(s)
Test Notes: 0.020 Liter(s)
Container ID: SSC00258

Canister Dilution Factor: 2.16

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
115-07-1	Propene	**870**	11	**500**	6.3	
75-71-8	Dichlorodifluoromethane (CFC 12)	**53**	11	**11**	2.2	
74-87-3	Chloromethane	ND	11	ND	5.2	
76-14-2	1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)	**1,100**	11	**150**	1.5	
75-01-4	Vinyl Chloride	**78**	11	**30**	4.2	
106-99-0	1,3-Butadiene	ND	11	ND	4.9	
74-83-9	Bromomethane	ND	11	ND	2.8	
75-00-3	Chloroethane	**26**	11	**9.9**	4.1	
64-17-5	Ethanol	ND	110	ND	57	
75-05-8	Acetonitrile	ND	11	ND	6.4	
107-02-8	Acrolein	ND	43	ND	19	
67-64-1	Acetone	ND	110	ND	45	
75-69-4	Trichlorofluoromethane	ND	11	ND	1.9	
67-63-0	2-Propanol (Isopropyl Alcohol)	ND	110	ND	44	
107-13-1	Acrylonitrile	ND	11	ND	5.0	
75-35-4	1,1-Dichloroethene	**11**	11	**2.9**	2.7	
75-09-2	Methylene Chloride	ND	11	ND	3.1	
107-05-1	3-Chloro-1-propene (Allyl Chloride)	ND	11	ND	3.5	
76-13-1	Trichlorotrifluoroethane	ND	11	ND	1.4	
75-15-0	Carbon Disulfide	ND	110	ND	35	
156-60-5	trans-1,2-Dichloroethene	ND	11	ND	2.7	
75-34-3	1,1-Dichloroethane	ND	11	ND	2.7	
1634-04-4	Methyl tert-Butyl Ether	ND	11	ND	3.0	
108-05-4	Vinyl Acetate	ND	110	ND	31	
78-93-3	2-Butanone (MEK)	ND	110	ND	37	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Landau Associates,Inc.**
Client Sample ID: **GP-38-12292016** ALS Project ID: P1700001
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P1700001-002

Test Code: EPA TO-15 Modified Date Collected: 12/29/16
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: 1/3/17
Analyst: Lusine Hakobyan Date Analyzed: 1/4 - 1/5/17
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.10 Liter(s)
Test Notes: 0.020 Liter(s)
Container ID: SSC00258

Canister Dilution Factor: 2.16

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
156-59-2	cis-1,2-Dichloroethene	**21**	11	**5.4**	2.7	
141-78-6	Ethyl Acetate	ND	22	ND	6.0	
110-54-3	n-Hexane	**920**	11	**260**	3.1	
67-66-3	Chloroform	ND	11	ND	2.2	
109-99-9	Tetrahydrofuran (THF)	ND	11	ND	3.7	
107-06-2	1,2-Dichloroethane	ND	11	ND	2.7	
71-55-6	1,1,1-Trichloroethane	ND	11	ND	2.0	
71-43-2	Benzene	**70**	11	**22**	3.4	
56-23-5	Carbon Tetrachloride	ND	11	ND	1.7	
110-82-7	Cyclohexane	**2,200**	22	**640**	6.3	
78-87-5	1,2-Dichloropropane	ND	11	ND	2.3	
75-27-4	Bromodichloromethane	ND	11	ND	1.6	
79-01-6	Trichloroethene	**19**	11	**3.4**	2.0	
123-91-1	1,4-Dioxane	ND	11	ND	3.0	
80-62-6	Methyl Methacrylate	ND	22	ND	5.3	
142-82-5	n-Heptane	**3,100**	54	**760**	13	**D**
10061-01-5	cis-1,3-Dichloropropene	ND	11	ND	2.4	
108-10-1	4-Methyl-2-pentanone	ND	11	ND	2.6	
10061-02-6	trans-1,3-Dichloropropene	ND	11	ND	2.4	
79-00-5	1,1,2-Trichloroethane	ND	11	ND	2.0	
108-88-3	Toluene	**54**	11	**14**	2.9	
591-78-6	2-Hexanone	ND	11	ND	2.6	
124-48-1	Dibromochloromethane	ND	11	ND	1.3	
106-93-4	1,2-Dibromoethane	ND	11	ND	1.4	
123-86-4	n-Butyl Acetate	ND	11	ND	2.3	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
D = The reported result is from a dilution.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Landau Associates,Inc.**
Client Sample ID: **GP-38-12292016** ALS Project ID: P1700001
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P1700001-002

Test Code: EPA TO-15 Modified Date Collected: 12/29/16
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: 1/3/17
Analyst: Lusine Hakobyan Date Analyzed: 1/4 - 1/5/17
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.10 Liter(s)
Test Notes: 0.020 Liter(s)
Container ID: SSC00258

Canister Dilution Factor: 2.16

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
111-65-9	n-Octane	**260**	11	**56**	2.3	
127-18-4	Tetrachloroethene	ND	11	ND	1.6	
108-90-7	Chlorobenzene	**190**	11	**42**	2.3	
100-41-4	Ethylbenzene	**62**	11	**14**	2.5	
179601-23-1	m,p-Xylenes	**440**	22	**100**	5.0	
75-25-2	Bromoform	ND	11	ND	1.0	
100-42-5	Styrene	ND	11	ND	2.5	
95-47-6	o-Xylene	**130**	11	**29**	2.5	
111-84-2	n-Nonane	**200**	11	**38**	2.1	
79-34-5	1,1,2,2-Tetrachloroethane	ND	11	ND	1.6	
98-82-8	Cumene	**300**	11	**62**	2.2	
80-56-8	alpha-Pinene	**65**	11	**12**	1.9	
103-65-1	n-Propylbenzene	**170**	11	**35**	2.2	
622-96-8	4-Ethyltoluene	**28**	11	**5.7**	2.2	
108-67-8	1,3,5-Trimethylbenzene	**110**	11	**23**	2.2	
95-63-6	1,2,4-Trimethylbenzene	**270**	11	**56**	2.2	
100-44-7	Benzyl Chloride	ND	11	ND	2.1	
541-73-1	1,3-Dichlorobenzene	ND	11	ND	1.8	
106-46-7	1,4-Dichlorobenzene	**100**	11	**17**	1.8	
95-50-1	1,2-Dichlorobenzene	**22**	11	**3.6**	1.8	
5989-27-5	d-Limonene	ND	11	ND	1.9	
96-12-8	1,2-Dibromo-3-chloropropane	ND	11	ND	1.1	
120-82-1	1,2,4-Trichlorobenzene	ND	11	ND	1.5	
91-20-3	Naphthalene	ND	11	ND	2.1	
87-68-3	Hexachlorobutadiene	ND	11	ND	1.0	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Landau Associates,Inc.**
Client Sample ID: **GP-39-12292016** ALS Project ID: P1700001
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P1700001-003

Test Code: EPA TO-15 Modified Date Collected: 12/29/16
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: 1/3/17
Analyst: Lusine Hakobyan Date Analyzed: 1/5/17
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.020 Liter(s)
Test Notes: 0.010 Liter(s)
Container ID: SSC00120

Canister Dilution Factor: 2.19

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
115-07-1	Propene	**1,200**	55	**700**	32	
75-71-8	Dichlorodifluoromethane (CFC 12)	**1,100**	55	**210**	11	
74-87-3	Chloromethane	ND	55	ND	27	
76-14-2	1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)	**1,300**	55	**190**	7.8	
75-01-4	Vinyl Chloride	**11,000**	55	**4,200**	21	
106-99-0	1,3-Butadiene	ND	55	ND	25	
74-83-9	Bromomethane	ND	55	ND	14	
75-00-3	Chloroethane	**83**	55	**32**	21	
64-17-5	Ethanol	ND	550	ND	290	
75-05-8	Acetonitrile	ND	55	ND	33	
107-02-8	Acrolein	ND	220	ND	96	
67-64-1	Acetone	ND	550	ND	230	
75-69-4	Trichlorofluoromethane	ND	55	ND	9.7	
67-63-0	2-Propanol (Isopropyl Alcohol)	ND	550	ND	220	
107-13-1	Acrylonitrile	ND	55	ND	25	
75-35-4	1,1-Dichloroethene	ND	55	ND	14	
75-09-2	Methylene Chloride	ND	55	ND	16	
107-05-1	3-Chloro-1-propene (Allyl Chloride)	ND	55	ND	17	
76-13-1	Trichlorotrifluoroethane	ND	55	ND	7.1	
75-15-0	Carbon Disulfide	ND	550	ND	180	
156-60-5	trans-1,2-Dichloroethene	ND	55	ND	14	
75-34-3	1,1-Dichloroethane	ND	55	ND	14	
1634-04-4	Methyl tert-Butyl Ether	ND	55	ND	15	
108-05-4	Vinyl Acetate	ND	550	ND	160	
78-93-3	2-Butanone (MEK)	ND	550	ND	190	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Landau Associates,Inc.**
Client Sample ID: **GP-39-12292016** ALS Project ID: P1700001
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P1700001-003

Test Code: EPA TO-15 Modified Date Collected: 12/29/16
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: 1/3/17
Analyst: Lusine Hakobyan Date Analyzed: 1/5/17
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.020 Liter(s)
Test Notes: 0.010 Liter(s)
Container ID: SSC00120

Canister Dilution Factor: 2.19

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
156-59-2	cis-1,2-Dichloroethene	**380**	55	**95**	14	
141-78-6	Ethyl Acetate	ND	110	ND	30	
110-54-3	n-Hexane	**840**	55	**240**	16	
67-66-3	Chloroform	ND	55	ND	11	
109-99-9	Tetrahydrofuran (THF)	ND	55	ND	19	
107-06-2	1,2-Dichloroethane	ND	55	ND	14	
71-55-6	1,1,1-Trichloroethane	ND	55	ND	10	
71-43-2	Benzene	**450**	55	**140**	17	
56-23-5	Carbon Tetrachloride	ND	55	ND	8.7	
110-82-7	Cyclohexane	**3,000**	110	**880**	32	
78-87-5	1,2-Dichloropropane	ND	55	ND	12	
75-27-4	Bromodichloromethane	ND	55	ND	8.2	
79-01-6	Trichloroethene	**77**	55	**14**	10	
123-91-1	1,4-Dioxane	ND	55	ND	15	
80-62-6	Methyl Methacrylate	ND	110	ND	27	
142-82-5	n-Heptane	**2,400**	55	**580**	13	
10061-01-5	cis-1,3-Dichloropropene	ND	55	ND	12	
108-10-1	4-Methyl-2-pentanone	**78**	55	**19**	13	
10061-02-6	trans-1,3-Dichloropropene	ND	55	ND	12	
79-00-5	1,1,2-Trichloroethane	ND	55	ND	10	
108-88-3	Toluene	**1,400**	55	**380**	15	
591-78-6	2-Hexanone	ND	55	ND	13	
124-48-1	Dibromochloromethane	ND	55	ND	6.4	
106-93-4	1,2-Dibromoethane	ND	55	ND	7.1	
123-86-4	n-Butyl Acetate	ND	55	ND	12	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Landau Associates,Inc.**
Client Sample ID: **GP-39-12292016** ALS Project ID: P1700001
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P1700001-003

Test Code: EPA TO-15 Modified Date Collected: 12/29/16
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: 1/3/17
Analyst: Lusine Hakobyan Date Analyzed: 1/5/17
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.020 Liter(s)
Test Notes: 0.010 Liter(s)
Container ID: SSC00120

Canister Dilution Factor: 2.19

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
111-65-9	n-Octane	**1,900**	55	**400**	12	
127-18-4	Tetrachloroethene	**67**	55	**9.9**	8.1	
108-90-7	Chlorobenzene	ND	55	ND	12	
100-41-4	Ethylbenzene	**4,200**	55	**960**	13	
179601-23-1	m,p-Xylenes	**8,600**	110	**2,000**	25	
75-25-2	Bromoform	ND	55	ND	5.3	
100-42-5	Styrene	ND	55	ND	13	
95-47-6	o-Xylene	**3,200**	55	**730**	13	
111-84-2	n-Nonane	**15,000**	110	**2,900**	21	**D**
79-34-5	1,1,2,2-Tetrachloroethane	ND	55	ND	8.0	
98-82-8	Cumene	**780**	55	**160**	11	
80-56-8	alpha-Pinene	**1,300**	55	**230**	9.8	
103-65-1	n-Propylbenzene	**1,300**	55	**260**	11	
622-96-8	4-Ethyltoluene	**570**	55	**120**	11	
108-67-8	1,3,5-Trimethylbenzene	**1,800**	55	**360**	11	
95-63-6	1,2,4-Trimethylbenzene	**3,800**	55	**780**	11	
100-44-7	Benzyl Chloride	ND	55	ND	11	
541-73-1	1,3-Dichlorobenzene	ND	55	ND	9.1	
106-46-7	1,4-Dichlorobenzene	**69**	55	**11**	9.1	
95-50-1	1,2-Dichlorobenzene	**79**	55	**13**	9.1	
5989-27-5	d-Limonene	**620**	55	**110**	9.8	
96-12-8	1,2-Dibromo-3-chloropropane	ND	55	ND	5.7	
120-82-1	1,2,4-Trichlorobenzene	ND	55	ND	7.4	
91-20-3	Naphthalene	ND	55	ND	10	
87-68-3	Hexachlorobutadiene	ND	55	ND	5.1	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
D = The reported result is from a dilution.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Landau Associates,Inc.**
Client Sample ID: **GP-43-12292016** ALS Project ID: P1700001
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P1700001-004

Test Code: EPA TO-15 Modified Date Collected: 12/29/16
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: 1/3/17
Analyst: Lusine Hakobyan Date Analyzed: 1/4/17
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.030 Liter(s)
Test Notes:
Container ID: SSC00277

Canister Dilution Factor: 2.21

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
115-07-1	Propene	**1,200**	37	**670**	21	
75-71-8	Dichlorodifluoromethane (CFC 12)	**1,500**	37	**290**	7.5	
74-87-3	Chloromethane	ND	37	ND	18	
76-14-2	1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)	**1,200**	37	**170**	5.3	
75-01-4	Vinyl Chloride	**5,400**	37	**2,100**	14	
106-99-0	1,3-Butadiene	ND	37	ND	17	
74-83-9	Bromomethane	ND	37	ND	9.5	
75-00-3	Chloroethane	ND	37	ND	14	
64-17-5	Ethanol	ND	370	ND	200	
75-05-8	Acetonitrile	ND	37	ND	22	
107-02-8	Acrolein	ND	150	ND	64	
67-64-1	Acetone	**970**	370	**410**	160	
75-69-4	Trichlorofluoromethane	**430**	37	**77**	6.6	
67-63-0	2-Propanol (Isopropyl Alcohol)	ND	370	ND	150	
107-13-1	Acrylonitrile	ND	37	ND	17	
75-35-4	1,1-Dichloroethene	**81**	37	**21**	9.3	
75-09-2	Methylene Chloride	**85**	37	**24**	11	
107-05-1	3-Chloro-1-propene (Allyl Chloride)	ND	37	ND	12	
76-13-1	Trichlorotrifluoroethane	ND	37	ND	4.8	
75-15-0	Carbon Disulfide	ND	370	ND	120	
156-60-5	trans-1,2-Dichloroethene	**120**	37	**31**	9.3	
75-34-3	1,1-Dichloroethane	ND	37	ND	9.1	
1634-04-4	Methyl tert-Butyl Ether	ND	37	ND	10	
108-05-4	Vinyl Acetate	ND	370	ND	100	
78-93-3	2-Butanone (MEK)	**1,500**	370	**510**	120	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Landau Associates,Inc.**
Client Sample ID: **GP-43-12292016** ALS Project ID: P1700001
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P1700001-004

Test Code: EPA TO-15 Modified Date Collected: 12/29/16
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: 1/3/17
Analyst: Lusine Hakobyan Date Analyzed: 1/4/17
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.030 Liter(s)
Test Notes:
Container ID: SSC00277

Canister Dilution Factor: 2.21

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
156-59-2	cis-1,2-Dichloroethene	**2,800**	37	**710**	9.3	
141-78-6	Ethyl Acetate	ND	74	ND	20	
110-54-3	n-Hexane	**580**	37	**170**	10	
67-66-3	Chloroform	ND	37	ND	7.5	
109-99-9	Tetrahydrofuran (THF)	**910**	37	**310**	12	
107-06-2	1,2-Dichloroethane	ND	37	ND	9.1	
71-55-6	1,1,1-Trichloroethane	ND	37	ND	6.8	
71-43-2	Benzene	**340**	37	**110**	12	
56-23-5	Carbon Tetrachloride	ND	37	ND	5.9	
110-82-7	Cyclohexane	**500**	74	**140**	21	
78-87-5	1,2-Dichloropropane	ND	37	ND	8.0	
75-27-4	Bromodichloromethane	ND	37	ND	5.5	
79-01-6	Trichloroethene	**450**	37	**83**	6.9	
123-91-1	1,4-Dioxane	ND	37	ND	10	
80-62-6	Methyl Methacrylate	ND	74	ND	18	
142-82-5	n-Heptane	**1,900**	37	**470**	9.0	
10061-01-5	cis-1,3-Dichloropropene	ND	37	ND	8.1	
108-10-1	4-Methyl-2-pentanone	**630**	37	**150**	9.0	
10061-02-6	trans-1,3-Dichloropropene	ND	37	ND	8.1	
79-00-5	1,1,2-Trichloroethane	ND	37	ND	6.8	
108-88-3	Toluene	**6,300**	37	**1,700**	9.8	
591-78-6	2-Hexanone	ND	37	ND	9.0	
124-48-1	Dibromochloromethane	ND	37	ND	4.3	
106-93-4	1,2-Dibromoethane	ND	37	ND	4.8	
123-86-4	n-Butyl Acetate	ND	37	ND	7.8	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

Client: **Landau Associates,Inc.**
Client Sample ID: **GP-43-12292016** ALS Project ID: P1700001
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P1700001-004

Test Code: EPA TO-15 Modified Date Collected: 12/29/16
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: 1/3/17
Analyst: Lusine Hakobyan Date Analyzed: 1/4/17
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.030 Liter(s)
Test Notes:
Container ID: SSC00277

Canister Dilution Factor: 2.21

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
111-65-9	n-Octane	**1,500**	37	**310**	7.9	
127-18-4	Tetrachloroethene	**640**	37	**94**	5.4	
108-90-7	Chlorobenzene	ND	37	ND	8.0	
100-41-4	Ethylbenzene	**3,800**	37	**880**	8.5	
179601-23-1	m,p-Xylenes	**7,400**	74	**1,700**	17	
75-25-2	Bromoform	ND	37	ND	3.6	
100-42-5	Styrene	**96**	37	**23**	8.7	
95-47-6	o-Xylene	**1,800**	37	**420**	8.5	
111-84-2	n-Nonane	**3,200**	37	**610**	7.0	
79-34-5	1,1,2,2-Tetrachloroethane	ND	37	ND	5.4	
98-82-8	Cumene	**550**	37	**110**	7.5	
80-56-8	alpha-Pinene	**4,300**	37	**780**	6.6	
103-65-1	n-Propylbenzene	**560**	37	**110**	7.5	
622-96-8	4-Ethyltoluene	**260**	37	**53**	7.5	
108-67-8	1,3,5-Trimethylbenzene	**450**	37	**92**	7.5	
95-63-6	1,2,4-Trimethylbenzene	**1,300**	37	**270**	7.5	
100-44-7	Benzyl Chloride	ND	37	ND	7.1	
541-73-1	1,3-Dichlorobenzene	ND	37	ND	6.1	
106-46-7	1,4-Dichlorobenzene	ND	37	ND	6.1	
95-50-1	1,2-Dichlorobenzene	ND	37	ND	6.1	
5989-27-5	d-Limonene	**6,900**	37	**1,200**	6.6	
96-12-8	1,2-Dibromo-3-chloropropane	ND	37	ND	3.8	
120-82-1	1,2,4-Trichlorobenzene	ND	37	ND	5.0	
91-20-3	Naphthalene	ND	37	ND	7.0	
87-68-3	Hexachlorobutadiene	ND	37	ND	3.5	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Landau Associates,Inc.**
Client Sample ID: **GP-41-12292016** ALS Project ID: P1700001
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P1700001-005

Test Code: EPA TO-15 Modified Date Collected: 12/29/16
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: 1/3/17
Analyst: Lusine Hakobyan Date Analyzed: 1/5/17
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.020 Liter(s)
Test Notes:
Container ID: SSC00402

Canister Dilution Factor: 2.29

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
115-07-1	Propene	**1,500**	57	**880**	33	
75-71-8	Dichlorodifluoromethane (CFC 12)	**4,100**	57	**830**	12	
74-87-3	Chloromethane	ND	57	ND	28	
76-14-2	1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)	**2,900**	57	**410**	8.2	
75-01-4	Vinyl Chloride	**9,400**	57	**3,700**	22	
106-99-0	1,3-Butadiene	ND	57	ND	26	
74-83-9	Bromomethane	ND	57	ND	15	
75-00-3	Chloroethane	ND	57	ND	22	
64-17-5	Ethanol	ND	570	ND	300	
75-05-8	Acetonitrile	ND	57	ND	34	
107-02-8	Acrolein	ND	230	ND	100	
67-64-1	Acetone	ND	570	ND	240	
75-69-4	Trichlorofluoromethane	ND	57	ND	10	
67-63-0	2-Propanol (Isopropyl Alcohol)	ND	570	ND	230	
107-13-1	Acrylonitrile	ND	57	ND	26	
75-35-4	1,1-Dichloroethene	ND	57	ND	14	
75-09-2	Methylene Chloride	ND	57	ND	16	
107-05-1	3-Chloro-1-propene (Allyl Chloride)	ND	57	ND	18	
76-13-1	Trichlorotrifluoroethane	ND	57	ND	7.5	
75-15-0	Carbon Disulfide	ND	570	ND	180	
156-60-5	trans-1,2-Dichloroethene	ND	57	ND	14	
75-34-3	1,1-Dichloroethane	ND	57	ND	14	
1634-04-4	Methyl tert-Butyl Ether	ND	57	ND	16	
108-05-4	Vinyl Acetate	ND	570	ND	160	
78-93-3	2-Butanone (MEK)	ND	570	ND	190	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Landau Associates,Inc.**
Client Sample ID: **GP-41-12292016** ALS Project ID: P1700001
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P1700001-005

Test Code: EPA TO-15 Modified Date Collected: 12/29/16
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: 1/3/17
Analyst: Lusine Hakobyan Date Analyzed: 1/5/17
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.020 Liter(s)
Test Notes:
Container ID: SSC00402

Canister Dilution Factor: 2.29

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
156-59-2	cis-1,2-Dichloroethene	**97**	57	**24**	14	
141-78-6	Ethyl Acetate	ND	110	ND	32	
110-54-3	n-Hexane	**620**	57	**180**	16	
67-66-3	Chloroform	ND	57	ND	12	
109-99-9	Tetrahydrofuran (THF)	ND	57	ND	19	
107-06-2	1,2-Dichloroethane	ND	57	ND	14	
71-55-6	1,1,1-Trichloroethane	ND	57	ND	10	
71-43-2	Benzene	**490**	57	**150**	18	
56-23-5	Carbon Tetrachloride	ND	57	ND	9.1	
110-82-7	Cyclohexane	**410**	110	**120**	33	
78-87-5	1,2-Dichloropropane	ND	57	ND	12	
75-27-4	Bromodichloromethane	ND	57	ND	8.5	
79-01-6	Trichloroethene	ND	57	ND	11	
123-91-1	1,4-Dioxane	ND	57	ND	16	
80-62-6	Methyl Methacrylate	ND	110	ND	28	
142-82-5	n-Heptane	**920**	57	**230**	14	
10061-01-5	cis-1,3-Dichloropropene	ND	57	ND	13	
108-10-1	4-Methyl-2-pentanone	ND	57	ND	14	
10061-02-6	trans-1,3-Dichloropropene	ND	57	ND	13	
79-00-5	1,1,2-Trichloroethane	ND	57	ND	10	
108-88-3	Toluene	**550**	57	**150**	15	
591-78-6	2-Hexanone	ND	57	ND	14	
124-48-1	Dibromochloromethane	ND	57	ND	6.7	
106-93-4	1,2-Dibromoethane	ND	57	ND	7.5	
123-86-4	n-Butyl Acetate	ND	57	ND	12	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Landau Associates,Inc.**
Client Sample ID: **GP-41-12292016** ALS Project ID: P1700001
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P1700001-005

Test Code: EPA TO-15 Modified Date Collected: 12/29/16
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: 1/3/17
Analyst: Lusine Hakobyan Date Analyzed: 1/5/17
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.020 Liter(s)
Test Notes:
Container ID: SSC00402

Canister Dilution Factor: 2.29

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
111-65-9	n-Octane	**1,800**	57	**380**	12	
127-18-4	Tetrachloroethene	ND	57	ND	8.4	
108-90-7	Chlorobenzene	ND	57	ND	12	
100-41-4	Ethylbenzene	**910**	57	**210**	13	
179601-23-1	m,p-Xylenes	**2,200**	110	**510**	26	
75-25-2	Bromoform	ND	57	ND	5.5	
100-42-5	Styrene	ND	57	ND	13	
95-47-6	o-Xylene	**910**	57	**210**	13	
111-84-2	n-Nonane	**9,800**	57	**1,900**	11	
79-34-5	1,1,2,2-Tetrachloroethane	ND	57	ND	8.3	
98-82-8	Cumene	**240**	57	**48**	12	
80-56-8	alpha-Pinene	**1,300**	57	**220**	10	
103-65-1	n-Propylbenzene	**240**	57	**48**	12	
622-96-8	4-Ethyltoluene	**91**	57	**19**	12	
108-67-8	1,3,5-Trimethylbenzene	**520**	57	**110**	12	
95-63-6	1,2,4-Trimethylbenzene	**920**	57	**190**	12	
100-44-7	Benzyl Chloride	ND	57	ND	11	
541-73-1	1,3-Dichlorobenzene	ND	57	ND	9.5	
106-46-7	1,4-Dichlorobenzene	ND	57	ND	9.5	
95-50-1	1,2-Dichlorobenzene	**76**	57	**13**	9.5	
5989-27-5	d-Limonene	**90**	57	**16**	10	
96-12-8	1,2-Dibromo-3-chloropropane	ND	57	ND	5.9	
120-82-1	1,2,4-Trichlorobenzene	ND	57	ND	7.7	
91-20-3	Naphthalene	ND	57	ND	11	
87-68-3	Hexachlorobutadiene	ND	57	ND	5.4	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

Client: **Landau Associates,Inc.**

Client Sample ID: **Method Blank** ALS Project ID: P1700001

Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P170104-MB

Test Code: EPA TO-15 Modified Date Collected: NA

Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: NA

Analyst: Cory Lewis Date Analyzed: 1/4/17

Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 1.00 Liter(s)

Test Notes:

Canister Dilution Factor: 1.00

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
115-07-1	Propene	ND	0.50	ND	0.29	
75-71-8	Dichlorodifluoromethane (CFC 12)	ND	0.50	ND	0.10	
74-87-3	Chloromethane	ND	0.50	ND	0.24	
76-14-2	1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)	ND	0.50	ND	0.072	
75-01-4	Vinyl Chloride	ND	0.50	ND	0.20	
106-99-0	1,3-Butadiene	ND	0.50	ND	0.23	
74-83-9	Bromomethane	ND	0.50	ND	0.13	
75-00-3	Chloroethane	ND	0.50	ND	0.19	
64-17-5	Ethanol	ND	5.0	ND	2.7	
75-05-8	Acetonitrile	ND	0.50	ND	0.30	
107-02-8	Acrolein	ND	2.0	ND	0.87	
67-64-1	Acetone	ND	5.0	ND	2.1	
75-69-4	Trichlorofluoromethane	ND	0.50	ND	0.089	
67-63-0	2-Propanol (Isopropyl Alcohol)	ND	5.0	ND	2.0	
107-13-1	Acrylonitrile	ND	0.50	ND	0.23	
75-35-4	1,1-Dichloroethene	ND	0.50	ND	0.13	
75-09-2	Methylene Chloride	ND	0.50	ND	0.14	
107-05-1	3-Chloro-1-propene (Allyl Chloride)	ND	0.50	ND	0.16	
76-13-1	Trichlorotrifluoroethane	ND	0.50	ND	0.065	
75-15-0	Carbon Disulfide	ND	5.0	ND	1.6	
156-60-5	trans-1,2-Dichloroethene	ND	0.50	ND	0.13	
75-34-3	1,1-Dichloroethane	ND	0.50	ND	0.12	
1634-04-4	Methyl tert-Butyl Ether	ND	0.50	ND	0.14	
108-05-4	Vinyl Acetate	ND	5.0	ND	1.4	
78-93-3	2-Butanone (MEK)	ND	5.0	ND	1.7	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

Client: **Landau Associates,Inc.**

Client Sample ID: **Method Blank** ALS Project ID: P1700001

Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P170104-MB

Test Code: EPA TO-15 Modified Date Collected: NA

Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: NA

Analyst: Cory Lewis Date Analyzed: 1/4/17

Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 1.00 Liter(s)

Test Notes:

Canister Dilution Factor: 1.00

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
156-59-2	cis-1,2-Dichloroethene	ND	0.50	ND	0.13	
141-78-6	Ethyl Acetate	ND	1.0	ND	0.28	
110-54-3	n-Hexane	ND	0.50	ND	0.14	
67-66-3	Chloroform	ND	0.50	ND	0.10	
109-99-9	Tetrahydrofuran (THF)	ND	0.50	ND	0.17	
107-06-2	1,2-Dichloroethane	ND	0.50	ND	0.12	
71-55-6	1,1,1-Trichloroethane	ND	0.50	ND	0.092	
71-43-2	Benzene	ND	0.50	ND	0.16	
56-23-5	Carbon Tetrachloride	ND	0.50	ND	0.080	
110-82-7	Cyclohexane	ND	1.0	ND	0.29	
78-87-5	1,2-Dichloropropane	ND	0.50	ND	0.11	
75-27-4	Bromodichloromethane	ND	0.50	ND	0.075	
79-01-6	Trichloroethene	ND	0.50	ND	0.093	
123-91-1	1,4-Dioxane	ND	0.50	ND	0.14	
80-62-6	Methyl Methacrylate	ND	1.0	ND	0.24	
142-82-5	n-Heptane	ND	0.50	ND	0.12	
10061-01-5	cis-1,3-Dichloropropene	ND	0.50	ND	0.11	
108-10-1	4-Methyl-2-pentanone	ND	0.50	ND	0.12	
10061-02-6	trans-1,3-Dichloropropene	ND	0.50	ND	0.11	
79-00-5	1,1,2-Trichloroethane	ND	0.50	ND	0.092	
108-88-3	Toluene	ND	0.50	ND	0.13	
591-78-6	2-Hexanone	ND	0.50	ND	0.12	
124-48-1	Dibromochloromethane	ND	0.50	ND	0.059	
106-93-4	1,2-Dibromoethane	ND	0.50	ND	0.065	
123-86-4	n-Butyl Acetate	ND	0.50	ND	0.11	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

Client: **Landau Associates,Inc.**

Client Sample ID: **Method Blank** ALS Project ID: P1700001

Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P170104-MB

Test Code:	EPA TO-15 Modified	Date Collected:	NA
Instrument ID:	Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16	Date Received:	NA
Analyst:	Cory Lewis	Date Analyzed:	1/4/17
Sample Type:	6.0 L Silonite Canister	Volume(s) Analyzed:	1.00 Liter(s)
Test Notes:			

Canister Dilution Factor: 1.00

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
111-65-9	n-Octane	ND	0.50	ND	0.11	
127-18-4	Tetrachloroethene	ND	0.50	ND	0.074	
108-90-7	Chlorobenzene	ND	0.50	ND	0.11	
100-41-4	Ethylbenzene	ND	0.50	ND	0.12	
179601-23-1	m,p-Xylenes	ND	1.0	ND	0.23	
75-25-2	Bromoform	ND	0.50	ND	0.048	
100-42-5	Styrene	ND	0.50	ND	0.12	
95-47-6	o-Xylene	ND	0.50	ND	0.12	
111-84-2	n-Nonane	ND	0.50	ND	0.095	
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.50	ND	0.073	
98-82-8	Cumene	ND	0.50	ND	0.10	
80-56-8	alpha-Pinene	ND	0.50	ND	0.090	
103-65-1	n-Propylbenzene	ND	0.50	ND	0.10	
622-96-8	4-Ethyltoluene	ND	0.50	ND	0.10	
108-67-8	1,3,5-Trimethylbenzene	ND	0.50	ND	0.10	
95-63-6	1,2,4-Trimethylbenzene	ND	0.50	ND	0.10	
100-44-7	Benzyl Chloride	ND	0.50	ND	0.097	
541-73-1	1,3-Dichlorobenzene	ND	0.50	ND	0.083	
106-46-7	1,4-Dichlorobenzene	ND	0.50	ND	0.083	
95-50-1	1,2-Dichlorobenzene	ND	0.50	ND	0.083	
5989-27-5	d-Limonene	ND	0.50	ND	0.090	
96-12-8	1,2-Dibromo-3-chloropropane	ND	0.50	ND	0.052	
120-82-1	1,2,4-Trichlorobenzene	ND	0.50	ND	0.067	
91-20-3	Naphthalene	ND	0.50	ND	0.095	
87-68-3	Hexachlorobutadiene	ND	0.50	ND	0.047	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

Client: **Landau Associates,Inc.**

Client Sample ID: **Method Blank** ALS Project ID: P1700001

Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P170104-MB

Test Code: EPA TO-15 Modified Date Collected: NA

Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: NA

Analyst: Lusine Hakobyan Date Analyzed: 1/4/17

Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 1.00 Liter(s)

Test Notes:

Canister Dilution Factor: 1.00

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
115-07-1	Propene	ND	0.50	ND	0.29	
75-71-8	Dichlorodifluoromethane (CFC 12)	ND	0.50	ND	0.10	
74-87-3	Chloromethane	ND	0.50	ND	0.24	
76-14-2	1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)	ND	0.50	ND	0.072	
75-01-4	Vinyl Chloride	ND	0.50	ND	0.20	
106-99-0	1,3-Butadiene	ND	0.50	ND	0.23	
74-83-9	Bromomethane	ND	0.50	ND	0.13	
75-00-3	Chloroethane	ND	0.50	ND	0.19	
64-17-5	Ethanol	ND	5.0	ND	2.7	
75-05-8	Acetonitrile	ND	0.50	ND	0.30	
107-02-8	Acrolein	ND	2.0	ND	0.87	
67-64-1	Acetone	ND	5.0	ND	2.1	
75-69-4	Trichlorofluoromethane	ND	0.50	ND	0.089	
67-63-0	2-Propanol (Isopropyl Alcohol)	ND	5.0	ND	2.0	
107-13-1	Acrylonitrile	ND	0.50	ND	0.23	
75-35-4	1,1-Dichloroethene	ND	0.50	ND	0.13	
75-09-2	Methylene Chloride	ND	0.50	ND	0.14	
107-05-1	3-Chloro-1-propene (Allyl Chloride)	ND	0.50	ND	0.16	
76-13-1	Trichlorotrifluoroethane	ND	0.50	ND	0.065	
75-15-0	Carbon Disulfide	ND	5.0	ND	1.6	
156-60-5	trans-1,2-Dichloroethene	ND	0.50	ND	0.13	
75-34-3	1,1-Dichloroethane	ND	0.50	ND	0.12	
1634-04-4	Methyl tert-Butyl Ether	ND	0.50	ND	0.14	
108-05-4	Vinyl Acetate	ND	5.0	ND	1.4	
78-93-3	2-Butanone (MEK)	ND	5.0	ND	1.7	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

Client: **Landau Associates,Inc.**

Client Sample ID: **Method Blank** ALS Project ID: P1700001

Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P170104-MB

Test Code: EPA TO-15 Modified Date Collected: NA

Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: NA

Analyst: Lusine Hakobyan Date Analyzed: 1/4/17

Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 1.00 Liter(s)

Test Notes:

Canister Dilution Factor: 1.00

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
156-59-2	cis-1,2-Dichloroethene	ND	0.50	ND	0.13	
141-78-6	Ethyl Acetate	ND	1.0	ND	0.28	
110-54-3	n-Hexane	ND	0.50	ND	0.14	
67-66-3	Chloroform	ND	0.50	ND	0.10	
109-99-9	Tetrahydrofuran (THF)	ND	0.50	ND	0.17	
107-06-2	1,2-Dichloroethane	ND	0.50	ND	0.12	
71-55-6	1,1,1-Trichloroethane	ND	0.50	ND	0.092	
71-43-2	Benzene	ND	0.50	ND	0.16	
56-23-5	Carbon Tetrachloride	ND	0.50	ND	0.080	
110-82-7	Cyclohexane	ND	1.0	ND	0.29	
78-87-5	1,2-Dichloropropane	ND	0.50	ND	0.11	
75-27-4	Bromodichloromethane	ND	0.50	ND	0.075	
79-01-6	Trichloroethene	ND	0.50	ND	0.093	
123-91-1	1,4-Dioxane	ND	0.50	ND	0.14	
80-62-6	Methyl Methacrylate	ND	1.0	ND	0.24	
142-82-5	n-Heptane	ND	0.50	ND	0.12	
10061-01-5	cis-1,3-Dichloropropene	ND	0.50	ND	0.11	
108-10-1	4-Methyl-2-pentanone	ND	0.50	ND	0.12	
10061-02-6	trans-1,3-Dichloropropene	ND	0.50	ND	0.11	
79-00-5	1,1,2-Trichloroethane	ND	0.50	ND	0.092	
108-88-3	Toluene	ND	0.50	ND	0.13	
591-78-6	2-Hexanone	ND	0.50	ND	0.12	
124-48-1	Dibromochloromethane	ND	0.50	ND	0.059	
106-93-4	1,2-Dibromoethane	ND	0.50	ND	0.065	
123-86-4	n-Butyl Acetate	ND	0.50	ND	0.11	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

Client: **Landau Associates,Inc.**

Client Sample ID: **Method Blank** ALS Project ID: P1700001

Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P170104-MB

Test Code: EPA TO-15 Modified Date Collected: NA

Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: NA

Analyst: Lusine Hakobyan Date Analyzed: 1/4/17

Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 1.00 Liter(s)

Test Notes:

Canister Dilution Factor: 1.00

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
111-65-9	n-Octane	ND	0.50	ND	0.11	
127-18-4	Tetrachloroethene	ND	0.50	ND	0.074	
108-90-7	Chlorobenzene	ND	0.50	ND	0.11	
100-41-4	Ethylbenzene	ND	0.50	ND	0.12	
179601-23-1	m,p-Xylenes	ND	1.0	ND	0.23	
75-25-2	Bromoform	ND	0.50	ND	0.048	
100-42-5	Styrene	ND	0.50	ND	0.12	
95-47-6	o-Xylene	ND	0.50	ND	0.12	
111-84-2	n-Nonane	ND	0.50	ND	0.095	
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.50	ND	0.073	
98-82-8	Cumene	ND	0.50	ND	0.10	
80-56-8	alpha-Pinene	ND	0.50	ND	0.090	
103-65-1	n-Propylbenzene	ND	0.50	ND	0.10	
622-96-8	4-Ethyltoluene	ND	0.50	ND	0.10	
108-67-8	1,3,5-Trimethylbenzene	ND	0.50	ND	0.10	
95-63-6	1,2,4-Trimethylbenzene	ND	0.50	ND	0.10	
100-44-7	Benzyl Chloride	ND	0.50	ND	0.097	
541-73-1	1,3-Dichlorobenzene	ND	0.50	ND	0.083	
106-46-7	1,4-Dichlorobenzene	ND	0.50	ND	0.083	
95-50-1	1,2-Dichlorobenzene	ND	0.50	ND	0.083	
5989-27-5	d-Limonene	ND	0.50	ND	0.090	
96-12-8	1,2-Dibromo-3-chloropropane	ND	0.50	ND	0.052	
120-82-1	1,2,4-Trichlorobenzene	ND	0.50	ND	0.067	
91-20-3	Naphthalene	ND	0.50	ND	0.095	
87-68-3	Hexachlorobutadiene	ND	0.50	ND	0.047	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

SURROGATE SPIKE RECOVERY RESULTS

Client: **Landau Associates,Inc.**
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Project ID: P1700001

Test Code: EPA TO-15 Modified
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date(s) Collected: 12/29/16
Analyst: Cory Lewis Date(s) Received: 1/3/17
Sample Type: 6.0 L Silonite Canister(s) Date(s) Analyzed: 1/4 - 1/5/17
Test Notes:

Client Sample ID	ALS Sample ID	1,2-Dichloroethane-d4 Percent Recovered	Toluene-d8 Percent Recovered	Bromofluorobenzene Percent Recovered	Acceptance Limits	Data Qualifier
Method Blank	P170104-MB	**105**	**100**	**91**	70-130	
Method Blank	P170104-MB	**106**	**98**	**93**	70-130	
Lab Control Sample	P170104-LCS	**102**	**97**	**94**	70-130	
Lab Control Sample	P170104-LCS	**106**	**96**	**95**	70-130	
Ambient-12292016	P1700001-001	**107**	**97**	**91**	70-130	
GP-38-12292016	P1700001-002	**105**	**73**	**84**	70-130	
GP-39-12292016	P1700001-003	**105**	**85**	**94**	70-130	
GP-43-12292016	P1700001-004	**106**	**86**	**91**	70-130	
GP-41-12292016	P1700001-005	**108**	**89**	**96**	70-130	

Surrogate percent recovery is verified and accepted based on the on-column result.
Reported results are shown in concentration units and as a result of the calculation, may vary slightly from the on-column percent recovery.

ALS ENVIRONMENTAL

LABORATORY CONTROL SAMPLE SUMMARY

Client: **Landau Associates,Inc.**
Client Sample ID: **Lab Control Sample** ALS Project ID: P1700001
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P170104-LCS

Test Code: EPA TO-15 Modified Date Collected: NA
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: NA
Analyst: Cory Lewis Date Analyzed: 1/4/17
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.125 Liter(s)
Test Notes:

CAS #	Compound	Spike Amount µg/m³	Result µg/m³	% Recovery	ALS Acceptance Limits	Data Qualifier
115-07-1	Propene	210	**191**	**91**	52-127	
75-71-8	Dichlorodifluoromethane (CFC 12)	210	**188**	**90**	68-109	
74-87-3	Chloromethane	210	**180**	**86**	51-130	
76-14-2	1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)	211	**177**	**84**	66-114	
75-01-4	Vinyl Chloride	210	**215**	**102**	61-125	
106-99-0	1,3-Butadiene	210	**231**	**110**	62-144	
74-83-9	Bromomethane	210	**193**	**92**	73-123	
75-00-3	Chloroethane	210	**206**	**98**	69-122	
64-17-5	Ethanol	1,060	**1050**	**99**	62-124	
75-05-8	Acetonitrile	213	**212**	**100**	57-114	
107-02-8	Acrolein	212	**182**	**86**	62-116	
67-64-1	Acetone	1,060	**1040**	**98**	57-117	
75-69-4	Trichlorofluoromethane	210	**182**	**87**	63-98	
67-63-0	2-Propanol (Isopropyl Alcohol)	424	**427**	**101**	66-121	
107-13-1	Acrylonitrile	213	**209**	**98**	68-123	
75-35-4	1,1-Dichloroethene	213	**198**	**93**	76-118	
75-09-2	Methylene Chloride	212	**199**	**94**	60-118	
107-05-1	3-Chloro-1-propene (Allyl Chloride)	212	**217**	**102**	65-126	
76-13-1	Trichlorotrifluoroethane	212	**180**	**85**	73-114	
75-15-0	Carbon Disulfide	213	**206**	**97**	57-102	
156-60-5	trans-1,2-Dichloroethene	213	**204**	**96**	74-123	
75-34-3	1,1-Dichloroethane	212	**199**	**94**	69-111	
1634-04-4	Methyl tert-Butyl Ether	213	**191**	**90**	69-113	
108-05-4	Vinyl Acetate	1,060	**1190**	**112**	76-128	
78-93-3	2-Butanone (MEK)	212	**211**	**100**	63-127	

Laboratory Control Sample percent recovery is verified and accepted based on the on-column result.
Reported results are shown in concentration units and as a result of the calculation, may vary slightly.

Client: **Landau Associates,Inc.**
Client Sample ID: **Lab Control Sample** ALS Project ID: P1700001
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P170104-LCS

Test Code: EPA TO-15 Modified Date Collected: NA
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: NA
Analyst: Cory Lewis Date Analyzed: 1/4/17
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.125 Liter(s)
Test Notes:

CAS #	Compound	Spike Amount µg/m³	**Result µg/m³**	**% Recovery**	ALS Acceptance Limits	**Data Qualifier**
156-59-2	cis-1,2-Dichloroethene	212	**202**	**95**	72-117	
141-78-6	Ethyl Acetate	426	**479**	**112**	68-127	
110-54-3	n-Hexane	213	**228**	**107**	55-116	
67-66-3	Chloroform	212	**192**	**91**	70-109	
109-99-9	Tetrahydrofuran (THF)	213	**195**	**92**	72-113	
107-06-2	1,2-Dichloroethane	212	**193**	**91**	69-113	
71-55-6	1,1,1-Trichloroethane	212	**188**	**89**	72-115	
71-43-2	Benzene	212	**194**	**92**	65-107	
56-23-5	Carbon Tetrachloride	213	**193**	**91**	71-113	
110-82-7	Cyclohexane	425	**409**	**96**	71-115	
78-87-5	1,2-Dichloropropane	212	**200**	**94**	71-115	
75-27-4	Bromodichloromethane	214	**206**	**96**	75-118	
79-01-6	Trichloroethene	212	**187**	**88**	68-114	
123-91-1	1,4-Dioxane	213	**208**	**98**	81-131	
80-62-6	Methyl Methacrylate	424	**419**	**99**	72-130	
142-82-5	n-Heptane	213	**205**	**96**	68-116	
10061-01-5	cis-1,3-Dichloropropene	210	**213**	**101**	77-126	
108-10-1	4-Methyl-2-pentanone	213	**214**	**100**	69-126	
10061-02-6	trans-1,3-Dichloropropene	213	**215**	**101**	79-125	
79-00-5	1,1,2-Trichloroethane	212	**198**	**93**	75-119	
108-88-3	Toluene	212	**185**	**87**	59-118	
591-78-6	2-Hexanone	213	**208**	**98**	69-129	
124-48-1	Dibromochloromethane	213	**193**	**91**	74-136	
106-93-4	1,2-Dibromoethane	212	**190**	**90**	73-131	
123-86-4	n-Butyl Acetate	216	**215**	**100**	69-130	

Laboratory Control Sample percent recovery is verified and accepted based on the on-column result.
Reported results are shown in concentration units and as a result of the calculation, may vary slightly.

Client: **Landau Associates,Inc.**
Client Sample ID: **Lab Control Sample** ALS Project ID: P1700001
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P170104-LCS

Test Code: EPA TO-15 Modified Date Collected: NA
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: NA
Analyst: Cory Lewis Date Analyzed: 1/4/17
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.125 Liter(s)
Test Notes:

CAS #	Compound	Spike Amount µg/m³	**Result µg/m³**	**% Recovery**	ALS Acceptance Limits	**Data Qualifier**
111-65-9	n-Octane	212	**202**	**95**	66-120	
127-18-4	Tetrachloroethene	213	**179**	**84**	65-130	
108-90-7	Chlorobenzene	212	**184**	**87**	68-120	
100-41-4	Ethylbenzene	212	**197**	**93**	68-122	
179601-23-1	m,p-Xylenes	424	**409**	**96**	68-123	
75-25-2	Bromoform	212	**201**	**95**	69-130	
100-42-5	Styrene	212	**199**	**94**	71-133	
95-47-6	o-Xylene	212	**201**	**95**	68-122	
111-84-2	n-Nonane	212	**206**	**97**	65-120	
79-34-5	1,1,2,2-Tetrachloroethane	212	**223**	**105**	69-130	
98-82-8	Cumene	212	**193**	**91**	70-123	
80-56-8	alpha-Pinene	213	**199**	**93**	70-128	
103-65-1	n-Propylbenzene	214	**208**	**97**	69-125	
622-96-8	4-Ethyltoluene	212	**214**	**101**	67-130	
108-67-8	1,3,5-Trimethylbenzene	212	**196**	**92**	67-124	
95-63-6	1,2,4-Trimethylbenzene	212	**227**	**107**	67-129	
100-44-7	Benzyl Chloride	212	**245**	**116**	79-138	
541-73-1	1,3-Dichlorobenzene	212	**233**	**110**	65-136	
106-46-7	1,4-Dichlorobenzene	213	**192**	**90**	66-141	
95-50-1	1,2-Dichlorobenzene	212	**211**	**100**	67-136	
5989-27-5	d-Limonene	212	**238**	**112**	71-134	
96-12-8	1,2-Dibromo-3-chloropropane	212	**212**	**100**	73-136	
120-82-1	1,2,4-Trichlorobenzene	212	**231**	**109**	64-134	
91-20-3	Naphthalene	214	**241**	**113**	62-136	
87-68-3	Hexachlorobutadiene	213	**199**	**93**	60-133	

Laboratory Control Sample percent recovery is verified and accepted based on the on-column result.
Reported results are shown in concentration units and as a result of the calculation, may vary slightly.

ALS ENVIRONMENTAL

LABORATORY CONTROL SAMPLE SUMMARY

Client: **Landau Associates,Inc.**
Client Sample ID: **Lab Control Sample** ALS Project ID: P1700001
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P170104-LCS

Test Code: EPA TO-15 Modified Date Collected: NA
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: NA
Analyst: Lusine Hakobyan Date Analyzed: 1/4/17
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.125 Liter(s)
Test Notes:

CAS #	Compound	Spike Amount µg/m³	Result µg/m³	% Recovery	ALS Acceptance Limits	Data Qualifier
115-07-1	Propene	210	**193**	**92**	52-127	
75-71-8	Dichlorodifluoromethane (CFC 12)	210	**189**	**90**	68-109	
74-87-3	Chloromethane	210	**173**	**82**	51-130	
76-14-2	1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)	211	**174**	**82**	66-114	
75-01-4	Vinyl Chloride	210	**213**	**101**	61-125	
106-99-0	1,3-Butadiene	210	**221**	**105**	62-144	
74-83-9	Bromomethane	210	**199**	**95**	73-123	
75-00-3	Chloroethane	210	**209**	**100**	69-122	
64-17-5	Ethanol	1,060	**1060**	**100**	62-124	
75-05-8	Acetonitrile	213	**216**	**101**	57-114	
107-02-8	Acrolein	212	**188**	**89**	62-116	
67-64-1	Acetone	1,060	**1050**	**99**	57-117	
75-69-4	Trichlorofluoromethane	210	**184**	**88**	63-98	
67-63-0	2-Propanol (Isopropyl Alcohol)	424	**430**	**101**	66-121	
107-13-1	Acrylonitrile	213	**209**	**98**	68-123	
75-35-4	1,1-Dichloroethene	213	**199**	**93**	76-118	
75-09-2	Methylene Chloride	212	**196**	**92**	60-118	
107-05-1	3-Chloro-1-propene (Allyl Chloride)	212	**219**	**103**	65-126	
76-13-1	Trichlorotrifluoroethane	212	**180**	**85**	73-114	
75-15-0	Carbon Disulfide	213	**205**	**96**	57-102	
156-60-5	trans-1,2-Dichloroethene	213	**208**	**98**	74-123	
75-34-3	1,1-Dichloroethane	212	**201**	**95**	69-111	
1634-04-4	Methyl tert-Butyl Ether	213	**193**	**91**	69-113	
108-05-4	Vinyl Acetate	1,060	**1130**	**107**	76-128	
78-93-3	2-Butanone (MEK)	212	**207**	**98**	63-127	

Laboratory Control Sample percent recovery is verified and accepted based on the on-column result.
Reported results are shown in concentration units and as a result of the calculation, may vary slightly.

Client: **Landau Associates,Inc.**
Client Sample ID: **Lab Control Sample** ALS Project ID: P1700001
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P170104-LCS

Test Code: EPA TO-15 Modified Date Collected: NA
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: NA
Analyst: Lusine Hakobyan Date Analyzed: 1/4/17
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.125 Liter(s)
Test Notes:

CAS #	Compound	Spike Amount µg/m³	**Result µg/m³**	**% Recovery**	ALS Acceptance Limits	**Data Qualifier**
156-59-2	cis-1,2-Dichloroethene	212	**204**	**96**	72-117	
141-78-6	Ethyl Acetate	426	**473**	**111**	68-127	
110-54-3	n-Hexane	213	**226**	**106**	55-116	
67-66-3	Chloroform	212	**193**	**91**	70-109	
109-99-9	Tetrahydrofuran (THF)	213	**194**	**91**	72-113	
107-06-2	1,2-Dichloroethane	212	**197**	**93**	69-113	
71-55-6	1,1,1-Trichloroethane	212	**187**	**88**	72-115	
71-43-2	Benzene	212	**188**	**89**	65-107	
56-23-5	Carbon Tetrachloride	213	**192**	**90**	71-113	
110-82-7	Cyclohexane	425	**398**	**94**	71-115	
78-87-5	1,2-Dichloropropane	212	**198**	**93**	71-115	
75-27-4	Bromodichloromethane	214	**203**	**95**	75-118	
79-01-6	Trichloroethene	212	**183**	**86**	68-114	
123-91-1	1,4-Dioxane	213	**204**	**96**	81-131	
80-62-6	Methyl Methacrylate	424	**405**	**96**	72-130	
142-82-5	n-Heptane	213	**201**	**94**	68-116	
10061-01-5	cis-1,3-Dichloropropene	210	**210**	**100**	77-126	
108-10-1	4-Methyl-2-pentanone	213	**210**	**99**	69-126	
10061-02-6	trans-1,3-Dichloropropene	213	**214**	**100**	79-125	
79-00-5	1,1,2-Trichloroethane	212	**193**	**91**	75-119	
108-88-3	Toluene	212	**175**	**83**	59-118	
591-78-6	2-Hexanone	213	**198**	**93**	69-129	
124-48-1	Dibromochloromethane	213	**185**	**87**	74-136	
106-93-4	1,2-Dibromoethane	212	**181**	**85**	73-131	
123-86-4	n-Butyl Acetate	216	**206**	**95**	69-130	

Laboratory Control Sample percent recovery is verified and accepted based on the on-column result.
Reported results are shown in concentration units and as a result of the calculation, may vary slightly.

Client: **Landau Associates,Inc.**
Client Sample ID: **Lab Control Sample** ALS Project ID: P1700001
Client Project ID: **Transportation Corridor Investigation / 1148009.010.014** ALS Sample ID: P170104-LCS

Test Code: EPA TO-15 Modified Date Collected: NA
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: NA
Analyst: Lusine Hakobyan Date Analyzed: 1/4/17
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 0.125 Liter(s)
Test Notes:

CAS #	Compound	Spike Amount µg/m³	**Result µg/m³**	**% Recovery**	ALS Acceptance Limits	**Data Qualifier**
111-65-9	n-Octane	212	**195**	**92**	66-120	
127-18-4	Tetrachloroethene	213	**171**	**80**	65-130	
108-90-7	Chlorobenzene	212	**175**	**83**	68-120	
100-41-4	Ethylbenzene	212	**186**	**88**	68-122	
179601-23-1	m,p-Xylenes	424	**384**	**91**	68-123	
75-25-2	Bromoform	212	**191**	**90**	69-130	
100-42-5	Styrene	212	**187**	**88**	71-133	
95-47-6	o-Xylene	212	**190**	**90**	68-122	
111-84-2	n-Nonane	212	**196**	**92**	65-120	
79-34-5	1,1,2,2-Tetrachloroethane	212	**208**	**98**	69-130	
98-82-8	Cumene	212	**182**	**86**	70-123	
80-56-8	alpha-Pinene	213	**188**	**88**	70-128	
103-65-1	n-Propylbenzene	214	**194**	**91**	69-125	
622-96-8	4-Ethyltoluene	212	**199**	**94**	67-130	
108-67-8	1,3,5-Trimethylbenzene	212	**183**	**86**	67-124	
95-63-6	1,2,4-Trimethylbenzene	212	**209**	**99**	67-129	
100-44-7	Benzyl Chloride	212	**230**	**108**	79-138	
541-73-1	1,3-Dichlorobenzene	212	**215**	**101**	65-136	
106-46-7	1,4-Dichlorobenzene	213	**178**	**84**	66-141	
95-50-1	1,2-Dichlorobenzene	212	**193**	**91**	67-136	
5989-27-5	d-Limonene	212	**221**	**104**	71-134	
96-12-8	1,2-Dibromo-3-chloropropane	212	**200**	**94**	73-136	
120-82-1	1,2,4-Trichlorobenzene	212	**219**	**103**	64-134	
91-20-3	Naphthalene	214	**226**	**106**	62-136	
87-68-3	Hexachlorobutadiene	213	**191**	**90**	60-133	

Laboratory Control Sample percent recovery is verified and accepted based on the on-column result.
Reported results are shown in concentration units and as a result of the calculation, may vary slightly.