

## Module 1 Lesson 5 – Conducting Undesirable Event Inspections

### EXERCISE 3 – Reviewing Sample Results

#### **Scenario:**

- The operator had oil leak from a tank located on the well site. It was reported timely, but now we are at the point of confirmation soil sampling. The operator excavated a 6-foot-deep pit where the tank was located. The operator collected a composite sample from the pit bottom and 8 other composite samples from the pit walls (2 composite samples per wall). Each wall had two composite samples collected (above 3 feet deep and below 3 feet deep). The lab report for these samples and a sample map was submit to the BLM through a Sundry Notice – Subsequent Report.

#### **Instructions:**

- Read and review the sample map.
- Read and review the lab report for the oil spill.
- Compare the results to the state standards at Table 910-1 (last page).
- Determine if any compounds are higher the state standards.
- Determine what the operator should do based on these samples.

#### **Exercise Documents:**

- Sample Map (1 pp)
- Lab Report (14 pp)
- State Standards (1 pp)

### Sample Map

Conoco Condensate Oil Spill

#### Legend

- Composite Samples
- Pit Bottom
- Pit Wall



Google Earth



20 ft



Hall Environmental Analysis Laboratory  
4901 Hawkins NE  
Albuquerque, NM 87109  
TEL: 505-345-3975 FAX: 505-345-4107  
Website: [www.hallenvironmental.com](http://www.hallenvironmental.com)

December 20, 2016

Heather Woods  
Rule Engineering LLC  
501 Airport Dr., Ste 205  
Farmington, NM 87401  
TEL: (505) 325-1055  
FAX

RE: Ute 80-15

OrderNo.: 1611797

Dear Heather Woods:

Hall Environmental Analysis Laboratory received 9 sample(s) on 11/16/2016 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to [www.hallenvironmental.com](http://www.hallenvironmental.com) or the state specific web sites. In order to properly interpret your results it is imperative that you review this report in its entirety. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. When necessary, data qualifiers are provided on both the sample analysis report and the QC summary report, both sections should be reviewed. All samples are reported, as received, unless otherwise indicated. Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH and residual chlorine are qualified as being analyzed outside of the recommended holding time.

Please don't hesitate to contact HEAL for any additional information or clarifications.

ADHS Cert #AZ0682 -- NMED-DWB Cert #NM9425 -- NMED-Micro Cert #NM0190

Sincerely,

A handwritten signature in black ink, appearing to read 'Andy Freeman', is written over a white background.

Andy Freeman  
Laboratory Manager  
4901 Hawkins NE  
Albuquerque, NM 87109

## Hall Environmental Analysis Laboratory, Inc.

CLIENT: Rule Engineering LLC

Client Sample ID: SS1 (Pit Bottom)

Project: Ute 80-15

Collection Date: 11/15/2016 9:30:00 AM

Lab ID: 1611797-001

Matrix: SOIL

Received Date: 11/16/2016 8:00:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>EPA METHOD 8015M/D: DIESEL RANGE ORGANICS</b>							Analyst: JME
Diesel Range Organics (DRO)	350	9.7		mg/Kg	1	11/18/2016 3:30:24 PM	28696
Motor Oil Range Organics (MRO)	ND	48		mg/Kg	1	11/18/2016 3:30:24 PM	28696
Surr: DNOP	75.1	70-130		%Rec	1	11/18/2016 3:30:24 PM	28696
<b>EPA METHOD 8015D: GASOLINE RANGE</b>							Analyst: NSB
Gasoline Range Organics (GRO)	330	24		mg/Kg	5	11/17/2016 6:15:39 PM	28715
Surr: BFB	341	68.3-144	S	%Rec	5	11/17/2016 6:15:39 PM	28715
<b>EPA METHOD 8021B: VOLATILES</b>							Analyst: NSB
Benzene	ND	0.24		mg/Kg	5	11/17/2016 6:15:39 PM	28715
Toluene	0.92	0.24		mg/Kg	5	11/17/2016 6:15:39 PM	28715
Ethylbenzene	1.2	0.24		mg/Kg	5	11/17/2016 6:15:39 PM	28715
Xylenes, Total	14	0.47		mg/Kg	5	11/17/2016 6:15:39 PM	28715
Surr: 4-Bromofluorobenzene	125	80-120	S	%Rec	5	11/17/2016 6:15:39 PM	28715

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

<b>Qualifiers:</b>	* Value exceeds Maximum Contaminant Level	B Analyte detected in the associated Method Blank
	D Sample Diluted Due to Matrix	E Value above quantitation range
	H Holding times for preparation or analysis exceeded	J Analyte detected below quantitation limits
	ND Not Detected at the Reporting Limit	P Sample pH Not In Range
	R RPD outside accepted recovery limits	RL Reporting Detection Limit
	S % Recovery outside of range due to dilution or matrix	W Sample container temperature is out of limit as specified

**Hall Environmental Analysis Laboratory, Inc.**

CLIENT: Rule Engineering LLC

Client Sample ID: SS2 (West Wall; 3-6 ft.)

Project: Ute 80-15

Collection Date: 11/15/2016 9:45:00 AM

Lab ID: 1611797-002

Matrix: SOIL

Received Date: 11/16/2016 8:00:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>EPA METHOD 8015M/D: DIESEL RANGE ORGANICS</b>							Analyst: JME
Diesel Range Organics (DRO)	620	9.6		mg/Kg	1	11/18/2016 3:57:21 PM	28696
Motor Oil Range Organics (MRO)	ND	48		mg/Kg	1	11/18/2016 3:57:21 PM	28696
Surr: DNOP	76.8	70-130		%Rec	1	11/18/2016 3:57:21 PM	28696
<b>EPA METHOD 8015D: GASOLINE RANGE</b>							Analyst: NSB
Gasoline Range Organics (GRO)	630	49		mg/Kg	10	11/17/2016 6:39:11 PM	28715
Surr: BFB	285	68.3-144	S	%Rec	10	11/17/2016 6:39:11 PM	28715
<b>EPA METHOD 8021B: VOLATILES</b>							Analyst: NSB
Benzene	ND	0.24		mg/Kg	10	11/17/2016 6:39:11 PM	28715
Toluene	2.9	0.49		mg/Kg	10	11/17/2016 6:39:11 PM	28715
Ethylbenzene	2.2	0.49		mg/Kg	10	11/17/2016 6:39:11 PM	28715
Xylenes, Total	35	0.97		mg/Kg	10	11/17/2016 6:39:11 PM	28715
Surr: 4-Bromofluorobenzene	125	80-120	S	%Rec	10	11/17/2016 6:39:11 PM	28715

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

<b>Qualifiers:</b>	* Value exceeds Maximum Contaminant Level	B Analyte detected in the associated Method Blank
	D Sample Diluted Due to Matrix	E Value above quantitation range
	H Holding times for preparation or analysis exceeded	J Analyte detected below quantitation limits
	ND Not Detected at the Reporting Limit	P Sample pH Not In Range
	R RPD outside accepted recovery limits	RL Reporting Detection Limit
	S % Recovery outside of range due to dilution or matrix	W Sample container temperature is out of limit as specified

## Hall Environmental Analysis Laboratory, Inc.

CLIENT: Rule Engineering LLC

Client Sample ID: SS3 (North Wall; 3-6 ft.)

Project: Ute 80-15

Collection Date: 11/15/2016 10:00:00 AM

Lab ID: 1611797-003

Matrix: SOIL

Received Date: 11/16/2016 8:00:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>EPA METHOD 8015M/D: DIESEL RANGE ORGANICS</b>							Analyst: TOM
Diesel Range Organics (DRO)	3000	93		mg/Kg	10	11/22/2016 2:15:04 PM	28696
Motor Oil Range Organics (MRO)	ND	470		mg/Kg	10	11/22/2016 2:15:04 PM	28696
Surr: DNOP	0	70-130	S	%Rec	10	11/22/2016 2:15:04 PM	28696
<b>EPA METHOD 8015D: GASOLINE RANGE</b>							Analyst: NSB
Gasoline Range Organics (GRO)	3000	490		mg/Kg	100	11/17/2016 7:02:41 PM	28715
Surr: BFB	147	68.3-144	S	%Rec	100	11/17/2016 7:02:41 PM	28715
<b>EPA METHOD 8021B: VOLATILES</b>							Analyst: NSB
Benzene	ND	2.4		mg/Kg	100	11/17/2016 7:02:41 PM	28715
Toluene	55	4.9		mg/Kg	100	11/17/2016 7:02:41 PM	28715
Ethylbenzene	16	4.9		mg/Kg	100	11/17/2016 7:02:41 PM	28715
Xylenes, Total	250	9.8		mg/Kg	100	11/17/2016 7:02:41 PM	28715
Surr: 4-Bromofluorobenzene	116	80-120		%Rec	100	11/17/2016 7:02:41 PM	28715

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:	* Value exceeds Maximum Contaminant Level	B Analyte detected in the associated Method Blank
	D Sample Diluted Due to Matrix	E Value above quantitation range
	H Holding times for preparation or analysis exceeded	J Analyte detected below quantitation limits
	ND Not Detected at the Reporting Limit	P Sample pH Not In Range
	R RPD outside accepted recovery limits	RI Reporting Detection Limit
	S % Recovery outside of range due to dilution or matrix	W Sample container temperature is out of limit as specified

**Hall Environmental Analysis Laboratory, Inc.**

CLIENT: Rule Engineering LLC

Client Sample ID: SS4 (East Wall; 3-6 ft.)

Project: Ute 80-15

Collection Date: 11/15/2016 10:30:00 AM

Lab ID: 1611797-005

Matrix: SOIL

Received Date: 11/16/2016 8:00:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>EPA METHOD 8015M/D: DIESEL RANGE ORGANICS</b>							Analyst: JME
Diesel Range Organics (DRO)	270	9.4		mg/Kg	1	11/18/2016 5:17:51 PM	28696
Motor Oil Range Organics (MRO)	ND	47		mg/Kg	1	11/18/2016 5:17:51 PM	28696
Surr: DNOP	70.5	70.130		%Rec	1	11/18/2016 5:17:51 PM	28696
<b>EPA METHOD 8015D: GASOLINE RANGE</b>							Analyst: NSB
Gasoline Range Organics (GRO)	250	4.9		mg/Kg	1	11/17/2016 7:49:39 PM	28715
Surr: BFB	826	68.3-144	S	%Rec	1	11/17/2016 7:49:39 PM	28715
<b>EPA METHOD 8021B: VOLATILES</b>							Analyst: NSB
Benzene	0.087	0.025		mg/Kg	1	11/17/2016 7:49:39 PM	28715
Toluene	2.3	0.049		mg/Kg	1	11/17/2016 7:49:39 PM	28715
Ethylbenzene	1.0	0.049		mg/Kg	1	11/17/2016 7:49:39 PM	28715
Xylenes, Total	15	0.99		mg/Kg	10	11/18/2016 8:26:34 PM	28715
Surr: 4-Bromofluorobenzene	177	80-120	S	%Rec	1	11/17/2016 7:49:39 PM	28715

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

<b>Qualifiers:</b>	* Value exceeds Maximum Contaminant Level	B Analyte detected in the associated Method Blank
	D Sample Diluted Due to Matrix	E Value above quantitation range
	H Holding times for preparation or analysis exceeded	J Analyte detected below quantitation limits
	ND Not Detected at the Reporting Limit	P Sample pH Not In Range
	R RPD outside accepted recovery limits	RL Reporting Detection Limit
	S % Recovery outside of range due to dilution or matrix	W Sample container temperature is out of limit as specified

## Hall Environmental Analysis Laboratory, Inc.

CLIENT: Rule Engineering LLC

Client Sample ID: SS 5 ( South Wall; 3-6 ft.)

Project: Ute 80-15

Collection Date: 11/15/2016 11:15:00 AM

Lab ID: 1611797-008

Matrix: SOIL

Received Date: 11/16/2016 8:00:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>EPA METHOD 8015M/D: DIESEL RANGE ORGANICS</b>							Analyst: JME
Diesel Range Organics (DRO)	310	9.8		mg/Kg	1	11/18/2016 6:38:06 PM	28696
Motor Oil Range Organics (MRO)	ND	49		mg/Kg	1	11/18/2016 6:38:06 PM	28696
Surr: DNOP	72.2	70-130		%Rec	1	11/18/2016 6:38:06 PM	28696
<b>EPA METHOD 8015D: GASOLINE RANGE</b>							Analyst: NSB
Gasoline Range Organics (GRO)	410	47		mg/Kg	10	11/17/2016 10:10:36 PM	28715
Surr: BFB	195	68.3-144	S	%Rec	10	11/17/2016 10:10:36 PM	28715
<b>EPA METHOD 8021B: VOLATILES</b>							Analyst: NSB
Benzene	ND	0.24		mg/Kg	10	11/17/2016 10:10:36 PM	28715
Toluene	4.0	0.47		mg/Kg	10	11/17/2016 10:10:36 PM	28715
Ethylbenzene	1.8	0.47		mg/Kg	10	11/17/2016 10:10:36 PM	28715
Xylenes, Total	28	0.95		mg/Kg	10	11/17/2016 10:10:36 PM	28715
Surr: 4-Bromofluorobenzene	119	80-120		%Rec	10	11/17/2016 10:10:36 PM	28715

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:	* Value exceeds Maximum Contaminant Level	B Analyte detected in the associated Method Blank
	D Sample Diluted Due to Matrix	E Value above quantitation range
	H Holding times for preparation or analysis exceeded	J Analyte detected below quantitation limits
	ND Not Detected at the Reporting Limit	P Sample pH Not In Range
	R RPD outside accepted recovery limits	RL Reporting Detection Limit
	S % Recovery outside of range due to dilution or matrix	W Sample container temperature is out of limit as specified



## Hall Environmental Analysis Laboratory, Inc.

CLIENT: Rule Engineering LLC

Client Sample ID: **SS6 (North Wall; 1-3 ft.)**

Project: Ute 80-15

Collection Date: 11/15/2016 10:15:00 AM

Lab ID: 1611797-004

Matrix: SOIL

Received Date: 11/16/2016 8:00:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>SAR SOLUBLE CATIONS</b>							Analyst: MED
Sodium Adsorption Ratio	40	0			1	12/8/2016	29020
<b>RESISTIVITY AND EC SOIL</b>							Analyst: LGT
Conductivity	2630	1.00		µmhos/cm	1	12/1/2016 11:23:00 AM	28926
<b>EPA METHOD 7471: MERCURY</b>							Analyst: JLF
Mercury	ND	0.033		mg/Kg	1	11/30/2016 3:08:59 PM	28907
<b>EPA METHOD 6010B: SOIL METALS</b>							Analyst: MED
Arsenic	ND	4.8		mg/Kg	2	11/30/2016 11:00:23 AM	28886
Barium	55	0.19		mg/Kg	2	11/30/2016 11:00:23 AM	28888
Cadmium	ND	0.19		mg/Kg	2	11/30/2016 11:00:23 AM	28886
Chromium	2.8	0.57		mg/Kg	2	11/30/2016 11:00:23 AM	28886
Copper	14	0.57		mg/Kg	2	11/30/2016 11:00:23 AM	28886
Lead	4.1	0.48		mg/Kg	2	11/30/2016 11:00:23 AM	28886
Nickel	4.2	0.96		mg/Kg	2	11/30/2016 11:00:23 AM	28886
Selenium	ND	4.8		mg/Kg	2	11/30/2016 11:00:23 AM	28886
Silver	ND	0.48		mg/Kg	2	11/30/2016 11:00:23 AM	28886
Zinc	33	4.8		mg/Kg	2	11/30/2016 11:00:23 AM	28886
<b>EPA METHOD 8015M/D: DIESEL RANGE ORGANICS</b>							Analyst: TOM
Diesel Range Organics (DRO)	71	9.8		mg/Kg	1	11/21/2016 3:41:23 PM	28696
Motor Oil Range Organics (MRO)	ND	49		mg/Kg	1	11/21/2016 3:41:23 PM	28696
Surr: DNOP	88.2	70.130		%Rec	1	11/21/2016 3:41:23 PM	28696
<b>EPA METHOD 8015D: GASOLINE RANGE</b>							Analyst: NSB
Gasoline Range Organics (GRO)	46	4.7		mg/Kg	1	11/17/2016 7:26:11 PM	28715
Surr: BFB	221	68.3-144	S	%Rec	1	11/17/2016 7:26:11 PM	28715
<b>EPA METHOD 8021B: VOLATILES</b>							Analyst: NSB
Benzene	ND	0.024		mg/Kg	1	11/17/2016 7:26:11 PM	28715
Toluene	0.37	0.047		mg/Kg	1	11/17/2016 7:26:11 PM	28715
Ethylbenzene	0.17	0.047		mg/Kg	1	11/17/2016 7:26:11 PM	28715
Xylenes, Total	2.8	0.094		mg/Kg	1	11/17/2016 7:26:11 PM	28715
Surr: 4-Bromofluorobenzene	118	80-120		%Rec	1	11/17/2016 7:26:11 PM	28715
<b>EPA METHOD 8270C: PAHS</b>							Analyst: JDC
Naphthalene	0.23	0.020		mg/Kg	1	11/29/2016 4:43:05 PM	28780
Acenaphthene	ND	0.020		mg/Kg	1	11/29/2016 4:43:05 PM	28780
Fluorene	0.020	0.020		mg/Kg	1	11/29/2016 4:43:05 PM	28780
Anthracene	ND	0.020		mg/Kg	1	11/29/2016 4:43:05 PM	28780
Fluoranthene	ND	0.020		mg/Kg	1	11/29/2016 4:43:05 PM	28780
Pyrene	ND	0.020		mg/Kg	1	11/29/2016 4:43:05 PM	28780

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:	* Value exceeds Maximum Contaminant Level	B Analyte detected in the associated Method Blank
D Sample Diluted Due to Matrix	E Value above quantitation range	J Analyte detected below quantitation limits
H Holding times for preparation or analysis exceeded	P Sample pH Not In Range	RI Reporting Detection Limit
ND Not Detected at the Reporting Limit	W Sample container temperature is out of limit as specified	
R RPD outside accepted recovery limits		
S % Recovery outside of range due to dilution or matrix		

**Hall Environmental Analysis Laboratory, Inc.**

CLIENT: Rule Engineering LLC

Client Sample ID: **SS6 (cont.)**

Project: Ute 80-15

Collection Date: 11/15/2016 10:15:00 AM

Lab ID: 1611797-004

Matrix: SOIL

Received Date: 11/16/2016 8:00:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>EPA METHOD 8270C: PAHS</b>							Analyst: JDC
Benz(a)anthracene	ND	0.020		mg/Kg	1	11/29/2016 4:43:05 PM	28780
Chrysene	ND	0.020		mg/Kg	1	11/29/2016 4:43:05 PM	28780
Benzo(b)fluoranthene	ND	0.020		mg/Kg	1	11/29/2016 4:43:05 PM	28780
Benzo(k)fluoranthene	ND	0.020		mg/Kg	1	11/29/2016 4:43:05 PM	28780
Benzo(a)pyrene	ND	0.020		mg/Kg	1	11/29/2016 4:43:05 PM	28780
Dibenz(a,h)anthracene	ND	0.020		mg/Kg	1	11/29/2016 4:43:05 PM	28780
Indeno(1,2,3-cd)pyrene	ND	0.020		mg/Kg	1	11/29/2016 4:43:05 PM	28780
Surr: Benzo(e)pyrene	122	41.5-212		%Rec	1	11/29/2016 4:43:05 PM	28780
Surr: N-hexadecane	104	40.7-181		%Rec	1	11/29/2016 4:43:05 PM	28780
<b>SM4500-H+B: PH</b>							Analyst: JRR
pH	9.42	1.68		pH Units	1	11/29/2016 4:08:00 PM	R39035

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:		
*	Value exceeds Maximum Contaminant Level	B Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E Value above quantitation range
H	Holding times for preparation or analysis exceeded	J Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P Sample pH Not In Range
R	RPD outside accepted recovery limits	RL Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W Sample container temperature is out of limit as specified

Analytical Report

Lab Order 1611797

Date Reported: 12/20/2016

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Rule Engineering LLC

Project: Ute 80-15

Lab ID: 1611797-006

Client Sample ID: 557 (East Wall; 1-3 ft.)

Collection Date: 11/15/2016 10:45:00 AM

Received Date: 11/16/2016 8:00:00 AM

Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>SAR SOLUBLE CATIONS</b>							Analyst: MED
Sodium Adsorption Ratio	13	0			1	12/8/2016	29020
<b>RESISTIVITY AND EC SOIL</b>							Analyst: LGT
Conductivity	1940	1.00		µmhos/cm	1	12/1/2016 11:23:00 AM	28926
<b>EPA METHOD 7471: MERCURY</b>							Analyst: JLF
Mercury	ND	0.032		mg/Kg	1	11/30/2016 3:10:43 PM	28907
<b>EPA METHOD 6010B: SOIL METALS</b>							Analyst: MED
Arsenic	ND	4.9		mg/Kg	2	11/30/2016 11:03:57 AM	28886
Barium	250	0.20		mg/Kg	2	11/30/2016 11:03:57 AM	28886
Cadmium	ND	0.20		mg/Kg	2	11/30/2016 11:03:57 AM	28886
Chromium	4.6	0.59		mg/Kg	2	11/30/2016 11:03:57 AM	28886
Copper	11	0.59		mg/Kg	2	11/30/2016 11:03:57 AM	28886
Lead	3.3	0.49		mg/Kg	2	11/30/2016 11:03:57 AM	28886
Nickel	4.9	0.99		mg/Kg	2	11/30/2016 11:03:57 AM	28886
Selenium	ND	4.9		mg/Kg	2	11/30/2016 11:03:57 AM	28886
Silver	ND	0.49		mg/Kg	2	11/30/2016 11:03:57 AM	28886
Zinc	30	4.9		mg/Kg	2	11/30/2016 11:03:57 AM	28886
<b>EPA METHOD 8015M/D: DIESEL RANGE ORGANICS</b>							Analyst: TOM
Diesel Range Organics (DRO)	ND	10		mg/Kg	1	11/22/2016 2:36:32 PM	28696
Motor Oil Range Organics (MRO)	ND	50		mg/Kg	1	11/22/2016 2:36:32 PM	28696
Surr: DNOP	90.4	70-130		%Rec	1	11/22/2016 2:36:32 PM	28696
<b>EPA METHOD 8015D: GASOLINE RANGE</b>							Analyst: NSB
Gasoline Range Organics (GRO)	ND	4.7		mg/Kg	1	11/17/2016 8:13:07 PM	28715
Surr: BFB	92.8	68.3-144		%Rec	1	11/17/2016 8:13:07 PM	28715
<b>EPA METHOD 8021B: VOLATILES</b>							Analyst: NSB
Benzene	ND	0.023		mg/Kg	1	11/17/2016 8:13:07 PM	28715
Toluene	ND	0.047		mg/Kg	1	11/17/2016 8:13:07 PM	28715
Ethylbenzene	ND	0.047		mg/Kg	1	11/17/2016 8:13:07 PM	28715
Xylenes, Total	ND	0.093		mg/Kg	1	11/17/2016 8:13:07 PM	28715
Surr: 4-Bromofluorobenzene	104	80-120		%Rec	1	11/17/2016 8:13:07 PM	28715
<b>EPA METHOD 8270C: PAHS</b>							Analyst: JDC
Naphthalene	ND	0.020		mg/Kg	1	11/29/2016 5:31:24 PM	28780
Acenaphthene	ND	0.020		mg/Kg	1	11/29/2016 5:31:24 PM	28780
Fluorene	ND	0.020		mg/Kg	1	11/29/2016 5:31:24 PM	28780
Anthracene	ND	0.020		mg/Kg	1	11/29/2016 5:31:24 PM	28780
Fluoranthene	ND	0.020		mg/Kg	1	11/29/2016 5:31:24 PM	28780
Pyrene	ND	0.020		mg/Kg	1	11/29/2016 5:31:24 PM	28780

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

<b>Qualifiers:</b>	* Value exceeds Maximum Contaminant Level	B Analyte detected in the associated Method Blank
	D Sample Diluted Due to Matrix	E Value above quantitation range
	H Holding times for preparation or analysis exceeded	J Analyte detected below quantitation limits
	ND Not Detected at the Reporting Limit	P Sample pH Not In Range
	R RPD outside accepted recovery limits	RL Reporting Detection Limit
	S % Recovery outside of range due to dilution or matrix	W Sample container temperature is out of limit as specified

## Hall Environmental Analysis Laboratory, Inc.

CLIENT: Rule Engineering LLC

Client Sample ID: SS7 (env.)

Project: Ute 80-15

Collection Date: 11/15/2016 10:45:00 AM

Lab ID: 1611797-006

Matrix: SOIL

Received Date: 11/16/2016 8:00:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>EPA METHOD 8270C: PAHS</b>							Analyst: JDC
Benz(a)anthracene	ND	0.020		mg/Kg	1	11/29/2016 5:31:24 PM	28780
Chrysene	ND	0.020		mg/Kg	1	11/29/2016 5:31:24 PM	28780
Benzo(b)fluoranthene	ND	0.020		mg/Kg	1	11/29/2016 5:31:24 PM	28780
Benzo(k)fluoranthene	ND	0.020		mg/Kg	1	11/29/2016 5:31:24 PM	28780
Benzo(a)pyrene	ND	0.020		mg/Kg	1	11/29/2016 5:31:24 PM	28780
Dibenz(a,h)anthracene	ND	0.020		mg/Kg	1	11/29/2016 5:31:24 PM	28780
Indeno(1,2,3-cd)pyrene	ND	0.020		mg/Kg	1	11/29/2016 5:31:24 PM	28780
Surr: Benzo(e)pyrene	89.5	41.5-212		%Rec	1	11/29/2016 5:31:24 PM	28780
Surr: N-hexadecane	71.8	40.7-181		%Rec	1	11/29/2016 5:31:24 PM	28780
<b>SM4500-H+B: PH</b>							Analyst: JRR
pH	7.90	1.68		pH Units	1	11/29/2016 4:06:00 PM	R39035

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:		
*	Value exceeds Maximum Contaminant Level	B Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E Value above quantitation range
H	Holding times for preparation or analysis exceeded	J Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P Sample pH Not In Range
R	RPD outside accepted recovery limits	RI Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W Sample container temperature is out of limit as specified

## Hall Environmental Analysis Laboratory, Inc.

CLIENT: Rule Engineering LLC

Client Sample ID: SS8 - (South Wall; 1-3 ft.)

Project: Ute 80-15

Collection Date: 11/15/2016 11:00:00 AM

Lab ID: 1611797-007

Matrix: SOIL

Received Date: 11/16/2016 8:00:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>SAR SOLUBLE CATIONS</b>							Analyst: MED
Sodium Adsorption Ratio	30	0			1	12/8/2016	29020
<b>RESISTIVITY AND EC SOIL</b>							Analyst: LGT
Conductivity	2350	1.00		µmhos/cm	1	12/1/2016 11:23:00 AM	28926
<b>EPA METHOD 7471: MERCURY</b>							Analyst: JLF
Mercury	ND	0.034		mg/Kg	1	11/30/2016 3:14:18 PM	28907
<b>EPA METHOD 6010B: SOIL METALS</b>							Analyst: MED
Arsenic	ND	4.9		mg/Kg	2	11/30/2016 11:14:30 AM	28886
Barium	700	0.49		mg/Kg	5	12/5/2016 1:54:32 PM	28866
Cadmium	ND	0.20		mg/Kg	2	11/30/2016 11:14:30 AM	28886
Chromium	4.6	0.59		mg/Kg	2	11/30/2016 11:14:30 AM	28886
Copper	11	0.59		mg/Kg	2	11/30/2016 11:14:30 AM	28886
Lead	3.1	0.49		mg/Kg	2	11/30/2016 11:14:30 AM	28886
Nickel	4.4	0.98		mg/Kg	2	11/30/2016 11:14:30 AM	28886
Selenium	ND	4.9		mg/Kg	2	11/30/2016 11:14:30 AM	28888
Silver	ND	0.49		mg/Kg	2	11/30/2016 11:14:30 AM	28886
Zinc	29	4.9		mg/Kg	2	11/30/2016 11:14:30 AM	28886
<b>EPA METHOD 8015M/D: DIESEL RANGE ORGANICS</b>							Analyst: JME
Diesel Range Organics (DRO)	35	9.5		mg/Kg	1	11/18/2016 6:11:23 PM	28696
Motor Oil Range Organics (MRO)	ND	48		mg/Kg	1	11/18/2016 6:11:23 PM	28696
Surr: DNOP	70.3	70-130		%Rec	1	11/18/2016 6:11:23 PM	28696
<b>EPA METHOD 8015D: GASOLINE RANGE</b>							Analyst: NSB
Gasoline Range Organics (GRO)	23	4.7		mg/Kg	1	11/17/2016 8:36:33 PM	28715
Surr: BFB	158	68.3-144	S	%Rec	1	11/17/2016 8:36:33 PM	28715
<b>EPA METHOD 8021B: VOLATILES</b>							Analyst: NSB
Benzene	ND	0.024		mg/Kg	1	11/17/2016 8:36:33 PM	28715
Toluene	ND	0.047		mg/Kg	1	11/17/2016 8:36:33 PM	28715
Ethylbenzene	0.049	0.047		mg/Kg	1	11/17/2016 8:36:33 PM	28715
Xylenes, Total	0.72	0.095		mg/Kg	1	11/17/2016 8:36:33 PM	28715
Surr: 4-Bromofluorobenzene	111	80-120		%Rec	1	11/17/2016 8:36:33 PM	28715
<b>EPA METHOD 8270C: PAHS</b>							Analyst: JDC
Naphthalene	0.078	0.020		mg/Kg	1	11/29/2016 5:55:35 PM	28780
Acenaphthene	ND	0.020		mg/Kg	1	11/29/2016 5:55:35 PM	28780
Fluorene	ND	0.020		mg/Kg	1	11/29/2016 5:55:35 PM	28780
Anthracene	ND	0.020		mg/Kg	1	11/29/2016 5:55:35 PM	28780
Fluoranthene	ND	0.020		mg/Kg	1	11/29/2016 5:55:35 PM	28780
Pyrene	ND	0.020		mg/Kg	1	11/29/2016 5:55:35 PM	28780

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:	* Value exceeds Maximum Contaminant Level	B Analyte detected in the associated Method Blank
	D Sample Diluted Due to Matrix	E Value above quantitation range
	H Holding times for preparation or analysis exceeded	J Analyte detected below quantitation limits
	ND Not Detected at the Reporting Limit	P Sample pl I Not In Range
	R RPD outside accepted recovery limits	RI Reporting Detection Limit
	S % Recovery outside of range due to dilution or matrix	W Sample container temperature is out of limit as specified

**Hall Environmental Analysis Laboratory, Inc.**

CLIENT: Rule Engineering LLC

Client Sample ID: SS8 (Cont.)

Project: Ute 80-15

Collection Date: 11/15/2016 11:00:00 AM

Lab ID: 1611797-007

Matrix: SOIL

Received Date: 11/16/2016 8:00:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>EPA METHOD 8270C: PAHS</b>							Analyst: JDC
Benz(a)anthracene	ND	0.020		mg/Kg	1	11/29/2016 5:55:35 PM	28780
Chrysene	ND	0.020		mg/Kg	1	11/29/2016 5:55:35 PM	28780
Benzo(b)fluoranthene	ND	0.020		mg/Kg	1	11/29/2016 5:55:35 PM	28780
Benzo(k)fluoranthene	ND	0.020		mg/Kg	1	11/29/2016 5:55:35 PM	28780
Benzo(a)pyrene	ND	0.020		mg/Kg	1	11/29/2016 5:55:35 PM	28780
Dibenz(a,h)anthracene	ND	0.020		mg/Kg	1	11/29/2016 5:55:35 PM	28780
Indeno(1,2,3-cd)pyrene	ND	0.020		mg/Kg	1	11/29/2016 5:55:35 PM	28780
Surr: Benzo(e)pyrene	68.1	41.5-212		%Rec	1	11/29/2016 5:55:35 PM	28780
Surr: N-hexadecane	63.4	40.7-181		%Rec	1	11/29/2016 5:55:35 PM	28780
<b>SM4500-H+B: PH</b>							Analyst: JRR
pH	8.91	1.68		pH Units	1	11/29/2016 4:08:00 PM	R39035

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:	* Value exceeds Maximum Contaminant Level	B Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E Value above quantitation range
H	Holding times for preparation or analysis exceeded	J Analyte detected below quantitation limit
ND	Not Detected at the Reporting Limit	P Sample pH Not In Range
R	RPD outside accepted recovery limits	RI Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W Sample container temperature is out of limit as specified

## Hall Environmental Analysis Laboratory, Inc.

CLIENT: Rule Engineering LLC

Client Sample ID: S59 ( West Wall; 1-3 ft. )

Project: Ute 80-15

Collection Date: 11/15/2016 11:30:00 AM

Lab ID: 1611797-009

Matrix: SOIL

Received Date: 11/16/2016 8:00:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>SAR SOLUBLE CATIONS</b>							Analyst: MED
Sodium Adsorption Ratio	42	0			1	12/8/2016	29020
<b>RESISTIVITY AND EC SOIL</b>							Analyst: LGT
Conductivity	1620	1.00		µmhos/cm	1	12/1/2016 11:23:00 AM	28926
<b>EPA METHOD 7471: MERCURY</b>							Analyst: JLF
Mercury	ND	0.033		mg/Kg	1	11/30/2016 3:22:09 PM	28907
<b>EPA METHOD 6010B: SOIL METALS</b>							Analyst: MED
Arsenic	ND	2.4		mg/Kg	1	11/30/2016 11:16:16 AM	28886
Barium	160	0.097		mg/Kg	1	11/30/2016 11:16:16 AM	28886
Cadmium	ND	0.097		mg/Kg	1	11/30/2016 11:16:16 AM	28886
Chromium	1.8	0.29		mg/Kg	1	11/30/2016 11:16:16 AM	28886
Copper	9.5	0.29		mg/Kg	1	11/30/2016 11:16:16 AM	28886
Lead	2.9	0.24		mg/Kg	1	11/30/2016 11:16:16 AM	28886
Nickel	3.1	0.48		mg/Kg	1	11/30/2016 11:16:16 AM	28886
Selenium	ND	2.4		mg/Kg	1	11/30/2016 11:16:16 AM	28886
Silver	ND	0.24		mg/Kg	1	11/30/2016 11:16:16 AM	28886
Zinc	31	2.4		mg/Kg	1	11/30/2016 11:16:16 AM	28886
<b>EPA METHOD 8015M/D: DIESEL RANGE ORGANICS</b>							Analyst: JME
Diesel Range Organics (DRO)	42	9.7		mg/Kg	1	11/18/2016 7:04:53 PM	28696
Motor Oil Range Organics (MRO)	ND	48		mg/Kg	1	11/18/2016 7:04:53 PM	28696
Surr: DNOP	71.4	70-130		%Rec	1	11/18/2016 7:04:53 PM	28696
<b>EPA METHOD 8015D: GASOLINE RANGE</b>							Analyst: NSB
Gasoline Range Organics (GRO)	8.7	4.8		mg/Kg	1	11/17/2016 10:34:03 PM	28715
Surr: BFB	113	68.3-144		%Rec	1	11/17/2016 10:34:03 PM	28715
<b>EPA METHOD 8021B: VOLATILES</b>							Analyst: NSB
Benzene	ND	0.024		mg/Kg	1	11/17/2016 10:34:03 PM	28715
Toluene	ND	0.048		mg/Kg	1	11/17/2016 10:34:03 PM	28715
Ethylbenzene	ND	0.048		mg/Kg	1	11/17/2016 10:34:03 PM	28715
Xylenes, Total	0.26	0.097		mg/Kg	1	11/17/2016 10:34:03 PM	28715
Surr: 4-Bromofluorobenzene	107	80-120		%Rec	1	11/17/2016 10:34:03 PM	28715
<b>EPA METHOD 8270C: PAHS</b>							Analyst: JDC
Naphthalene	0.039	0.020		mg/Kg	1	11/29/2016 6:43:52 PM	28780
Acenaphthene	ND	0.020		mg/Kg	1	11/29/2016 6:43:52 PM	28780
Fluorene	ND	0.020		mg/Kg	1	11/29/2016 6:43:52 PM	28780
Anthracene	ND	0.020		mg/Kg	1	11/29/2016 6:43:52 PM	28780
Fluoranthene	ND	0.020		mg/Kg	1	11/29/2016 6:43:52 PM	28780
Pyrene	ND	0.020		mg/Kg	1	11/29/2016 6:43:52 PM	28780

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:	* Value exceeds Maximum Contaminant Level	B Analyte detected in the associated Method Blank
	D Sample Diluted Due to Matrix	E Value above quantitation range
	H Holding times for preparation or analysis exceeded	J Analyte detected below quantitation limit
	ND Not Detected at the Reporting Limit	P Sample pH Not In Range
	R RPD outside accepted recovery limits	RL Reporting Detection Limit
	S % Recovery outside of range due to dilution or matrix	W Sample container temperature is out of limit as specified

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Rule Engineering LLC

Client Sample ID: SS9 (cont.)

Project: Ute 80-15

Collection Date: 11/15/2016 11:30:00 AM

Lab ID: 1611797-009

Matrix: SOIL

Received Date: 11/16/2016 8:00:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
<b>EPA METHOD 8270C: PAHS</b>							Analyst: JDC
Benz(a)anthracene	ND	0.020		mg/Kg	1	11/29/2016 6:43:52 PM	28780
Chrysene	ND	0.020		mg/Kg	1	11/29/2016 6:43:52 PM	28780
Benzo(b)fluoranthene	ND	0.020		mg/Kg	1	11/29/2016 6:43:52 PM	28780
Benzo(k)fluoranthene	ND	0.020		mg/Kg	1	11/29/2016 6:43:52 PM	28780
Benzo(a)pyrene	ND	0.020		mg/Kg	1	11/29/2016 6:43:52 PM	28780
Dibenz(a,h)anthracene	ND	0.020		mg/Kg	1	11/29/2016 6:43:52 PM	28780
Indeno(1,2,3-cd)pyrene	ND	0.020		mg/Kg	1	11/29/2016 6:43:52 PM	28780
Surr: Benzo(e)pyrene	76.3	41.5-212		%Rec	1	11/29/2016 6:43:52 PM	28780
Surr: N-hexadecane	61.4	40.7-181		%Rec	1	11/29/2016 6:43:52 PM	28780
<b>SM4500-H+B: PH</b>							Analyst: JRR
pH	9.62	1.68		pH Units	1	11/29/2016 4:06:00 PM	R39035

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:		
*	Value exceeds Maximum Contaminant Level	B Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E Value above quantitation range
H	Holding times for preparation or analysis exceeded	J Analyte detected below quantitation limit
ND	Not Detected at the Reporting Limit	P Sample pH Not In Range
R	RPD outside accepted recovery limits	RL Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W Sample container temperature is out of limit as specified



**Table 910-1 CONCENTRATION LEVELS<sup>1</sup>**

Contaminant of Concern	Concentrations
<b>Organic Compounds in Soil</b>	
TPH (total volatile and extractable petroleum hydrocarbons)	500 mg/kg
Benzene	0.17 mg/kg <sup>2</sup>
Toluene	85 mg/kg <sup>2</sup>
Ethylbenzene	100 mg/kg <sup>2</sup>
Xylenes (total)	175 mg/kg <sup>2</sup>
Acenaphthene	1,000 mg/kg <sup>2</sup>
Anthracene	1,000 mg/kg <sup>2</sup>
Benz(a)anthracene	0.22 mg/kg <sup>2</sup>
Benzo(b)fluoranthene	0.22 mg/kg <sup>2</sup>
Benzo(k)fluoranthene	2.2 mg/kg <sup>2</sup>
Benzo(a)pyrene	0.022 mg/kg <sup>2</sup>
Chrysene	22 mg/kg <sup>2</sup>
Dibenzo(a,h)anthracene	0.022 mg/kg <sup>2</sup>
Fluoranthene	1,000 mg/kg <sup>2</sup>
Fluorene	1,000 mg/kg <sup>2</sup>
Indeno(1,2,3,c,d)pyrene	0.22 mg/kg <sup>2</sup>
Naphthalene	23 mg/kg <sup>2</sup>
Pyrene	1,000 mg/kg <sup>2</sup>
<b>Organic Compounds in Ground Water</b>	
Benzene	5 µg/l <sup>3</sup>
Toluene	560 to 1,000 µg/l <sup>3</sup>
Ethylbenzene	700 µg/l <sup>3</sup>
Xylenes (Total)	1,400 to 10,000 µg/l <sup>3,4</sup>
<b>Inorganics in Soils</b>	
Electrical Conductivity (EC)	<4 mmhos/cm or 2x background
Sodium Adsorption Ratio (SAR)	<12 <sup>5</sup>
pH	6-9
<b>Inorganics in Ground Water</b>	
Total Dissolved Solids (TDS)	<1.25 x background <sup>3</sup>
Chlorides	<1.25 x background <sup>3</sup>
Sulfates	<1.25 x background <sup>3</sup>
<b>Metals in Soils</b>	
Arsenic	0.39 mg/kg <sup>2</sup>
Barium (LDNR True Total Barium)	15,000 mg/kg <sup>2</sup>
Boron (Hot Water Soluble)	2 mg/l <sup>3</sup>
Cadmium	70 mg/kg <sup>3,6</sup>
Chromium (III)	120,000 mg/kg <sup>2</sup>
Chromium (VI)	23 mg/kg <sup>2,6</sup>
Copper	3,100 mg/kg <sup>2</sup>
Lead (inorganic)	400 mg/kg <sup>2</sup>
Mercury	23 mg/kg <sup>2</sup>
Nickel (soluble salts)	1,600 mg/kg <sup>2,6</sup>
Selenium	390 mg/kg <sup>2,6</sup>
Silver	390 mg/kg <sup>2</sup>
Zinc	23,000 mg/kg <sup>2,6</sup>
<b>Liquid Hydrocarbons in Soils and Ground Water</b>	
Liquid hydrocarbons including condensate and oil	Below detection level

COGCC recommends that the latest version of EPA SW 846 analytical methods be used where possible and that analyses of samples be performed by laboratories that maintain state or national accreditation programs.