## R. T. HICKS CONSULTANTS, LTD.

901 Rio Grande Blvd NW ▲ Suite F-142 ▲ Albuquerque, NM 87104 ▲ 505.266.5004 ▲ Fax: 505.266-0745 Artesia ▲ Carlsbad ▲ Durango ▲ Midland

April 24, 2015

Dr. Tomas Oberding NMOCD District 1 1625 French Drive Hobbs, New Mexico 88240 *VIA EMAIL*  **RECEIVED** By OCD; Dr. Oberding at 12:31 pm, Apr 24, 2015

RE: Caravan BVW State #9H/Caravan BVV State 6H Temporary Pit, In-place Burial Notice Unit C, Section 33, T24S, R33E, API #30-025-41641 Unit C, Section 33, T24S, R33E, API #30-025-41610

Dr. Oberding:

On behalf of Yates Petroleum Corporation, R. T. Hicks Consultants is provides this notice to NMOCD with a copy to the State Land Office (e-mail, return e-mail receipt) that closure operations at the above- referenced pit will begin <u>on April 28, 2015</u>. The closure process should require about two weeks, depending on the availability of machinery. The rig was released on November 23, 2014.

After hydraulic fracturing and flow-back were completed, 4-point composite samples were collected from the inner horseshoe cell, outer horseshoe cell, and from the clean soil of the berms (beneath the liner) of the pit on March 4, 2015 for laboratory analyses. The table below calculates the concentration for "3:1 stabilized" material to allow comparison with Table II the Pit Rule (Closure Criteria for Burial Trenches and Waste Left in Place in Temporary Pits). The formula use in the table below is:

3:1 Stabilized Solids = ((Outer Composite\*0.66) + (0.34\*Inner Composite) + (Mixing Dirt\*3))

								4									_	
Well Name	Sample	Name	Samı Typ	ple Sample Date	Chloride <i>80,000</i>	Benzene <u>10</u>	BTEX 50	GRO+DRO <u>1000</u>	TPH 418.1 2500	GRO+DRO+ DROext	GRO	DRO	MRO	т	E	x	Lab	Report
Caravan 9H Pit	Outer Comp	osite		3/4/2015	12000	1.3	16	1960		4260	260	2200	1800	12	3.5	16	Hall	1
Caravan 9H Pit	Inner Comp	osite		3/4/2015	140000	0	0.48	17		17	17	0	0	0.2	0.1	0.48	Hall	2
Caravan 9H Pit	<b>Mixing Dirt</b>	Comp.		3/4/2015	51	0	0	0		0	0	0	0	0	0	0	Hall	2
Caravan 9H Pit	3:1 Stab	ilized	CALCU	LATED	38012.00	0.11	1.40	164.51	0.00	354.26								
Analytical Report       Analytical Report       Analytical Report         Hall Environmental Analytis Laboratory, Inc.       Hall Environmental Analytis Laboratory, Inc.       Analytical Report         CLEXY: R.T. Hala Comminant, LTD       Clear Sample I       CLEXY: R.T. Hala Comminant, LTD       Clear Sample I       Clear Sample ID       Philoign Dir						eport 3293 3/17/2015												
CLIENT: R.T. Hicks Consul Project: Common St Unit #	hants, LTD		Client Sample I Collection Do	CLIENT: R.T. Hicks Consul Project: Caravan St. Unit #	itents, LTD 9H mit		Client Sampl Collection 1	e ID: 4pt Inner Comp Date: 3/4/2015 12:10:00	PM	CLIENT: R.T. Hicks C	on sultants, l	LTD			Client So	unple ID: 5	pt Mixing Dirt	
CLIENT: R.T. Hicks Consul Project: Caravan St. Unit # Lab ID: 1503293-001	itaats, LTD 19H pit Matrix:	SOIL	Client Sample I Collection Da Received Da	CLIENT: R.T. Hicks Consul Project: Caravan St. Unit # Lab ID: 1503293-002	tauts, LTD 9H pit Matr	ian: SOIL	Client Sampl Collection I Received I	e ID: 4pt Inner Comp Date: 3/4/2015 12:10:00 Date: 3/6/2015 10:45:00	PM AM	CLIENT: R.T. Hicks C Project: Caravan St. U Lab ID: 1503293-003	onsultants, l Juit #9H pit	LTD	atrix: SOIL		Client Sa Collect Receiv	umple ID: 5 ion Date: 3 red Date: 3	pt Mixing Dirt /4/2015 12:15:0 /6/2015 10:45:0	0 PM 0 AM
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April 24, 2015 Page 2

The inner composite and outer composite ratio in the formula approximates the solids volume generated during drilling. The solids placed in the outer shoe are derived from drilling the surface casing string and production string. The inner shoe contains solids from drilling intermediate casing string.

Laboratory analyses of the component samples (attached) and the calculation of stabilized cuttings "demonstrate that, after the waste is solidified or stabilized with soil or other non-waste material at a ratio of no more than 3:1 soil or other non-waste material to waste, the concentration of any contaminant in the stabilized waste is not higher than the parameters listed in Table II of 19.15.17.13 NMAC."

On December 31, 2014, Hicks Consultants submitted a variance request to your office proposing replacement of certified US Mail notification to the State Land Office with e-mail notification plus a "read request". This variance applies only to the notice of on-site closure of temporary pits on State surface. This same variance request is attached to this letter for the above-referenced temporary pit on State surface.

I will follow up this notice with a phone call to determine if email notification to the SLO may be employed in lieu of US Mail notification. I will also call you the day before closure begins.

Sincerely, R.T. Hicks Consultants

Mile Sullelie

Mike Stubblefield Project Manager

Copy: Yates Petroleum Corporation Ed Martin New Mexico State Land Office PO Box 1148 Santa Fe, NM 87504-1148 E-mail read receipt requested

## R. T. HICKS CONSULTANTS, LTD.

901 Rio Grande Blvd NW ▲ Suite F-142 ▲ Albuquerque, NM 87104 ▲ 505.266.5004 ▲ Fax: 505.266-0745

December 16, 2014

Dr. Tomáš J. Oberding NMOCD District 1 1625 French Drive Hobbs, New Mexico 88240 *VIA EMAIL* 

RE: Variance Request Murchison Oil and Gas, Inc., Jackson Unit #17H temporary pit API# 30-025-41087, Pit Permit #P1-05981

Dear Dr. Oberding:

The "In-place Burial" closure plan for the above referenced pit was submitted with the C-144 pit application on January 6, 2014 and approved on January 16, 2014. The rig was released from this well on April 14, 2014. Following the well completion of the Jackson Unit #17H well, NMOCD granted a variance to allow cuttings from a nearby well on a different lease, Brininstool 4 St. #4H, to be deposited into the #17H pit during the closed loop drilling. The last cuttings were deposited into the pit in September 2014. NMOCD recently approved a 3-month extension, created a new closure deadline of January 14, 2015.

Hicks Consultants requests a variance to allow TPH by Method 8015M (GRO+DRO+MRO) to substitute for the required method of TPH by 418.1 (2,500 mg/kg) when determining compliance with Table II Standards for in-place closure.

**R.T. Hicks Consultants** 

Knistin Tope

Kristin Pope Project Geologist

Enclosure: Variance Request

Copy: Murchison Oil and Gas, Inc.

New Mexico State Land Office, Ed Martin PO Box 1148 Santa Fe, NM 87504-1148

## **Statement Explaining Why the Applicant Seeks a Variance**

The prescriptive mandates of the Rule that are the subject of this variance request are the following subsections of 19.15.17.13.D:

The operator shall collect, at a minimum, a five point composite of the contents of the (5) temporary pit or drying pad/tank associated with a closed-loop system to demonstrate that, after the waste is solidified or stabilized with soil or other non-waste material at a ratio of no more than 3:1 soil or other non-waste material to waste, the concentration of any contaminant in the stabilized waste is not higher than the parameters listed in Table II of 19.15.17.13 NMAC.

	Table II Closure Criteria for Burial Trenches and								
Waste Left in Place in Temporary Pits									
Depth below bottom of pit to groundwater less than 10,000 mg/l TDS	Constituent	Method*	Limit**						
	Chloride	EPA Method 300.0	20,000 mg/kg						
25-50 feet	TPH	EPA SW-846 Method 418.1	100 mg/kg						
	BTEX	EPA SW-846 Method 8021B or 8260B	50 mg/kg						
	Benzene	EPA SW-846 Method 8021B	10 mg/kg						

http://www.nmcpr.state.nm.us/nmac/parts/title19/19.015.0017.htm[7/3/2013 10:50:10 AM]

191517 NMAC

		or 8015M	
	Chloride	EPA Method 300.0	40,000 mg/kg
51, 100, 0, 7	TPH	EPA SW-846	2,500 mg/kg
51-100 feet		Method 418.1	
	GRO+DRO	EPA SW-846	1,000 mg/kg
		Method 8015M	
	BTEX	EPA SW-846 Method 8021B	50 mg/kg
		or 8260B	
	Benzene	EPA SW-846 Method 8021B	10 mg/kg
		or 8015M	
	Chloride	EPA Method 300.0	80,000 mg/kg
	TPH	EPA SW-846	2,500 mg/kg
> 100 feet		Method 418.1	
	GRO+DRO	EPA SW-846	1,000 mg/kg
		Method 8015M	
	BTEX	EPA SW-846 Method 8021B	50 mg/kg
		or \$260B	
	Benzene	EPA SW-846 Method 8021B	10 mg/kg
		or 8015M	

\*Or other test methods approved by the division

\*\*Numerical limits or natural background level, whichever is greater

[19.15.17.13 NMAC - Rp, 19.15.17.13 NMAC, 6/28/13]

On October 28, 2014 composite samples were recovered from the Jackson Unit #17H pit, one from the inner and one from the outer cells, as well as a composite sample of available mixing dirt from the berms of the pit below the liner. These three composites were submitted for individual analyses for parameters listed in Table II of 19.15.17.13 NMAC. As approved previously by OCD, an accurate demonstration that "after the waste is solidified or stabilized with soil or other non-waste material at a ratio of no more than 3:1 soil or other non-waste material to waste, the concentration of any contaminant in the stabilized waste is not higher than the parameters listed in Table II of 19.15.17.13 NMAC" may be derived by mathematically mixing the laboratory results. First, we calculated "pit composite" concentration based on the volume of cuttings of each cell (3.5 parts outer, 1 part inner cell) and the individual laboratory results. Next we mathematically mixed the composite pit concentration with the mixing dirt concentrations at a ratio of 3 parts mixing dirt to 1 part pit contents. When compared to Table II closure criteria, TPH (418.1) target concentrations were not met, as shown in the table below. TPH (418.1) is approximately 17% over the Pit Rule standard while TPH by 8015 (GRO+DRO+MRO) is 29% of the 2,500-mg/kg limit. All other constituents meet the in-place burial limits of the Rule.

Jackson Unit #17H	3:1 STABILIZED CUTTINGS CALCULATIONS					
Constituent	Table II Limit (GW>100')	10/28/2014 Samples*				
Chloride	80,000 mg/kg	7302				
ТРН	2,500 mg/kg	2927				
GRO+DRO	1,000 mg/kg	612				
BTEX	50 mg/kg	3.15				
Benzene	10 mg/kg	0.25				
GRO+DRO+MRO		735				

\*Concentrations of stabilized cuttings determined using component concentrations inserted into the follow formula:

3:1 Stabilized Cuttings = [inner pit cell+ (3.5\*outer pit cell)/4.5] + (mixing dirt\*3) 4

EPA Method 418.1 measures carbon-hydrogen bonds (hydrocarbons) and is not specific to petroleum-based material. Several analytical laboratories have informed us that many non-petroleum organic additives used during drilling (e.g. cellulose, pine pulp, vegetable oils, cottonseed hulls, nut shells) will be captured by the 418.1 analytical method. Method 418.1 can also capture other naturally-occurring material in a sample such as dry grass and humic material in topsoil. For example, TPH concentrations of grass (14,000 mg/kg), pine needles (16,000 mg/kg), and oak leaves (18,000 mg/kg)<sup>1</sup> would not meet the Table II concentration limits and the Commission did not intend that the in-place burial limit for TPH include hydrocarbons associated with leaves or pine pulp.

We conclude that TPH by 418.1 captures a broader spectrum of hydrocarbons than was envisioned by the Commission when evaluating the burial standards for drilling solids. In contrast, TPH by 8015M (GRO+DRO+MRO) appears to better reflect the intent of the Commission as reflected in the Findings of Fact, which state (emphasis added):

P. The Commission finds that constituents reflected in Tables I and II (other than chloride), benzene, and toluene, ethylbenzene and xylene (a compound commonly referred to as BTEX), as well as the *gasoline range organics* ("*GRO*") and diesel range organics ("*DRO*"), which are compounds in the total petroleum hydrocarbons ("*TPH*"), are light aromatics. While they are soluble and are able to travel to groundwater, they are slower than chlorides in unsaturated flow, which is why chlorides are used as the outer boundary marker for contaminates. Moreover, the light aromatics are volatile, particularly benzene, which is highly volatile. The resident time for light aromatics is very short, and they will evaporate quickly and degrade in the soil. This is

<sup>&</sup>lt;sup>1</sup> "Frequently Asked Questions About TPH Analytical Methods for Crude Oil" see <u>http://www.api.org/environment-health-and-safety/environmental-performance/~/~/media/cd8032db1be74914a6b3c816bab33786.ashx</u>



Hall Environmental Analysis Laboratory 4901 Hawkins NE Albuquerque, NM 87109 TEL: 505-345-3975 FAX: 505-345-4107 Website: <u>www.hallenvironmental.com</u>

March 17, 2015

Mike Stubblefield R.T. Hicks Consultants, LTD 901 Rio Grande Blvd. NW Suite F-142 Albuquerque, NM 87104 TEL: (505) 266-5004 FAX (505) 266-0745

RE: Caravan St. Unit #9H pit

OrderNo.: 1503293

Dear Mike Stubblefield:

Hall Environmental Analysis Laboratory received 3 sample(s) on 3/6/2015 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 <u>www.hallenvironmental.com</u> 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 qualifers 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,

ander

Andy Freeman Laboratory Manager 4901 Hawkins NE Albuquerque, NM 87109

**Analytical Report** Lab Order 1503293 Date Reported: 3/17/2015

### Hall Environmental Analysis Laboratory, Inc.

CLIENT: R.T. Hicks Consultants, LTD

Caravan St. Unit #9H pit

Project:

Client Sample ID: 4pt Outer Comp Collection Date: 3/4/2015 11:45:00 AM Previved Date: 3/6/2015 10:45:00 AM

Lab ID: 1503293-001	Matrix:	SOIL		<b>Received Date:</b> 3/6/2015 10:45:00 AM					
Analyses	Result RL Qual Units DF Da		Date Analyzed	Batch					
EPA METHOD 8015D: DIESEL RANG	E ORGANICS					Analyst	JME		
Diesel Range Organics (DRO)	2200	110		mg/Kg	10	3/10/2015 10:15:20 PM	18038		
Motor Oil Range Organics (MRO)	1800	530		mg/Kg	10	3/10/2015 10:15:20 PM	18038		
Surr: DNOP	0	63.5-128	S	%REC	10	3/10/2015 10:15:20 PM	18038		
EPA METHOD 8015D: GASOLINE RA	NGE					Analyst	: NSB		
Gasoline Range Organics (GRO)	260	5.0		mg/Kg	1	3/11/2015 12:33:30 PM	18043		
Surr: BFB	432	80-120	S	%REC	1	3/11/2015 12:33:30 PM	18043		
EPA METHOD 8021B: VOLATILES						Analyst	: NSB		
Benzene	1.3	0.050		mg/Kg	1	3/11/2015 12:33:30 PM	18043		
Toluene	12	0.50		mg/Kg	10	3/12/2015 2:54:27 AM	18043		
Ethylbenzene	3.5	0.050		mg/Kg	1	3/11/2015 12:33:30 PM	18043		
Xylenes, Total	16	1.0		mg/Kg	10	3/12/2015 2:54:27 AM	18043		
Surr: 4-Bromofluorobenzene	188	80-120	S	%REC	1	3/11/2015 12:33:30 PM	18043		
EPA METHOD 300.0: ANIONS						Analyst	LGT		
Chloride	12000	750		mg/Kg	500	) 3/11/2015 12:44:44 PM	18083		

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

Qualifiers:	*	Value exceeds Maximum Contaminant Level.	В	Analyte detected in the associated Method Blank

- H Holding times for preparation or analysis exceeded
  - ND Not Detected at the Reporting Limit Page 1 of 8
  - Р Sample pH Not In Range
  - RL Reporting Detection Limit
- Value exceeds Maximum Contaminant Level.
- E Value above quantitation range J
- Analyte detected below quantitation limits
- 0 RSD is greater than RSDlimit
- R RPD outside accepted recovery limits
- Spike Recovery outside accepted recovery limits S

**Analytical Report** Lab Order 1503293 Date Reported: 3/17/2015

### Hall Environmental Analysis Laboratory, Inc.

CLIENT: R.T. Hicks Consultants, LTD

**Project:** Caravan St. Unit #9H pit

Client Sample ID: 4pt Inner Comp Collection Date: 3/4/2015 12:10:00 PM Previved Date: 3/6/2015 10:45:00 AM

Lab ID: 1503293-002	Matrix:	SOIL		<b>Received Date:</b> 3/6/2015 10:45:00 AM					
Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch		
EPA METHOD 8015D: DIESEL RANG	E ORGANICS					Analyst	: JME		
Diesel Range Organics (DRO)	ND	9.6		mg/Kg	1	3/10/2015 10:36:51 PM	18038		
Motor Oil Range Organics (MRO)	ND	48		mg/Kg	1	3/10/2015 10:36:51 PM	18038		
Surr: DNOP	104	63.5-128		%REC	1	3/10/2015 10:36:51 PM	18038		
EPA METHOD 8015D: GASOLINE RA	NGE					Analyst	: NSB		
Gasoline Range Organics (GRO)	17	5.0		mg/Kg	1	3/11/2015 1:02:14 PM	18043		
Surr: BFB	127	80-120	S	%REC	1	3/11/2015 1:02:14 PM	18043		
EPA METHOD 8021B: VOLATILES						Analyst	: NSB		
Benzene	ND	0.050		mg/Kg	1	3/11/2015 1:02:14 PM	18043		
Toluene	0.20	0.050		mg/Kg	1	3/11/2015 1:02:14 PM	18043		
Ethylbenzene	0.14	0.050		mg/Kg	1	3/11/2015 1:02:14 PM	18043		
Xylenes, Total	0.48	0.10		mg/Kg	1	3/11/2015 1:02:14 PM	18043		
Surr: 4-Bromofluorobenzene	120	80-120		%REC	1	3/11/2015 1:02:14 PM	18043		
EPA METHOD 300.0: ANIONS						Analyst	: LGT		
Chloride	140000	7500		mg/Kg	5E	3/16/2015 12:32:27 PM	18083		

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

Qualifiers:	*	Value exceeds Maximum Contaminant Level.
	Е	Value above quantitation range
	J	Analyte detected below quantitation limits
	0	RSD is greater than RSDlimit
	R	RPD outside accepted recovery limits
	S	Spike Recovery outside accepted recovery limits

- В Analyte detected in the associated Method Blank
- Н Holding times for preparation or analysis exceeded ND
  - Not Detected at the Reporting Limit Page 2 of 8
- Р Sample pH Not In Range
- RL Reporting Detection Limit

Analytical Report Lab Order 1503293 Date Reported: 3/17/2015

### Hall Environmental Analysis Laboratory, Inc.

CLIENT: R.T. Hicks Consultants, LTD

**Project:** Caravan St. Unit #9H pit

Client Sample ID: 5 pt Mixing Dirt Collection Date: 3/4/2015 12:15:00 PM Received Date: 3/6/2015 10:45:00 AM

Lab ID: 1503293-003	Matrix:	SOIL	Received	<b>Received Date:</b> 3/6/2015 10:45:00 AM					
Analyses	Result RL Qual		Qual Units	DF	Date Analyzed	Batch			
EPA METHOD 8015D: DIESEL RANGE	E ORGANICS				Analyst	: JME			
Diesel Range Organics (DRO)	ND	11	mg/Kg	1	3/10/2015 10:58:11 PM	18038			
Motor Oil Range Organics (MRO)	ND	54	mg/Kg	1	3/10/2015 10:58:11 PM	18038			
Surr: DNOP	103	63.5-128	%REC	1	3/10/2015 10:58:11 PM	18038			
EPA METHOD 8015D: GASOLINE RAI	NGE				Analyst	: NSB			
Gasoline Range Organics (GRO)	ND	5.0	mg/Kg	1	3/11/2015 1:30:58 PM	18043			
Surr: BFB	93.6	80-120	%REC	1	3/11/2015 1:30:58 PM	18043			
EPA METHOD 8021B: VOLATILES					Analyst	: NSB			
Benzene	ND	0.050	mg/Kg	1	3/11/2015 1:30:58 PM	18043			
Toluene	ND	0.050	mg/Kg	1	3/11/2015 1:30:58 PM	18043			
Ethylbenzene	ND	0.050	mg/Kg	1	3/11/2015 1:30:58 PM	18043			
Xylenes, Total	ND	0.099	mg/Kg	1	3/11/2015 1:30:58 PM	18043			
Surr: 4-Bromofluorobenzene	109	80-120	%REC	1	3/11/2015 1:30:58 PM	18043			
EPA METHOD 300.0: ANIONS					Analyst	: LGT			
Chloride	51	30	mg/Kg	20	3/11/2015 1:21:58 PM	18083			

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

- \* Value exceeds Maximum Contaminant Level.
  - E Value above quantitation range
  - J Analyte detected below quantitation limits
- O RSD is greater than RSDlimit

**Oualifiers:** 

- R RPD outside accepted recovery limits
- S Spike Recovery outside accepted recovery limits
- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit Page 3 of 8
- P Sample pH Not In Range
- RL Reporting Detection Limit

Client: Project:	R.T. H Carava	licks Consultants, LTD an St. Unit #9H pit				
Sample ID	MB-18083	SampType: MBLK	TestCode: EPA Method	300.0: Anions		
Client ID:	PBS	Batch ID: 18083	RunNo: 24785			
Prep Date:	3/11/2015	Analysis Date: 3/11/2015	SeqNo: 730064	Units: mg/Kg		
Analyte		Result PQL SPK value	SPK Ref Val %REC LowLimit	HighLimit %RPD	RPDLimit Qual	I
Chloride		ND 1.5				
Sample ID	LCS-18083	SampType: LCS	TestCode: EPA Method	300.0: Anions		
Client ID:	LCSS	Batch ID: 18083	RunNo: 24785			
Prep Date:	3/11/2015	Analysis Date: 3/11/2015	SeqNo: 730065	Units: mg/Kg		
Analyte		Result PQL SPK value	SPK Ref Val %REC LowLimit	HighLimit %RPD	RPDLimit Qual	I
Chloride		14 1.5 15.00	0 92.0 90	110		

#### Qualifiers:

- \* Value exceeds Maximum Contaminant Level.
- E Value above quantitation range
- J Analyte detected below quantitation limits
- O RSD is greater than RSDlimit
- R RPD outside accepted recovery limits
- S Spike Recovery outside accepted recovery limits
- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
  - P Sample pH Not In Range
  - RL Reporting Detection Limit
- - at the Deporting Limit

Page 4 of 8

1503293 17-Mar-15

WO#:

Client: R.T. Hic Project: Caravan	ks Consultants St. Unit #9H p	, LTD vit							
Sample ID MB-18038	SampType	MBLK	TestCode: EPA Method 8015D: Diesel Range Organics						
Client ID: PBS	Batch ID:	18038	RunNo: 2	24711					
Prep Date: 3/9/2015	Analysis Date:	3/10/2015	SeqNo: 7	28323	Units: mg/Kg				
Analyte	Result P(	QL SPK value	SPK Ref Val %REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Diesel Range Organics (DRO)	ND	10							
Motor Oil Range Organics (MRO)	ND	50							
Surr: DNOP	8.4	10.00	84.2	63.5	128				
Sample ID LCS-18038	SampType	LCS	TestCode: E	PA Method	8015D: Diesel	Range C	Organics		
Client ID: LCSS	Batch ID:	18038	RunNo: 2	24711					
Prep Date: 3/9/2015	Analysis Date:	3/10/2015	SeqNo: 7	28325	Units: mg/Kg				

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	45	10	50.00	0	90.9	67.8	130			
Surr: DNOP	4.5		5.000		89.3	63.5	128			

#### Qualifiers:

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- S Spike Recovery outside accepted recovery limits
- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
  - P Sample pH Not In Range
  - RL Reporting Detection Limit

Client: Project:	R.T. Hick Caravan S	ts Consultants St. Unit #9H p	, LTD it										
Sample ID	MB-18044	SampType	MBLK	Tes	tCode: EPA Meth	nod 8015D: Gasol	line Rang	e					
Client ID:	PBS	Batch ID:	18044	F	RunNo: <b>24730</b>								
Prep Date:	3/9/2015	Analysis Date:	3/10/2015	S	SeqNo: 728732	Units: %REC	)						
Analyte		Result P	QL SPK value	SPK Ref Val	%REC LowLin	mit HighLimit	%RPD	RPDLimit	Qual				
Surr: BFB		900	1000		89.5	80 120							
Sample ID	LCS-18044	SampType	LCS	Tes	tCode: EPA Meth	nod 8015D: Gaso	line Rang	е					
Client ID:	LCSS	Batch ID:	18044	F	RunNo: <b>24730</b>								
Prep Date:	3/9/2015	Analysis Date:	3/10/2015	S	SeqNo: <b>728733</b>	Units: %REC	Units: %REC						
Analyte		Result P	QL SPK value	SPK Ref Val	%REC LowLin	mit HighLimit	%RPD	RPDLimit	Qual				
Surr: BFB		1100	1000		108	80 120							
Sample ID	MB-18043	SampType	MBLK	Tes	tCode: EPA Meth	nod 8015D: Gaso	line Rang	e					
Client ID:	PBS	Batch ID:	18043	F	RunNo: <b>24730</b>								
Prep Date:	3/9/2015	Analysis Date:	3/10/2015	5	SeqNo: <b>728754</b>	Units: mg/K	g						
Analyte		Result P	QL SPK value	SPK Ref Val	%REC LowLin	mit HighLimit	%RPD	RPDLimit	Qual				
Gasoline Range	Organics (GRO)	ND	5.0										
Surr: BFB		910	1000		90.8	80 120							
Sample ID	LCS-18043	SampType	LCS	Tes	tCode: EPA Meth	nod 8015D: Gaso	line Rang	e					
Client ID:	LCSS	Batch ID:	18043	F	RunNo: <b>24730</b>								
Prep Date:	3/9/2015	Analysis Date:	3/10/2015	S	SeqNo: 728755	Units: mg/K	g						
Analyte		Result P	QL SPK value	SPK Ref Val	%REC LowLin	mit HighLimit	%RPD	RPDLimit	Qual				
Gasoline Range	Organics (GRO)	26	5.0 25.00	0	105	64 130							
Surr: BFB		980	1000		97.5	80 120							
Sample ID	LCSD-18043	SampType	LCSD	Tes	tCode: EPA Meth	nod 8015D: Gaso	line Rang	e					
Client ID:	LCSS02	Batch ID:	18043	F	RunNo: <b>24730</b>								
Prep Date:	3/9/2015	Analysis Date:	3/10/2015	S	SeqNo: <b>728756</b>	Units: %REC	Units: %REC						
Analyte		Result P	QL SPK value	SPK Ref Val	%REC LowLin	mit HighLimit	%RPD	RPDLimit	Qual				
Surr: BFB		990					0	0					

#### **Qualifiers:**

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- O RSD is greater than RSDlimit
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- S Spike Recovery outside accepted recovery limits
- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
  - P Sample pH Not In Range
  - RL Reporting Detection Limit

Client: Project:	R.T. H Carava	licks Consulta an St. Unit #9	ants, LT H pit	ΓD									
Sample ID	MB-18044	SampT	ype: ME	BLK	Tes	tCode: El	PA Method	8021B: Vola	tiles				
Client ID:	PBS	Batch	n ID: 18	044	R	anNo: 24	4730						
Prep Date:	3/9/2015	Analysis D	ate: 3/	10/2015	S	SeqNo: 7	28766	Units: %RE	С				
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual		
Surr: 4-Bron	nofluorobenzene	1.0		1.000		102	80	120					
Sample ID	LCS-18044	SampT	ype: LC	s	Tes	tCode: El	PA Method	8021B: Vola	tiles				
Client ID:	LCSS	Batch	n ID: 18	044	R	anNo: 24	4730						
Prep Date:	3/9/2015	Analysis D	ate: 3/	10/2015	S	SeqNo: 7	28767	Units: %RE	С				
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual		
Surr: 4-Bron	nofluorobenzene	1.1		1.000		112	80	120					
Sample ID	MB-18043	SampT	ype: ME	BLK	Tes	tCode: El	PA Method	8021B: Vola	tiles				
Client ID:	PBS	Batch	n ID: 18	043	R	anNo: 24	4730						
Prep Date:	3/9/2015	Analysis D	ate: 3/	10/2015	S	SeqNo: 7	28781	Units: <b>mg/k</b>	٢g				
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual		
Benzene		ND	0.050										
Toluene		ND	0.050										
Ethylbenzene		ND	0.050										
Xylenes, Total	<b>A I</b>	ND	0.10	4 000		400		100					
Surr: 4-Bron	nonuorobenzene	1.0		1.000		103	80	120					
Sample ID	LCS-18043	SampT	ype: LC	S	Tes	tCode: El	PA Method	8021B: Vola	tiles				
Client ID:	LCSS	Batch	n ID: <b>18</b>	043	R	RunNo: 24	4730						
Prep Date:	3/9/2015	Analysis D	ate: 3/	10/2015	S	SeqNo: 7	28782	Units: mg/k	Units: mg/Kg				
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual		
Benzene		1.1	0.050	1.000	0	111	76.6	128					
Toluene		1.1	0.050	1.000	0	109	75	124					
Ethylbenzene		1.1	0.050	1.000	0	109	79.5	126					
Surr: 4-Bron	nofluorobenzene	3.2 1.1	0.10	1.000	U	108	78.8 80	124					
Sample ID	LCSD-180/3	SamoT			Tos	tCode: E	PA Method	8021B: Vola	tilos				
Client ID:	LCSS02	Batch	D: 18	043	R	lunNo: 24	4730						
Prep Date:	3/9/2015	Analysis D	ate: 3/	10/2015	S	SeqNo: 7	28783	Units: mg/k	٢g				
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual		
Benzene		1.1	0.050	1.000	0	107	76.6	128	3.68	20			
Toluene		1.1	0.050	1.000	0	105	75	124	3.09	20			
Ethylbenzene		1.1	0.050	1.000	0	107	79.5	126	2.53	20			
Xylenes, Total		3.2	0.10	3.000	0	106	78.8	124	1.71	20			

#### **Qualifiers:**

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- E Value above quantitation range
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- S Spike Recovery outside accepted recovery limits
- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- P Sample pH Not In Range
- RL Reporting Detection Limit

Page 7 of 8

WO#:	1503293
	17-Mar-15

Client:	R.T. I	licks Consult	ants, L	ГD										
Project:	Carav	an St. Unit #9	H pit											
Sample ID	LCSD-18043	SampT	ype: LC	SD	TestCode: EPA Method 8021B: Volatiles									
Client ID:	LCSS02	Batch	n ID: 18	043	RunNo: <b>24730</b>									
Prep Date:	Prep Date: 3/9/2015		Analysis Date: 3/10/2015			SeqNo: 7	28783	Units: mg/h	٢g					
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual			
Surr: 4-Bromofluorobenzene		1.1		1.000		111	80	120	0					

#### **Qualifiers:**

- \* Value exceeds Maximum Contaminant Level.
- Е Value above quantitation range
- J Analyte detected below quantitation limits
- RSD is greater than RSDlimit 0
- R RPD outside accepted recovery limits
- S Spike Recovery outside accepted recovery limits
- В Analyte detected in the associated Method Blank
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- ND Not Detected at the Reporting Limit
  - Р Sample pH Not In Range
  - RL Reporting Detection Limit

Page 8 of 8

#### HALL ENVIRONMENTAL ANALYSIS LABORATORY

#### Hall Environmental Analysis Laboratory 4901 Hawkins NE Albuquerque, NM 87109 TEL: 505-345-3975 FAX: 505-345-4107 Website: www.hallenvironmental.com

Sample Log-In Check List

Client Name: RT HICKS	Work Order Number:	1503293		RcptNo:	1
Received by/date: AT 03/06/15				,	
Logged By: Anne Thorne	3/6/2015 10:45:00 AM		arne Im		
Completed By: Anne Thorne	3/9/2015		Ann Alina		
Reviewed By:	moult				
Chain of Custody	(/>···(!)				
1 Custody seals intact on sample bottles?	2	Yes	No 🗌	Not Present 🗹	
2. Is Chain of Custody complete?		Yes 🗹	No 🗌	Not Present	
3. How was the sample delivered?		<u>Client</u>			
<u>Log In</u>					
4. Was an attempt made to cool the samples?	,	Yes 🗹	No 🗌	na 🗌	
5. Were all samples received at a temperature	of >0° C to 6.0°C	Yes 🗹	No 🗌	na 🗌	
6. Sample(s) in proper container(s)?		Yes 🔽	No 🗌		
7. Sufficient sample volume for indicated test(s	3)?	Yes 🗹	No 🗌		
8. Are samples (except VOA and ONG) proper	ly preserved?	Yes 🗹	No 🗌		
9. Was preservative added to bottles?		Yes 🗌	No 🔽	NA 🗔	
10.VOA vials have zero headspace?		Yes 🗌	No 🗌	No VOA Vials 🗹	
11. Were any sample containers received broke	en?	Yes 🗆	No 🗹 🛛	# of preserved	
12. Does paperwork match bottle labels?		Yes 🗹	No 🗆	bottles checked for pH:	or >12 unless noted)
13 Are matrices correctly identified on Chain of	Custodv?	Yes 🗹	No 🗆	Adjusted?	
14 Is it clear what analyses were requested?		Yes 🔽	No 🗆		
15. Were all holding times able to be met? (If no, notify customer for authorization.)		Yes 🗹	No 🗌	Checked by:	
Special Handling (if applicable)					
16. Was client notified of all discrepancies with	this order?	Yes 🗌	No 🗆	NA 🗹	

Person Notified:		 	Da	te							
By Whom:		 	Via	a:	🗌 eMa	il 🗌	Phone [	_ Fax	🗌 In F	Person	
Regarding:		 				·					
<b>Client Instructions</b>	:							<u> </u>			

17. Additional remarks:

#### 18. Cooler Information

Cooler No	Temp ℃	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	1.2	Good	Not Present			

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Suitt E F- M3     Ranueration       Mail Project Name:     Analysis Regent       Mail Project Name:     Project Name:       Mail Project Name:     Analysis Regent       Mail Project Name:     Project Name:       Mail Project Name:     Project Name: </th <th>Infertion   Ant VS15   Laboration     Infertion   Interview   Interview   Interview     Interview   Interview   Interview   Interview     Interview</th> <th>International Standards     And LYSIS LABORATORY       And Kin Grand, Blud NW     Project Name:       And Kin Kin Standard     Project Name:       All Fill     Pro</th> <th>Indit   Arritical Consultants   Standard     Indit   Arritical Consultants   Arainada Blud Niul     India Address:   Sunda Blud Niul     India Address   Sunda Blud Niul     India Addres   Sunda Blud Niul <!--</th--><th>Instructure   Average     Instructure   Average     Instructure</th></th> | Infertion   Ant VS15   Laboration     Infertion   Interview   Interview   Interview     Interview   Interview   Interview   Interview     Interview | International Standards     And LYSIS LABORATORY       And Kin Grand, Blud NW     Project Name:       And Kin Kin Standard     Project Name:       All Fill     Pro | Indit   Arritical Consultants   Standard     Indit   Arritical Consultants   Arainada Blud Niul     India Address:   Sunda Blud Niul     India Address   Sunda Blud Niul     India Addres   Sunda Blud Niul </th <th>Instructure   Average     Instructure   Average     Instructure</th> | Instructure   Average     Instructure |

ŝ - A <u>R</u> 2 If necessary. samples submitted to 'Hall Environmental may be particularly true during closure and mixing. The benzene level that is reflected in Tables I and II, is lower than the levels recommended by the American Petroleum Institute, and GRO and DRO, while they could affect the odor and taste of water, are not a matter of concern with respect to toxicity. *The other compounds in TPH, the oil range organics and asphaltenes, are made up of large molecules and are not sufficiently mobile to pose a concern for human health or fresh water.* 

## Demonstration that the Variance Will Provide Equal or Better Protection of Fresh Water, Public Health and the Environment

The modified Method 8015 uses solvent extraction followed by gas chromatography and is more widely used in the regulation of the petroleum industry than the 418.1. The evaluation of TPH using method 8015M (GRO+DRO+MRO) provide a more accurate representation of the *petroleum* hydrocarbons without interference from organic, biodegradable, drilling additives such as vegetable/pine oils, cottonseed hulls, and nuts shells, which we believe are not intended for regulation. Our analyses of drilling pit solids demonstrates how "total" TPH results from 418.1 do not contribute to the protection of fresh water relative to SPLP (synthetic precipitation leaching procedure) TPH analysis by 418.1 with respect to the potential of the hydrocarbon to migrate into the underlying groundwater via leaching or into the root zone via wicking upward.

Reviewing the analyses of seven sample sets from five Murchison pits in 2014, the percentage of TPH by SPLP relative to "total" TPH ranges from 0% to 1.42%. This is likely because nearly all of the TPH in the stabilized cutting samples at this site are from the insoluble (or nearly insoluble) matter. The TPH analysis using the SPLP sample preparation method provides a better understanding of the actual risks to human health and the environment than the "total" TPH analysis, but currently there are no regulatory standard concentrations established for samples prepared by SPLP.

GRO+DRO+MRO analysis by 8015M offers greater characterization of leacheability by reporting actual petroleum hydrocarbon concentrations by their known chromatograph fingerprints. TPH using Method 418.1 is not the best indicator for risk to human health or the environment and we do not believe it was the intent of the Pit Rule to preclude in-place closure of a temporary pit due to non-petroleum organic matter, either naturally-occurring or in drilling additives. We believe that the approval of a variance allowing the use of TPH by method 8015M (GRO+DRO+MRO) in place of TPH by method 418.1 for comparison to the existing TPH standard (2,500 mg/kg) will provide equal or better protection of fresh water, public health, and the environment.