



June 22, 2010

Linda Spry O'Rourke  
COGCC  
707 Wapiti Court  
Suite 204  
Rifle, CO 81650

**RE: BBC PAD UPPER PIT SEEP  
TRACKING NUMBER 2606777  
GARFIELD COUNTY, CO**

Dear Ms. Spry O'Rourke:

This report has been prepared to present to you the Corrective Actions that have been taken and those that are planned in order to respond to the issues identified in the Notice of Alleged Violation (NOAV) issued to Bill Barrett Corporation (BBC) by the COGCC on May 21, 2010.

## **ALLEGED VIOLATION**

The alleged violation for this NOAV is an unauthorized release of E & P waste from the upper pit at the BBC pad location. Samples collected immediately following the discovery of this seep indicate that the seeping fluid is likely from the upper pit.

The NOAV also states that the release has impacted Waters of the State because of the pad's location in an unnamed intermittent drainage basin. BBC agrees that the pad is located within an unnamed intermittent drainage basin but does not concur that this indicates that there have been impacts to Waters of the State.

This location was reviewed prior to construction for drainage issues and assessed by Olsson Associates (Olsson), a third-party consultant, following the receipt of the NOAV, for review of the drainage basin and any impacts to the intermittent drainage. Olsson has extensive experience in the determination and delineation of Waters of the State and wetlands for US Army Corp of Engineers and assessing existing and threatened impacts to the same. During the site review, Olsson determined that all fluids that are seeping onto the lower pad are contained on location and that no impacts have migrated off location to affect or threaten the intermittent drainage down gradient of the site. Please see the Drainage Review report prepared by Olsson which is attached as Appendix A.

112 Red Feather Trail  
Silt, CO 81652  
P 970-876-1959  
F 970-876-0981

To ensure that no impacts have been made to groundwater, BBC will be investigating the extent of impacts from the release as detailed in the attached Form 27. Part of this investigation will be determining the vertical extent of subsurface impacts and the sampling and analysis of area groundwater sources.

## **CORRECTIVE ACTIONS**

1. A sample of the upper pit and the seep water was collected on May 13, 2010. In order to eliminate any further impacts from occurring, BBC drained the upper pit immediately. Therefore no additional samples could be collected from the pit after the NOAV was received by BBC. On May 24, 2010, Olsson Associates sampled the seep and submitted a sample for the analytical suite requested by you and in the NOAV. The data for these samples has been summarized and included in Appendix B. The laboratory analytical reports are also attached. The final lab report for the May 24, 2010 sample will be provided to you as soon as it becomes available.
2. As requested, an as-built drawing showing the upper pit construction has been provided as Appendix C.
3. As discussed with you, the pit will be relined as detailed in the BBC Upper Pit Relining detail attached as Appendix D. The design will include a double liner and a leak detection system. The leak detection system will be monitored on a regular basis to ensure liner integrity.
4. The upper pit has been used for completions operations. In addition to receiving produced water, there are also chemical products that may be present in very low percentages within the pit water due to their use in both the production and completion processes. The MSDS sheets for these chemical products are attached as Appendix E.
5. A Form 27 has been prepared for your review and approval. It, along with the domestic well/spring sampling plan, is attached as Appendix F.

If you have any questions regarding the information presented in this report, please contact me at (970)-876-1959.

Sincerely,



Scott Ghan  
Environmental Health and Safety Coordinator

Attachments

**APPENDIX A**

**BBC PAD DRAINAGE REVIEW (OLSSON)**



June 14, 2010

Mr. Scott Ghan  
Bill Barrett Corporation  
112 Red Feather Trail  
Silt, Colorado 81652

RE: Bill Barrett Corporation – BBC Pad Drainage Review  
Garfield County, Colorado

Dear Mr. Ghan:

This report summarizes the assessment of the BBC Pad site and its relation to the nearest intermittent drainage. The site assessment was conducted on May 26, 2010.

#### SITE LOCATION

The site is located in Garfield County, Colorado. The site legal description is the SE Quarter of the NE Quarter, Section 23, Township 6 South, and Range 92 West of the 6th Principal Meridian. See Figure 1 for the Site Location.

#### DRAINAGE REVIEW

As indicated by the Notice of Alleged Violation issued to Bill Barrett Corporation (BBC) on May 21, 2010, the BBC Pad is built in the drainage basin of an unnamed intermittent tributary of Divide Creek. The intermittent stream associated with this drainage basin lies approximately 1,500 feet to the North of the site.

The site itself sits in a small depression up gradient of this stream. This low area, immediately up gradient and down gradient of the site, does not exhibit a definable ordinary high water mark indicative of a channel that carries seasonal flow (See Photographic Log). Therefore, this area does not fit into the standard definition of an ephemeral or an intermittent drainage.

#### SURFACE AFFECTS TO STREAM

A review of the pad stormwater controls, the “Seep” area, and other potential pollution sources were reviewed to determine if any impacts to the intermittent stream down gradient of the site had occurred or threatened to occur. No issues were identified at the time of the site visit.

If you have any questions regarding the information presented in this report, please contact me at (970) 263-7800.

Sincerely,

Olsson Associates

A handwritten signature in black ink, appearing to read "Stuart Hall". The signature is written in a cursive, flowing style.

Stuart Hall  
Environmental Scientist

**Photographic Log  
BBC PAD DRAINAGE REVIEW  
5/26/2010**

**PHOTO 1**



View of the depression looking up gradient from the BBC pad site. The low lying area in the photo is approximately 50 feet south of the pad. There is no outlet channel observed down gradient from this site.

**PHOTO 2**



Closer view of the depression looking south from the BBC pad site. There is no definable ordinary high water mark observed.

**PHOTO 3**



View of the depression looking north towards the BBC pad site.

**Photographic Log**  
**BBC PAD DRAINAGE REVIEW**  
**5/26/2010**

**PHOTO 4**



Closer view of the depression looking north towards the BBC pad site. There is no definable ordinary high water mark observed.

**PHOTO 5**



View of the depression looking directly down gradient from the BBC pad site. The intermittent drainage approximately 1500 feet north of the site is observed at the top of the photo.

**PHOTO 6**



Closer view of the depression looking south towards the intermittent drainage. There is no definable ordinary high water mark observed.

**APPENDIX B**  
**PIT AND SEEP ANALYTICAL DATA**

## Analytical Data Summary

Sample Date	5/13/2010	5/13/2010	5/24/2010	units
Sample ID	SP-1	SE-1	SE-1	
Sample Description	Pit Water	Seep Water	Seep Water	
TDS	10900	8270	NT	mg/L
Conductivity	16900	12600	NT	µS/cm
pH	7.76	7.82	NT	
Alkalinity, Bicarbonate (as CaCO3)	NT	NT	1110	mg/L
Alkalinity, Carbonate (as CaCO3)	NT	NT	2.09	mg/L
Alkalinity, Hydroxide	NT	NT	ND	mg/L
Fluoride	NT	NT	8.67	mg/L
Sulfate	NT	NT	766	mg/L
Nitrate as N	NT	NT	ND	mg/L
Chloride	3880	3820	3190	mg/L
Bromide	NT	NT	26.2	mg/L
Chlorate	NT	NT	ND	mg/L
Chlorite	NT	NT	ND	mg/L
Ortho-Phosphate as P	NT	NT	ND	mg/L
<b>Total Petroleum Hydrocarbons</b>				
Gasoline (C6-C10)	18.7	ND	ND	mg/L
Diesel (C10-C28)	11.6	ND	ND	mg/L
<b>Dissolved Metals</b>				
Potassium	NT	NT	18500	µg/L
Lithium	NT	NT	653	µg/L
Manganese	NT	NT	20600	µg/L
Molybdenum	NT	NT	35.6	µg/L
Nickel	NT	NT	54.4	µg/L
Selenium	NT	NT	ND	µg/L
Silica	NT	NT	ND	µg/L
Silver	NT	NT	ND	µg/L
Strontium	NT	NT	16100	µg/L
Vanadium	NT	NT	ND	µg/L
Cadmium	NT	NT	ND	µg/L
Thallium	NT	NT	3.98	µg/L
Iron	NT	NT	61.5	µg/L
Copper	NT	NT	36.4	µg/L
Cobalt	NT	NT	89.7	µg/L
Zinc	NT	NT	10.3	µg/L
Calcium	NT	NT	553000	µg/L
Magnesium	NT	NT	447000	µg/L
Boron	NT	NT	1480	µg/L
Beryllium	NT	NT	ND	µg/L
Barium	NT	NT	184	µg/L
Arsenic	NT	NT	8.61	µg/L
Antimony	NT	NT	ND	µg/L
Chromium	NT	NT	5.06	µg/L
Lead	NT	NT	ND	µg/L
Uranium	NT	NT	74.0	µg/L
<b>Semi VOCs</b>				
1,2,4-Trichlorobenzene	NT	NT	ND	µg/L
1,2-Dichlorobenzene	NT	NT	ND	µg/L
1,2-Diphenylhydrazine	NT	NT	ND	µg/L
1,3-Dichlorobenzene	NT	NT	ND	µg/L

Sample Date	5/13/2010	5/13/2010	5/24/2010	
Sample ID	SP-1	SE-1	SE-1	
2-Chlorophenol	NT	NT	ND	µg/L
2,4,5-Trichlorophenol	NT	NT	ND	µg/L
Hexachlorocyclopentadiene	NT	NT	ND	µg/L
2,4,6-Trichlorophenol	NT	NT	ND	µg/L
2,4-Dimethylphenol	NT	NT	3.29	µg/L
2,4-Dinitrotoluene	NT	NT	ND	µg/L
2,6-Dinitrotoluene	NT	NT	ND	µg/L
2-Chloronaphthalene	NT	NT	ND	µg/L
1,4-Dichlorobenzene	NT	NT	ND	µg/L
Hexachlorobutadiene	NT	NT	ND	µg/L
2,4-Dinitrophenol	NT	NT	ND	µg/L
Hexachloroethane	NT	NT	ND	µg/L
Isophorone	NT	NT	ND	µg/L
N-Nitrosodimethylamine	NT	NT	ND	µg/L
N-Nitrosodiphenylamine	NT	NT	ND	µg/L
Nitrobenzene	NT	NT	ND	µg/L
Pentachlorophenol	NT	NT	ND	µg/L
Phenol	NT	NT	16.4	µg/L
Pyridine	NT	NT	ND	µg/L
Dimethyl Phthalate	NT	NT	ND	µg/L
Hexachlorobenzene	NT	NT	ND	µg/L
bis(2-ethylhexyl) phthalate	NT	NT	0.87	µg/L
Benzidine	NT	NT	ND	µg/L
Benzyl Alcohol	NT	NT	0.96	µg/L
2,4-Dichlorophenol	NT	NT	ND	µg/L
bis(2-chloroethoxy) methane	NT	NT	ND	µg/L
Aniline (Phenylamine, Aminobenzene)	NT	NT	ND	µg/L
bis(2-chloroisopropyl) ether	NT	NT	ND	µg/L
Benzoic Acid	NT	NT	35.3	µg/L
Carbazole	NT	NT	ND	µg/L
Cyclohexanone	NT	NT	ND	µg/L
di-n-Butyl Phthalate	NT	NT	0.55	µg/L
di-n-Octyl Phthalate	NT	NT	ND	µg/L
Dibenzofuran	NT	NT	ND	µg/L
Diethyl Phthalate	NT	NT	ND	µg/L
bis(2-chloroethyl) ether	NT	NT	ND	µg/L
3,3-Dichlorobenzidine	NT	NT	ND	µg/L
2-Nitroaniline	NT	NT	ND	µg/L
Benzyl Butyl Phthalate	NT	NT	ND	µg/L
4-Nitrophenol	NT	NT	ND	µg/L
2-methylphenol	NT	NT	14.5	µg/L
3&4-Methylphenol	NT	NT	12.6	µg/L
2-Nitrophenol	NT	NT	ND	µg/L
3-Nitroaniline	NT	NT	ND	µg/L
4,6-dinitro-2-methyl phenol	NT	NT	ND	µg/L
4-Bromophenyl-phenylether	NT	NT	ND	µg/L
4-chloro-3-methylphenol	NT	NT	ND	µg/L
4-Chloroaniline	NT	NT	ND	µg/L
4-Chlorophenyl Phenyl Ether	NT	NT	ND	µg/L
4-Nitroaniline	NT	NT	ND	µg/L
Dibenz(a,h)anthracene	NT	NT	ND	µg/L
Fluoranthene	NT	NT	0.037	µg/L
Indeno(1,2,3-c,d)Pyrene	NT	NT	ND	µg/L

Sample Date	5/13/2010	5/13/2010	5/24/2010	
Sample ID	SP-1	SE-1	SE-1	
Chrysene	NT	NT	ND	µg/L
Phenanthrene	NT	NT	ND	µg/L
Pyrene	NT	NT	ND	µg/L
Benzo(k)fluoranthene	NT	NT	ND	µg/L
Fluorene	NT	NT	ND	µg/L
Naphthalene	NT	NT	0.592	µg/L
Benzo(g,h,i)perylene	NT	NT	ND	µg/L
1-Methylnaphthalene	NT	NT	0.037	µg/L
2-Methylnaphthalene	NT	NT	0.058	µg/L
Acenaphthene	NT	NT	ND	µg/L
Anthracene	NT	NT	ND	µg/L
Benzo(a)anthracene	NT	NT	ND	µg/L
Benzo(a)pyrene	NT	NT	ND	µg/L
Benzo(b)fluoranthene	NT	NT	ND	µg/L
Acenaphthylene	NT	NT	ND	µg/L
Alkalinity, Total (as CaCO3)	NT	NT	1110	mg/L
<b>VOCs</b>				
1,1,1,2-Tetrachloroethane	NT	NT	ND	mg/L
1,1,1-Trichloroethane	NT	NT	ND	mg/L
1,1,2,2-Tetrachloroethane	NT	NT	ND	mg/L
1,1,2-Trichloroethane	NT	NT	ND	mg/L
1,1-Dichloroethane	NT	NT	ND	mg/L
1,1-Dichloroethene	NT	NT	ND	mg/L
1,1-Dichloropropene	NT	NT	ND	mg/L
1,2,3-Trichlorobenzene	NT	NT	ND	mg/L
1,2,3-Trichloropropane	NT	NT	ND	mg/L
1,2,4-Trichlorobenzene	NT	NT	ND	mg/L
1,2,4-Trimethylbenzene	NT	NT	0.0034	mg/L
1,2-Dibromo-3-chloropropane	NT	NT	ND	mg/L
1,2-Dibromoethane (EDB)	NT	NT	ND	mg/L
1,2-Dichlorobenzene	NT	NT	ND	mg/L
1,2-Dichloroethane	NT	NT	ND	mg/L
1,2-Dichloropropane	NT	NT	ND	mg/L
1,3,5-Trimethylbenzene	NT	NT	0.0071	mg/L
1,3-Dichlorobenzene	NT	NT	ND	mg/L
1,3-Dichloropropane	NT	NT	ND	mg/L
1,4-Dichlorobenzene	NT	NT	ND	mg/L
1-Butanol	NT	NT	ND	mg/L
2,2-Dichloropropane	NT	NT	ND	mg/L
2-Butanone	NT	NT	0.0677	mg/L
2-Chloroethyl vinyl ether	NT	NT	ND	mg/L
2-Chlorotoluene	NT	NT	ND	mg/L
2-Hexanone	NT	NT	ND	mg/L
4-Chlorotoluene	NT	NT	ND	mg/L
4-Isopropyltoluene	NT	NT	ND	mg/L
4-Methyl-2-pentanone	NT	NT	0.0055	mg/L
Acetone	NT	NT	5.09	mg/L
Acetonitrile	NT	NT	ND	mg/L
Benzene	1.61	0.00258	0.318	mg/L
Bromochloromethane	NT	NT	ND	mg/L
Bromodichloromethane	NT	NT	ND	mg/L
Bromoform	NT	NT	ND	mg/L
Bromomethane	NT	NT	ND	mg/L

Sample Date	5/13/2010	5/13/2010	5/24/2010	
Sample ID	SP-1	SE-1	SE-1	
Carbon disulfide	NT	NT	ND	mg/L
Carbon tetrachloride	NT	NT	ND	mg/L
Chlorobenzene	NT	NT	ND	mg/L
Chloroethane	NT	NT	ND	mg/L
Chloromethane	NT	NT	ND	mg/L
Cyclohexane	NT	NT	ND	mg/L
Dibromomethane	NT	NT	ND	mg/L
cis-1,2-Dichloroethene	NT	NT	ND	mg/L
cis-1,3-Dichloropropene	NT	NT	ND	mg/L
Ethylbenzene	0.205	ND	0.0066	mg/L
Dibromochloromethane	NT	NT	ND	mg/L
Hexachlorobutadiene	NT	NT	ND	mg/L
Iodomethane	NT	NT	ND	mg/L
Isopropylbenzene	NT	NT	ND	mg/L
m,p-Xylene	NT	NT	0.102	mg/L
Methyl Acetate	NT	NT	ND	mg/L
Methyl tert-Butyl Ether	NT	NT	ND	mg/L
Methylcyclohexane	NT	NT	ND	mg/L
Naphthalene	NT	NT	0.0248	mg/L
sec-Butylbenzene	NT	NT	ND	mg/L
n-Butylbenzene	NT	NT	ND	mg/L
n-Propylbenzene	NT	NT	ND	mg/L
o-Xylene	NT	NT	0.0278	mg/L
Styrene	NT	NT	ND	mg/L
Tetrachloroethene	NT	NT	ND	mg/L
Toluene	3.17	0.00325	0.421	mg/L
trans-1,2-Dichloroethene	NT	NT	ND	mg/L
trans-1,3-Dichloropropene	NT	NT	ND	mg/L
Trichloroethene	NT	NT	ND	mg/L
Trichlorofluoromethane	NT	NT	ND	mg/L
Vinyl acetate	NT	NT	ND	mg/L
Vinyl chloride	NT	NT	ND	mg/L
Total Xylenes	3.10000	0.00100	NT	mg/L

NT - Analyte not tested

mg/L - milligrams per liter

µS/cm - microSeimens per centimeter

ND - Not detected

µg/L - micrograms per liter

pending - analytical data still pending from lab



6/18/2010

Olsson Associates

Ken Kreie

826 21 1/2 Road

Grand Junction

CO

81505

Project Name- BBC - Pad Seep

Project Number- 010-0974

Attached are your analytical results for BBC - Pad Seep received by Origins Laboratory, Inc. May 25, 2010 11:00 am. This project is associated with Origins project number X005161-01 .

The analytical results in the following report were analyzed under the guidelines of EPA Methods specified in SW-846. The analytical results apply specifically to the samples and analyses specified per the attached Chain of Custody.

Thank you for selecting Origins for your analytical needs. Please contact us with any questions concerning this report, or if we can help with anything at all,

Origins Laboratory, Inc.  
303.433.1322  
o-squad@oelabinc.com



Olsson Associates  
826 21 1/2 Road  
Grand Junction CO 81505

Ken Kreie  
Project Number: 010-0974  
Project: BBC - Pad Seep

## CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Sampled	Date Received
SE-1	X005161-01	Water	5/24/2010 12:30:00PM	05/25/2010 11:00

Origins Laboratory, Inc.



*The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.*

Noelle E Doyle, Laboratory Manager

Page 3 of 29

Olsson Associates  
826 21 1/2 Road  
Grand Junction CO 81505

Ken Kreie  
Project Number: 010-0974  
Project: BBC - Pad Seep

## SE-1

5/24/2010 12:30:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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## XENCO

X005161-01 (Water)

### Bicarbonate by SM2320B

Alkalinity, Bicarbonate (as CaCO <sub>3</sub> )	1110	1	mg/L	1	809541	06/07/2010	06/07/2010
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### Carbonate by SM2320B

Alkalinity, Carbonate (as CaCO <sub>3</sub> )	2.09	1	mg/L	1	809541	"	06/07/2010
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### Cations by EPA 300

Fluoride	8.67	2	mg/L	10	808354	05/26/2010	05/26/2010
Sulfate	766	5	"	"	"	"	"
Nitrate as N	ND	0.5	"	"	"	"	"
Chloride	3190	5	"	"	"	"	" L
Bromide	26.2	5	"	"	"	"	"
Nitrite as N	ND	0.5	"	"	"	"	"

### GRO (TVPH)/DRO (TEPH)by EPA 8015M

Gasoline (C6-C10)	ND	5.00	mg/L	1	OE26002	05/26/2010	05/27/2010
Diesel (C10-C28)	ND	5.00	"	"	"	"	"

Surrogate: o-Terphenyl	90.7 %	60-130	"	"	"
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### Hydroxide by SM2320B

Origins Laboratory, Inc.



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Noelle E Doyle, Laboratory Manager

Olsson Associates  
826 21 1/2 Road  
Grand Junction CO 81505

Ken Kreie  
Project Number: 010-0974  
Project: BBC - Pad Seep

**SE-1****5/24/2010 12:30:00PM**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**XENCO****X005161-01 (Water)****Hydroxide by SM2320B**

Alkalinity, Hydroxide	ND	1	mg/L	1	809541	06/07/2010	06/07/2010
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**Metals by SW6010B**

Potassium	18500	1000	ug/L	1	809137	05/27/2010	06/04/2010
Lithium	653	100	"	"	"	"	"
Manganese	20600	15	"	"	"	"	"
Molybdenum	35.6	5	"	"	"	"	"
Nickel	54.4	10	"	"	"	"	"
Selenium	ND	30	"	"	"	"	"
Silica	ND	642	"	"	"	"	"
Silver	ND	20	"	"	"	"	"
Strontium	16100	15	"	"	"	"	"
Vanadium	ND	20	"	"	"	"	"
Cadmium	ND	5	"	"	"	"	"
Thallium	3.98	20	"	"	"	"	"
Iron	61.5	100	"	"	"	"	"
Copper	36.4	20	"	"	"	"	"
Cobalt	89.7	10	"	"	"	"	"
Zinc	10.3	25	"	"	"	"	"
Calcium	553000	200	"	"	"	"	"
Magnesium	447000	200	"	"	"	"	"
Boron	1480	25	"	"	"	"	"

Origins Laboratory, Inc.



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Noelle E Doyle, Laboratory Manager

Olsson Associates  
826 21 1/2 Road  
Grand Junction CO 81505

Ken Kreie  
Project Number: 010-0974  
Project: BBC - Pad Seep

## SE-1

5/24/2010 12:30:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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## XENCO

X005161-01 (Water)

### Metals by SW6010B

Beryllium	ND	4	ug/L	1	809137	05/27/2010	06/04/2010	
Barium	184	10	"	"	"	"	"	
Arsenic	8.61	10	"	"	"	"	"	I
Antimony	ND	20	"	"	"	"	"	
Chromium	5.06	5	"	"	"	"	"	
Lead	ND	10	"	"	"	"	"	

### Ortho-Phosphate as P by EPA 365.1

Ortho-Phosphate as P	ND	0.02	mg/L	1	809463	05/26/2010	05/26/2010	
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### Semivolatile Organic Compounds (SVOCs) by SW8270C

1,2,4-Trichlorobenzene	ND	4	ug/L	1	808792	05/28/2010	05/28/2010	
1,2-Dichlorobenzene	ND	4	"	"	"	"	"	
1,2-Diphenylhydrazine	ND	4	"	"	"	"	"	
1,3-Dichlorobenzene	ND	4	"	"	"	"	"	
2-Chlorophenol	ND	4	"	"	"	"	"	
2,4,5-Trichlorophenol	ND	4	"	"	"	"	"	
Hexachlorocyclopentadiene	ND	4	"	"	"	"	"	
2,4,6-Trichlorophenol	ND	1	"	"	"	"	"	
2,4-Dimethylphenol	3.29	4	"	"	"	"	"	I
2,4-Dinitrotoluene	ND	0.45	"	"	"	"	"	

Origins Laboratory, Inc.



*The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.*

Noelle E Doyle, Laboratory Manager

Olsson Associates  
826 21 1/2 Road  
Grand Junction CO 81505

Ken Kreie  
Project Number: 010-0974  
Project: BBC - Pad Seep

## SE-1

5/24/2010 12:30:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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## XENCO

X005161-01 (Water)

### Semivolatile Organic Compounds (SVOCs) by SW8270C

2,6-Dinitrotoluene	ND	0.39	ug/L	1	808792	05/28/2010	05/28/2010	
2-Chloronaphthalene	ND	4	"	"	"	"	"	
1,4-Dichlorobenzene	ND	4	"	"	"	"	"	
Hexachlorobutadiene	ND	4	"	"	"	"	"	
2,4-Dinitrophenol	ND	10	"	"	"	"	"	
Hexachloroethane	ND	2	"	"	"	"	"	
Isophorone	ND	4	"	"	"	"	"	
N-Nitrosodimethylamine	ND	4	"	"	"	"	"	
N-Nitrosodiphenylamine	ND	4	"	"	"	"	"	
Nitrobenzene	ND	4	"	"	"	"	"	
Pentachlorophenol	ND	10	"	"	"	"	"	
Phenol	16.4	1	"	"	"	"	"	
Pyridine	ND	10	"	"	"	"	"	
Dimethyl Phthalate	ND	1	"	"	"	"	"	
Hexachlorobenzene	ND	1	"	"	"	"	"	
bis(2-ethylhexyl) phthalate	0.87	4	"	"	"	"	"	I, V
Benzidine	ND	10	"	"	"	"	"	
Benzyl Alcohol	0.96	4	"	"	"	"	"	I
2,4-Dichlorophenol	ND	0.53	"	"	"	"	"	
bis(2-chloroethoxy) methane	ND	4	"	"	"	"	"	
Aniline (Phenylamine, Aminobenzene)	ND	4	"	"	"	"	"	
bis(2-chloroisopropyl) ether	ND	4	"	"	"	"	"	

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Olsson Associates  
826 21 1/2 Road  
Grand Junction CO 81505

Ken Kreie  
Project Number: 010-0974  
Project: BBC - Pad Seep

## SE-1

5/24/2010 12:30:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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## XENCO

X005161-01 (Water)

### Semivolatile Organic Compounds (SVOCs) by SW8270C

Benzoic Acid	35.3	50	ug/L	1	808792	05/28/2010	05/28/2010	I
Carbazole	ND	4	"	"	"	"	"	
Cyclohexanone	ND		"	"	"	"	"	
di-n-Butyl Phthalate	0.55	4	"	"	"	"	"	I
di-n-Octyl Phthalate	ND	1	"	"	"	"	"	
Dibenzofuran	ND	10	"	"	"	"	"	
Diethyl Phthalate	ND	1	"	"	"	"	"	
bis(2-chloroethyl) ether	ND	4	"	"	"	"	"	
3,3-Dichlorobenzidine	ND	4	"	"	"	"	"	
2-Nitroaniline	ND	50	"	"	"	"	"	
Benzyl Butyl Phthalate	ND	10	"	"	"	"	"	
4-Nitrophenol	ND	10	"	"	"	"	"	
2-methylphenol	14.5	4	"	"	"	"	"	
3&4-Methylphenol	12.6	4	"	"	"	"	"	
2-Nitrophenol	ND	4	"	"	"	"	"	
3-Nitroaniline	ND	50	"	"	"	"	"	
4,6-dinitro-2-methyl phenol	ND	10	"	"	"	"	"	
4-Bromophenyl-phenylether	ND	4	"	"	"	"	"	
4-chloro-3-methylphenol	ND	4	"	"	"	"	"	
4-Chloroaniline	ND	4	"	"	"	"	"	
4-Chlorophenyl Phenyl Ether	ND	4	"	"	"	"	"	
4-Nitroaniline	ND	50	"	"	"	"	"	

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## SE-1

5/24/2010 12:30:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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## XENCO

X005161-01 (Water)

### Semivolatile Organic Compounds (SVOCs) by SW8270C

Surrogate: 2,4,6-Tribromophenol	78 %	48-132			808792	05/28/2010	05/28/2010
Surrogate: Nitrobenzene-d5	83 %	8-130			"	"	"
Surrogate: Phenol-d6	34 %	10-59			"	"	"
Surrogate: Terphenyl-D14	92 %	27-133			"	"	"
Surrogate: 2-Fluorobiphenyl	83 %	19-126			"	"	"
Surrogate: 2-Fluorophenol	41 %	28-62			"	"	"

### Semivolatile Organic Compounds (SVOCs) by SW8270D

Dibenz(a,h)anthracene	ND	0.2	ug/L	1	808786	05/28/2010	05/29/2010
Fluoranthene	0.037	1	"	"	"	"	"
Indeno(1,2,3-c,d)Pyrene	ND	0.1	"	"	"	"	"
Chrysene	ND	0.1	"	"	"	"	"
Phenanthrene	ND	1	"	"	"	"	"
Pyrene	ND	0.1	"	"	"	"	"
Benzo(k)fluoranthene	ND	0.1	"	"	"	"	"
Fluorene	ND	1	"	"	"	"	"
Naphthalene	0.592	1	"	"	"	"	"
Benzo(g,h,i)perylene	ND	0.1	"	"	"	"	"
1-Methylnaphthalene	0.037	1	"	"	"	"	"
2-Methylnaphthalene	0.058	1	"	"	"	"	"
Acenaphthene	ND	1	"	"	"	"	"
Anthracene	ND	1	"	"	"	"	"

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## SE-1

5/24/2010 12:30:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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## XENCO

X005161-01 (Water)

### Semivolatile Organic Compounds (SVOCs) by SW8270D

Benzo(a)anthracene	ND	0.1	ug/L	1	808786	05/28/2010	05/29/2010	
Benzo(a)pyrene	ND	0.1	"	"	"	"	"	
Benzo(b)fluoranthene	ND	0.1	"	"	"	"	"	
Acenaphthylene	ND	1	"	"	"	"	"	

Surrogate: Nitrobenzene-d5	70 %	10-112			"	"	"	
Surrogate: Terphenyl-D14	65 %	20-128			"	"	"	
Surrogate: 2-Fluorobiphenyl	75 %	10-116			"	"	"	

### Total Alkalinity by SM2320B

Alkalinity, Total (as CaCO3)	1110	1	mg/L	1	809541	06/07/2010	06/07/2010	
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### VOC by EPA 8260B

1,1,1,2-Tetrachloroethane	ND	0.0010	mg/L	1	0E27001	05/27/2010	05/27/2010	
1,1,1-Trichloroethane	ND	0.0010	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	0.0010	"	"	"	"	"	
1,1,2-Trichloroethane	ND	0.0010	"	"	"	"	"	
1,1-Dichloroethane	ND	0.0010	"	"	"	"	"	
1,1-Dichloroethene	ND	0.0010	"	"	"	"	"	
1,1-Dichloropropene	ND	0.0010	"	"	"	"	"	

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## SE-1

5/24/2010 12:30:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.  
X005161-01 (Water)

### VOC by EPA 8260B

1,2,3-Trichlorobenzene	ND	0.0010	mg/L	1	OE27001	05/27/2010	05/27/2010	
1,2,3-Trichloropropane	ND	0.0010	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	0.0010	"	"	"	"	"	
1,2,4-Trimethylbenzene	0.0034	0.0010	"	"	"	"	"	
1,2-Dibromo-3-chloropropane	ND	0.0010	"	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	0.0010	"	"	"	"	"	
1,2-Dichlorobenzene	ND	0.0010	"	"	"	"	"	
1,2-Dichloroethane	ND	0.0010	"	"	"	"	"	
1,2-Dichloropropane	ND	0.0010	"	"	"	"	"	
1,3,5-Trimethylbenzene	0.0071	0.0010	"	"	"	"	"	
1,3-Dichlorobenzene	ND	0.0010	"	"	"	"	"	
1,3-Dichloropropane	ND	0.0010	"	"	"	"	"	
1,4-Dichlorobenzene	ND	0.0010	"	"	"	"	"	
1-Butanol	ND	0.100	"	"	"	"	"	
2,2-Dichloropropane	ND	0.0010	"	"	"	"	"	
2-Butanone	0.0677	0.0050	"	"	"	"	"	
2-Chloroethyl vinyl ether	ND	0.0050	"	"	"	"	"	
2-Chlorotoluene	ND	0.0010	"	"	"	"	"	
2-Hexanone	ND	0.0010	"	"	"	"	"	
4-Chlorotoluene	ND	0.0010	"	"	"	"	"	
4-Isopropyltoluene	ND	0.0010	"	"	"	"	"	
4-Methyl-2-pentanone	0.0055	0.0050	"	"	"	"	"	

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## SE-1

5/24/2010 12:30:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.  
X005161-01 (Water)

### VOC by EPA 8260B

Acetone	5.09	0.0800	mg/L	20	OE27001	05/27/2010	05/27/2010	
Acetonitrile	ND	0.0250	"	1	"	"	05/27/2010	
Benzene	0.318	0.0200	"	20	"	"	05/27/2010	
Bromochloromethane	ND	0.0010	"	1	"	"	05/27/2010	
Bromodichloromethane	ND	0.0010	"	"	"	"	"	
Bromoform	ND	0.0010	"	"	"	"	"	
Bromomethane	ND	0.0010	"	"	"	"	"	
Carbon disulfide	ND	0.0010	"	"	"	"	"	
Carbon tetrachloride	ND	0.0010	"	"	"	"	"	
Chlorobenzene	ND	0.0010	"	"	"	"	"	
Chloroethane	ND	0.0010	"	"	"	"	"	
Chloromethane	ND	0.0010	"	"	"	"	"	
Cyclohexane	ND	0.0010	"	"	"	"	"	
Dibromomethane	ND	0.0010	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	0.0010	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	0.0010	"	"	"	"	"	
Ethylbenzene	0.0066	0.0010	"	"	"	"	"	
Dibromochloromethane	ND	0.0010	"	"	"	"	"	
Hexachlorobutadiene	ND	0.0010	"	"	"	"	"	
Iodomethane	ND	0.0010	"	"	"	"	"	
Isopropylbenzene	ND	0.0010	"	"	"	"	"	
m,p-Xylene	0.102	0.0020	"	"	"	"	"	

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## SE-1

5/24/2010 12:30:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.  
X005161-01 (Water)

### VOC by EPA 8260B

Methyl Acetate	ND	0.0050	mg/L	1	OE27001	05/27/2010	05/27/2010	
Methyl tert-Butyl Ether	ND	0.0010	"	"	"	"	"	
Methylcyclohexane	ND	0.0010	"	"	"	"	"	
Naphthalene	0.0248	0.0010	"	"	"	"	"	
sec-Butylbenzene	ND	0.0010	"	"	"	"	"	
n-Butylbenzene	ND	0.0010	"	"	"	"	"	
n-Propylbenzene	ND	0.0010	"	"	"	"	"	
o-Xylene	0.0278	0.0010	"	"	"	"	"	
Styrene	ND	0.0010	"	"	"	"	"	
Tetrachloroethene	ND	0.0010	"	"	"	"	"	
Toluene	0.421	0.0200	"	20	"	"	05/27/2010	
trans-1,2-Dichloroethene	ND	0.0010	"	1	"	"	05/27/2010	
trans-1,3-Dichloropropene	ND	0.0010	"	"	"	"	"	
Trichloroethene	ND	0.0010	"	"	"	"	"	
Trichlorofluoromethane	ND	0.0010	"	"	"	"	"	
Vinyl acetate	ND	0.0050	"	"	"	"	"	
Vinyl chloride	ND	0.0010	"	"	"	"	"	

Surrogate: 1,2-Dichloroethane-d4	98.5 %	82.4-114	"	"	"
Surrogate: 4-Bromofluorobenzene	105 %	85.5-122	"	"	"
Surrogate: Toluene-d8	102 %	91.1-120	"	"	"

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Project Number: 010-0974  
Project: BBC - Pad Seep

### Extractable Petroleum Hydrocarbons by 8015M - Quality Control Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch OE26002 - Default Prep GC-Semi</b>										
<b>Blank (OE26002-BLK1)</b>					Prepared: 05/26/2010 Analyzed: 05/27/2010					
Gasoline (C6-C10)	ND	5.00	mg/L							
Diesel (C10-C28)	ND	5.00	"							
Surrogate: o-Terphenyl	46.8		mL	50.0		93.6	60-130			
<b>Blank (OE26002-BLK2)</b>					Prepared: 05/26/2010 Analyzed: 05/27/2010					
Gasoline (C6-C10)	ND	5.00	mg/L							
Diesel (C10-C28)	ND	5.00	"							
Surrogate: o-Terphenyl	47.7		mL	50.0		95.4	60-130			
<b>LCS (OE26002-BS1)</b>					Prepared: 05/26/2010 Analyzed: 05/27/2010					
Gasoline (C6-C10)	11.4	5.00	mg/L				65-140			
Diesel (C10-C28)	41.7	5.00	"	50.0		83.3	60-140			
Surrogate: o-Terphenyl	48.8		mL	50.0		97.7	60-130			
<b>LCS (OE26002-BS2)</b>					Prepared: 05/26/2010 Analyzed: 05/27/2010					
Gasoline (C6-C10)	11.3	5.00	mg/L				65-140			
Diesel (C10-C28)	41.3	5.00	"	50.0		82.7	60-140			
Surrogate: o-Terphenyl	49.1		mL	50.0		98.1	60-130			
<b>Matrix Spike (OE26002-MS1)</b>					Source: X005134-01	Prepared: 05/26/2010 Analyzed: 05/27/2010				
Gasoline (C6-C10)	10.8	5.00	mg/L		ND		65-130			
Diesel (C10-C28)	38.8	5.00	"	50.0	ND	77.5	60-140			
Surrogate: o-Terphenyl	52.8		mL	50.0		106	60-130			
<b>Matrix Spike (OE26002-MS2)</b>					Source: X005134-02	Prepared: 05/26/2010 Analyzed: 05/27/2010				
Gasoline (C6-C10)	11.5	5.00	mg/L		ND		65-130			
Diesel (C10-C28)	41.5	5.00	"	50.0	ND	83.0	60-140			
Surrogate: o-Terphenyl	53.1		mL	50.0		106	60-130			

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Project Number: 010-0974  
Project: BBC - Pad Seep

## Extractable Petroleum Hydrocarbons by 8015M - Quality Control Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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### Batch OE26002 - Default Prep GC-Semi

Matrix Spike Dup (OE26002-MSD1)		Source: X005134-01			Prepared: 05/26/2010 Analyzed: 05/27/2010					
Gasoline (C6-C10)	12.3	5.00	mg/L		ND		65-130	12.8	20	
Diesel (C10-C28)	44.3	5.00	"	50.0	ND	88.7	60-140	13.4	25	
Surrogate: o-Terphenyl	53.3		mL	50.0		107	60-130			
Matrix Spike Dup (OE26002-MSD2)		Source: X005134-02			Prepared: 05/26/2010 Analyzed: 05/27/2010					
Gasoline (C6-C10)	12.4	5.00	mg/L		ND		65-130	7.14	20	
Diesel (C10-C28)	43.5	5.00	"	50.0	ND	87.0	60-140	4.63	25	
Surrogate: o-Terphenyl	53.0		mL	50.0		106	60-130			

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## Volatile Organic Compounds by EPA Method 8260B - Quality Control Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch OE27001 - EPA 5030B

Blank (OE27001-BLK1)

Prepared: 05/27/2010 Analyzed: 05/27/2010

1,1,1,2-Tetrachloroethane	ND	0.001	mg/L
1,1,1-Trichloroethane	ND	0.001	"
1,1,2,2-Tetrachloroethane	ND	0.001	"
1,1,2-Trichloroethane	ND	0.001	"
1,1-Dichloroethane	ND	0.001	"
1,1-Dichloroethene	ND	0.001	"
1,1-Dichloropropene	ND	0.001	"
1,2,3-Trichlorobenzene	ND	0.001	"
1,2,3-Trichloropropane	ND	0.001	"
1,2,4-Trichlorobenzene	ND	0.001	"
1,2,4-Trimethylbenzene	ND	0.001	"
1,2-Dibromo-3-chloropropane	ND	0.001	"
1,2-Dibromoethane (EDB)	ND	0.001	"
1,2-Dichlorobenzene	ND	0.001	"
1,2-Dichloroethane	ND	0.001	"
1,2-Dichloropropane	ND	0.001	"
1,3,5-Trimethylbenzene	ND	0.001	"
1,3-Dichlorobenzene	ND	0.001	"
1,3-Dichloropropane	ND	0.001	"
1,4-Dichlorobenzene	ND	0.001	"
1-Butanol	ND	0.1	"
2,2-Dichloropropane	ND	0.001	"
2-Butanone	ND	0.005	"
2-Chloroethyl vinyl ether	ND	0.005	"
2-Chlorotoluene	ND	0.001	"
2-Hexanone	ND	0.001	"

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## Volatile Organic Compounds by EPA Method 8260B - Quality Control Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch OE27001 - EPA 5030B

Blank (OE27001-BLK1)

Prepared: 05/27/2010 Analyzed: 05/27/2010

4-Chlorotoluene	ND	0.001	mg/L
4-Isopropyltoluene	ND	0.001	"
4-Methyl-2-pentanone	ND	0.005	"
Acetone	ND	0.004	"
Acetonitrile	ND	0.02	"
Benzene	ND	0.001	"
Bromochloromethane	ND	0.001	"
Bromodichloromethane	ND	0.001	"
Bromoform	ND	0.001	"
Bromomethane	ND	0.001	"
Carbon disulfide	ND	0.001	"
Carbon tetrachloride	ND	0.001	"
Chlorobenzene	ND	0.001	"
Chloroethane	ND	0.001	"
Chloromethane	ND	0.001	"
Cyclohexane	ND	0.001	"
Dibromomethane	ND	0.001	"
cis-1,2-Dichloroethene	ND	0.001	"
cis-1,3-Dichloropropene	ND	0.001	"
Ethylbenzene	ND	0.001	"
Dibromochloromethane	ND	0.001	"
Hexachlorobutadiene	ND	0.001	"
Iodomethane	ND	0.001	"
Isopropylbenzene	ND	0.001	"
m,p-Xylene	ND	0.002	"
Methyl Acetate	ND	0.005	"

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## Volatile Organic Compounds by EPA Method 8260B - Quality Control Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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### Batch OE27001 - EPA 5030B

#### Blank (OE27001-BLK1)

Prepared: 05/27/2010 Analyzed: 05/27/2010

Methyl tert-Butyl Ether	ND	0.001	mg/L
Methylcyclohexane	ND	0.001	"
Naphthalene	ND	0.001	"
sec-Butylbenzene	ND	0.001	"
n-Butylbenzene	ND	0.001	"
n-Propylbenzene	ND	0.001	"
o-Xylene	ND	0.001	"
Styrene	ND	0.001	"
Tetrachloroethene	ND	0.001	"
Toluene	ND	0.001	"
trans-1,2-Dichloroethene	ND	0.001	"
trans-1,3-Dichloropropene	ND	0.001	"
Trichloroethene	ND	0.001	"
Trichlorofluoromethane	ND	0.001	"
Vinyl acetate	ND	0.005	"
Vinyl chloride	ND	0.001	"

Surrogate: 1,2-Dichloroethane-d4	60.9	ug/L	62.5	97.4	82.4-114
Surrogate: 4-Bromofluorobenzene	59.5	"	62.5	95.2	85.5-122
Surrogate: Toluene-d8	59.6	"	62.5	95.3	91.1-120

#### LCS (OE27001-BS1)

Prepared: 05/27/2010 Analyzed: 05/27/2010

Benzene	0.06	0.001	mg/L	0.0500	114	80.1-129
Chlorobenzene	0.05	0.001	"	0.0500	102	84.1-121
Toluene	0.06	0.001	"	0.0500	110	71.2-128
Trichloroethene	0.06	0.001	"	0.0500	112	81.5-119
Surrogate: 1,2-Dichloroethane-d4	63.8		ug/L	62.5	102	82.4-114
Surrogate: 4-Bromofluorobenzene	62.6		"	62.5	100	85.5-122
Surrogate: Toluene-d8	62.0		"	62.5	99.2	91.1-120

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Noelle E Doyle, Laboratory Manager

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Ken Kreie  
Project Number: 010-0974  
Project: BBC - Pad Seep

## Volatile Organic Compounds by EPA Method 8260B - Quality Control Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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### Batch OE27001 - EPA 5030B

Matrix Spike (OE27001-MS1)		Source: X005170-03			Prepared: 05/27/2010 Analyzed: 05/27/2010					
Benzene	0.1	0.001	mg/L	0.0500	0.06	106	71.3-131			
Chlorobenzene	0.05	0.001	"	0.0500	ND	98.6	77.9-130			
Toluene	0.05	0.001	"	0.0500	ND	106	70.1-131			
Trichloroethene	0.06	0.001	"	0.0500	ND	110	72.3-128			
Surrogate: 1,2-Dichloroethane-d4	62.2		ug/L	62.5		99.5	82.4-114			
Surrogate: 4-Bromofluorobenzene	63.8		"	62.5		102	85.5-122			
Surrogate: Toluene-d8	61.9		"	62.5		99.0	91.1-120			
Matrix Spike Dup (OE27001-MSD1)		Source: X005170-03			Prepared: 05/27/2010 Analyzed: 05/27/2010					
Benzene	0.1	0.001	mg/L	0.0500	0.06	107	71.3-131	0.239	25	
Chlorobenzene	0.05	0.001	"	0.0500	ND	103	77.9-130	4.36	25	
Toluene	0.05	0.001	"	0.0500	ND	109	70.1-131	3.22	25	
Trichloroethene	0.06	0.001	"	0.0500	ND	114	72.3-128	3.91	25	
Surrogate: 1,2-Dichloroethane-d4	62.5		ug/L	62.5		100	82.4-114			
Surrogate: 4-Bromofluorobenzene	63.6		"	62.5		102	85.5-122			
Surrogate: Toluene-d8	61.6		"	62.5		98.6	91.1-120			

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## Cations by EPA 300 - Quality Control XENCO

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch 808354 - E300P</b>										
<b>MS (374238-001 S)</b>		<b>Source: 374238-001 S</b>			<b>Prepared: 05/26/2010 Analyzed: 05/26/2010</b>					
Fluoride	4.88	0.2	mg/L	5.00	0.186	94	90-110	0	20	
Nitrate as N	1.21	0.05	"	1.13	0.127	96	90-110	0	20	
Sulfate	63.4	0.5	"	5.00	65.3		90-110	0	20	
Bromide	4.91	0.5	"	5.00	40.500	98	90-110	0	20	
Nitrite as N	1.56	0.05	"	1.52	40.050	103	90-110	0	20	
<b>MSD (374238-001 SD)</b>		<b>Source: 374238-001 SD</b>			<b>Prepared: 05/26/2010 Analyzed: 05/26/2010</b>					
Nitrite as N	1.67	0.05	mg/L	1.52	40.050	110	90-110	7	20	
Nitrate as N	1.25	0.05	"	1.13	0.127	99	90-110	3	20	
Fluoride	4.99	0.2	"	5.00	0.186	96	90-110	2	20	
Bromide	5.4	0.5	"	5.00	40.500	108	90-110	10	20	
Sulfate	64	0.5	"	5.00	65.3		90-110		20	
<b>LCS (564342-1-BKS)</b>		<b>Source: 564342-1-BKS</b>			<b>Prepared: 05/26/2010 Analyzed: 05/26/2010</b>					
Nitrate as N	1.22	0.05	mg/L	1.13	40.007	108	90-110	0	20	
Bromide	5.18	0.5	"	5.00	40.052	104	90-110	0	20	
Sulfate	5.44	0.5	"	5.00	40.076	109	90-110	0	20	
Nitrite as N	1.67	0.05	"	1.52	40.005	110	90-110	0	20	
Fluoride	5.36	0.2	"	5.00	40.030	107	90-110	0	20	
<b>BLANK (564342-1-BLK)</b>		<b>Source: 564342-1-BLK</b>			<b>Prepared: 05/26/2010 Analyzed: 05/26/2010</b>					
Bromide	ND	0.5	mg/L	0.00			-	0	20	
Sulfate	ND	0.5	"	0.00			-	0	20	
Fluoride	ND	0.2	"	0.00			-	0	20	
Nitrate as N	ND	0.05	"	0.00			-	0	20	
Nitrite as N	ND	0.05	"	0.00			-	0	20	

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Ken Kreie  
Project Number: 010-0974  
Project: BBC - Pad Seep

## Metals by SW6010B - Quality Control XENCO

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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### Batch 809137 - SW3010A

LCS (564300-1-BKS)		Source: 564300-1-BKS			Prepared: 05/27/2010 Analyzed: 06/03/2010					
Zinc	914	25	ug/L	1000	45.30	91	75-125	0	20	
Vanadium	932	20	"	1000	45.60	93	75-125	0	20	
Chromium	917	5	"	1000	41.10	92	75-125	0	20	
Thallium	951	20	"	1000	43.90	95	75-125	0	20	
Silica	ND	642	"	0.00	4109.0		75-125	0	30	
Strontium	941	15	"	1000	41.50	94	75-125	0	20	
Silver	487	20	"	500	41.60	97	75-125	0	20	
Iron	4550	100	"	5000	445.0	91	75-125	0	20	
Antimony	915	20	"	1000	43.80	92	75-125	0	20	
Arsenic	918	10	"	1000	44.60	92	75-125	0	20	
Barium	915	10	"	1000	42.00	92	75-125	0	20	
Beryllium	923	4	"	1000	40.670	92	75-125	0	20	
Boron	980	25	"	1000	43.40	98	75-125	0	20	
Cadmium	946	5	"	1000	40.570	95	75-125	0	20	
Copper	911	20	"	1000	49.60	91	75-125	0	20	
Calcium	22900	200	"	25000	459.0	92	75-125	0	20	
Selenium	940	30	"	1000	45.40	94	75-125	0	20	
Lead	956	10	"	1000	43.10	96	75-125	0	20	
Lithium	874	100	"	1000	411.0	87	75-125	0	20	
Magnesium	22900	200	"	25000	445.0	92	75-125	0	20	
Manganese	911	15	"	1000	44.40	91	75-125	0	20	
Molybdenum	922	5	"	1000	43.00	92	75-125	0	20	
Nickel	931	10	"	1000	45.20	93	75-125	0	20	
Potassium	9010	1000	"	10000	4350	90	75-125	0	20	
Cobalt	911	10	"	1000	40.720	91	75-125	0	20	

### BLANK (564300-1-BLK)

Source: 564300-1-BLK

Prepared: 05/27/2010 Analyzed: 06/03/2010

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Project Number: 010-0974  
Project: BBC - Pad Seep

## Metals by SW6010B - Quality Control XENCO

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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### Batch 809137 - SW3010A

BLANK (564300-1-BLK)		Source: 564300-1-BLK			Prepared: 05/27/2010 Analyzed: 06/03/2010					
Selenium	ND	30	ug/L	1000	-	0	20			
Barium	ND	10	"	1000	-	0	20			
Vanadium	ND	20	"	1000	-	0	20			
Magnesium	ND	200	"	25000	-	0	20			
Manganese	ND	15	"	1000	-	0	20			
Molybdenum	ND	5	"	1000	-	0	20			
Potassium	ND	1000	"	10000	-	0	20			
Silica	ND	642	"	0.00	-	0	30			
Silver	ND	20	"	500	-	0	20			
Strontium	ND	15	"	1000	-	0	20			
Thallium	ND	20	"	1000	-	0	20			
Chromium	ND	5	"	1000	-	0	20			
Antimony	ND	20	"	1000	-	0	20			
Zinc	ND	25	"	1000	-	0	20			
Cadmium	ND	5	"	1000	-	0	20			
Nickel	ND	10	"	1000	-	0	20			
Arsenic	ND	10	"	1000	-	0	20			
Cobalt	ND	10	"	1000	-	0	20			
Beryllium	ND	4	"	1000	-	0	20			
Boron	ND	25	"	1000	-	0	20			
Calcium	ND	200	"	25000	-	0	20			
Lead	ND	10	"	1000	-	0	20			
Iron	ND	100	"	5000	-	0	20			
Copper	ND	20	"	1000	-	0	20			
Lithium	ND	100	"	1000	-	0	20			

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Project: BBC - Pad Seep

## Ortho-Phosphate as P by EPA 365.1 - Quality Control XENCO

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch 809463 - NONE</b>										
<b>MS (374457-001 S)</b>		Source: 374457-001 S			Prepared: 05/26/2010 Analyzed: 05/26/2010					
Ortho-Phosphate as P	0.475	0.02	mg/L	0.500	0.020	95	90-110	0	10	
<b>MSD (374457-001 SD)</b>		Source: 374457-001 SD			Prepared: 05/26/2010 Analyzed: 05/26/2010					
Ortho-Phosphate as P	0.476	0.02	mg/L	0.500	0.020	95	90-110	0	10	
<b>LCS (809463-1-BKS)</b>		Source: 809463-1-BKS			Prepared: 05/26/2010 Analyzed: 05/26/2010					
Ortho-Phosphate as P	0.482	0.02	mg/L	0.500	0.006	96	90-110	0	10	
<b>BLANK (809463-1-BLK)</b>		Source: 809463-1-BLK			Prepared: 05/26/2010 Analyzed: 05/26/2010					
Ortho-Phosphate as P	ND	0.02	mg/L	0.500			-	0	10	

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## Semivolatile Organic Compounds (SVOCs) by SW8270D - Quality Control XENCO

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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### Batch 808786 - SW3510C

MS (374693-001 S)		Source: 374693-001 S			Prepared: 05/28/2010 Analyzed: 05/29/2010					
Pyrene	3.11	0.1	ug/L	5.00	±0.100	62	36-123	0	20	
Dibenz(a,h)anthracene	2.8	0.2	"	5.00	±0.200	56	11-115	0	20	
Fluoranthene	2.99	1	"	5.00	±1.00	60	42-112	0	20	
Fluorene	2.78	1	"	5.00	±1.00	56	25-109	0	20	
Indeno(1,2,3-c,d)Pyrene	2.83	0.1	"	5.00	±0.100	57	16-120	0	20	
Naphthalene	2.49	1	"	5.00	±1.00	50	12-102	0	20	
Phenanthrene	2.9	1	"	5.00	±1.00	58	38-108	0	20	
Benzo(a)anthracene	3.23	0.1	"	5.00	±0.100	65	28-115	0	20	
Chrysene	3.17	0.1	"	5.00	±0.100	63	11-115	0	20	
Benzo(g,h,i)perylene	2.79	0.1	"	5.00	±0.100	56	29-120	0	20	
Benzo(a)pyrene	3.03	0.1	"	5.00	±0.100	61	27-119	0	20	
Anthracene	2.79	1	"	5.00	±1.00	56	39-111	0	20	
Acenaphthylene	2.73	1	"	5.00	±1.00	55	21-109	0	20	
Acenaphthene	2.69	1	"	5.00	±1.000	54	23-100	0	20	
2-Methylnaphthalene	2.51	1	"	5.00	±1.00	50	10-115	0	20	
1-Methylnaphthalene	2.34	1	"	5.00	±1.00	47	10-104	0	20	
Benzo(b)fluoranthene	2.84	0.1	"	5.00	±0.100	57	15-116	0	20	
Benzo(k)fluoranthene	3.28	0.1	"	5.00	±0.100	66	33-122	0	20	
Surrogate: Terphenyl-D14	3.79		PERCENT	5.00		76	20-128			
Surrogate: Nitrobenzene-d5	2.71		"	5.00		54	10-112			
Surrogate: 2-Fluorobiphenyl	2.86		"	5.00		57	10-116			

MSD (374693-001 SD)		Source: 374693-001 SD			Prepared: 05/28/2010 Analyzed: 05/29/2010					
Dibenz(a,h)anthracene	2.78	0.2	ug/L	5.00	±0.200	56	11-115	1	20	
Fluoranthene	2.8	1	"	5.00	±1.00	56	42-112	7	20	
Fluorene	2.33	1	"	5.00	±1.00	47	25-109	18	20	
Indeno(1,2,3-c,d)Pyrene	2.84	0.1	"	5.00	±0.100	57	16-120	0	20	

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## Semivolatile Organic Compounds (SVOCs) by SW8270D - Quality Control XENCO

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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### Batch 808786 - SW3510C

MSD (374693-001 SD)		Source: 374693-001 SD			Prepared: 05/28/2010 Analyzed: 05/29/2010					
Naphthalene	1.72	1	ug/L	5.00	1.00	34	12-102	37	20	
Chrysene	3.03	0.1	"	5.00	0.100	61	11-115	5	20	
Pyrene	3.06	0.1	"	5.00	0.100	61	36-123	2	20	
Anthracene	2.48	1	"	5.00	1.00	50	39-111	12	20	
Phenanthrene	2.55	1	"	5.00	1.00	51	38-108	13	20	
Benzo(k)fluoranthene	2.27	0.1	"	5.00	0.100	45	33-122	36	20	
Benzo(g,h,i)perylene	2.82	0.1	"	5.00	0.100	56	29-120	1	20	
Benzo(b)fluoranthene	3.52	0.1	"	5.00	0.100	70	15-116	21	20	
Benzo(a)anthracene	3.13	0.1	"	5.00	0.100	63	28-115	3	20	
Acenaphthylene	2.12	1	"	5.00	1.00	42	21-109	25	20	
Acenaphthene	2.15	1	"	5.00	1.000	43	23-100	22	20	
2-Methylnaphthalene	1.79	1	"	5.00	1.00	36	10-115	33	20	
1-Methylnaphthalene	1.71	1	"	5.00	1.00	34	10-104	31	20	
Benzo(a)pyrene	2.9	0.1	"	5.00	0.100	58	27-119	4	20	
Surrogate: Terphenyl-D14	3.56		PERCENT	5.00		71	20-128			
Surrogate: Nitrobenzene-d5	1.83		"	5.00		37	10-112			
Surrogate: 2-Fluorobiphenyl	1.99		"	5.00		40	10-116			

LCS (564378-1-BKS)		Source: 564378-1-BKS			Prepared: 05/28/2010 Analyzed: 05/28/2010					
Dibenz(a,h)anthracene	3.36	0.2	ug/L	5.00	0.006	67	11-115	0	20	
Naphthalene	2.73	1	"	5.00	0.034	55	12-102	0	20	
Benzo(k)fluoranthene	2.77	0.1	"	5.00	0.012	55	33-122	0	20	
1-Methylnaphthalene	2.63	1	"	5.00	0.026	53	10-104	0	20	
Pyrene	3.31	0.1	"	5.00	0.008	66	36-123	0	20	
Indeno(1,2,3-c,d)Pyrene	3.36	0.1	"	5.00	0.011	67	16-120	0	20	
Fluorene	2.96	1	"	5.00	0.011	59	25-109	0	20	
Fluoranthene	3.29	1	"	5.00	0.008	66	42-112	0	20	

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Project Number: 010-0974  
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## Semivolatile Organic Compounds (SVOCs) by SW8270D - Quality Control XENCO

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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### Batch 808786 - SW3510C

LCS (564378-1-BKS)		Source: 564378-1-BKS			Prepared: 05/28/2010 Analyzed: 05/28/2010					
Chrysene	3.35	0.1	ug/L	5.00	±0.017	67	11-115	0	20	
2-Methylnaphthalene	2.75	1	"	5.00	±0.030	55	10-115	0	20	
Benzo(b)fluoranthene	3.85	0.1	"	5.00	±0.015	77	15-116	0	20	
Benzo(a)pyrene	3.28	0.1	"	5.00	±0.013	66	27-119	0	20	
Benzo(a)anthracene	3.4	0.1	"	5.00	±0.011	68	28-115	0	20	
Anthracene	3.03	1	"	5.00	±0.006	61	39-111	0	20	
Acenaphthylene	2.88	1	"	5.00	±0.026	58	21-109	0	20	
Acenaphthene	2.84	1	"	5.00	±0.027	57	23-100	0	20	
Benzo(g,h,i)perylene	3.31	0.1	"	5.00	±0.014	66	29-120	0	20	
Phenanthrene	3.14	1	"	5.00	±0.014	63	38-108	0	20	
Surrogate: Terphenyl-D14	3.82		PERCENT	5.00		76	20-128			
Surrogate: Nitrobenzene-d5	3		"	5.00		60	10-112			
Surrogate: 2-Fluorobiphenyl	2.98		"	5.00		60	10-116			

BLANK (564378-1-BLK)		Source: 564378-1-BLK			Prepared: 05/28/2010 Analyzed: 05/28/2010					
Fluoranthene	ND	1	ug/L	5.00		-	0	20		
Fluorene	ND	1	"	5.00		-	0	20		
Indeno(1,2,3-c,d)Pyrene	ND	0.1	"	5.00		-	0	20		
Naphthalene	ND	1	"	5.00		-	0	20		
Phenanthrene	ND	1	"	5.00		-	0	20		
Dibenz(a,h)anthracene	ND	0.2	"	5.00		-	0	20		
Pyrene	ND	0.1	"	5.00		-	0	20		
Chrysene	ND	0.1	"	5.00		-	0	20		
Benzo(k)fluoranthene	ND	0.1	"	5.00		-	0	20		
Benzo(g,h,i)perylene	ND	0.1	"	5.00		-	0	20		
Benzo(b)fluoranthene	ND	0.1	"	5.00		-	0	20		
Benzo(a)pyrene	ND	0.1	"	5.00		-	0	20		

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## Semivolatile Organic Compounds (SVOCs) by SW8270D - Quality Control XENCO

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch 808786 - SW3510C</b>										
<b>BLANK (564378-1-BLK)</b>		<b>Source: 564378-1-BLK</b>			<b>Prepared: 05/28/2010 Analyzed: 05/28/2010</b>					
Benzo(a)anthracene	ND	0.1	ug/L	5.00			-	0	20	
Anthracene	ND	1	"	5.00			-	0	20	
Acenaphthylene	ND	1	"	5.00			-	0	20	
2-Methylnaphthalene	ND	1	"	5.00			-	0	20	
1-Methylnaphthalene	ND	1	"	5.00			-	0	20	
Acenaphthene	ND	1	"	5.00			-	0	20	
Surrogate: Nitrobenzene-d5	2.58		PERCENT	5.00		52		10-112		
Surrogate: Terphenyl-D14	3.52		"	5.00		70		20-128		
Surrogate: 2-Fluorobiphenyl	2.65		"	5.00		53		10-116		

Origins Laboratory, Inc.



*The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.*

Noelle E Doyle, Laboratory Manager

Olsson Associates  
826 21 1/2 Road  
Grand Junction CO 81505

Ken Kreie  
Project Number: 010-0974  
Project: BBC - Pad Seep

## Total Alkalinity by SM2320B - Quality Control XENCO

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch 809541 - NONE</b>										
<b>LCS (809541-1-BKS)</b>		Source: 809541-1-BKS			Prepared: 06/07/2010 Analyzed: 06/07/2010					
Alkalinity, Total (as CaCO <sub>3</sub> )	246	1	mg/L	250	+0.392	98	80-120	0	20	
<b>BLANK (809541-1-BLK)</b>		Source: 809541-1-BLK			Prepared: 06/07/2010 Analyzed: 06/07/2010					
Alkalinity, Total (as CaCO <sub>3</sub> )	ND	1	mg/L	250			-	0	20	

Origins Laboratory, Inc.



*The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.*

Noelle E Doyle, Laboratory Manager

Olsson Associates

826 21 1/2 Road

Grand Junction CO

81505

Ken Kreie

Project Number: 010-0974

Project: BBC - Pad Seep

### Notes and Definitions

- V detected in sample and blank
- L exceeded calibration of range of instrument at that dilution. Value may be biased
- I Sample result was found between MDL and RL
- ND Analyte NOT DETECTED at or above the reporting limit
- RPD Relative Percent Difference

Origins Laboratory, Inc.



*The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.*

Noelle E Doyle, Laboratory Manager

Sample Summary

Origins Laboratory

Job No: D14061

Origins Laboratory, Denver, CO  
Project No: V#657

Sample Number	Collected		Received	Matrix		Client Sample ID
	Date	Time By		Code	Type	
D14061-1	05/24/10	12:30	06/09/10	AQ	Ground Water	SE-1

**Report of Analysis**

Page 1 of 1

<b>Client Sample ID:</b>	SE-1	<b>Date Sampled:</b>	05/24/10
<b>Lab Sample ID:</b>	D14061-1	<b>Date Received:</b>	06/09/10
<b>Matrix:</b>	AQ - Ground Water	<b>Percent Solids:</b>	n/a
<b>Project:</b>	Origins Laboratory, Denver, CO		

**General Chemistry**

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Chlorate	< 0.020	0.020	mg/l	1	06/11/10	GH	EPA 300.1

---

RL = Reporting Limit

**Report of Analysis**

Page 1 of 1

<b>Client Sample ID:</b>	SE-1	<b>Date Sampled:</b>	05/24/10
<b>Lab Sample ID:</b>	D14061-1R	<b>Date Received:</b>	06/09/10
<b>Matrix:</b>	AQ - Ground Water	<b>Percent Solids:</b>	n/a
<b>Project:</b>	Origins Laboratory, Denver, CO		

**General Chemistry**

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Chlorite <sup>a</sup>	< 0.20	0.20	mg/l	10	06/11/10	GH	EPA 300.1

(a) Sample received and analyzed outside the recommended holding time for chlorite.

---

RL = Reporting Limit

Report of Analysis

<b>Client Sample ID:</b>	X005161-1	<b>Date Sampled:</b>	05/24/10
<b>Lab Sample ID:</b>	D14368-1F	<b>Date Received:</b>	06/17/10
<b>Matrix:</b>	AQ - Groundwater Filtered	<b>Percent Solids:</b>	n/a
<b>Project:</b>	Origins Laboratory, Denver, CO		

Dissolved Metals Analysis

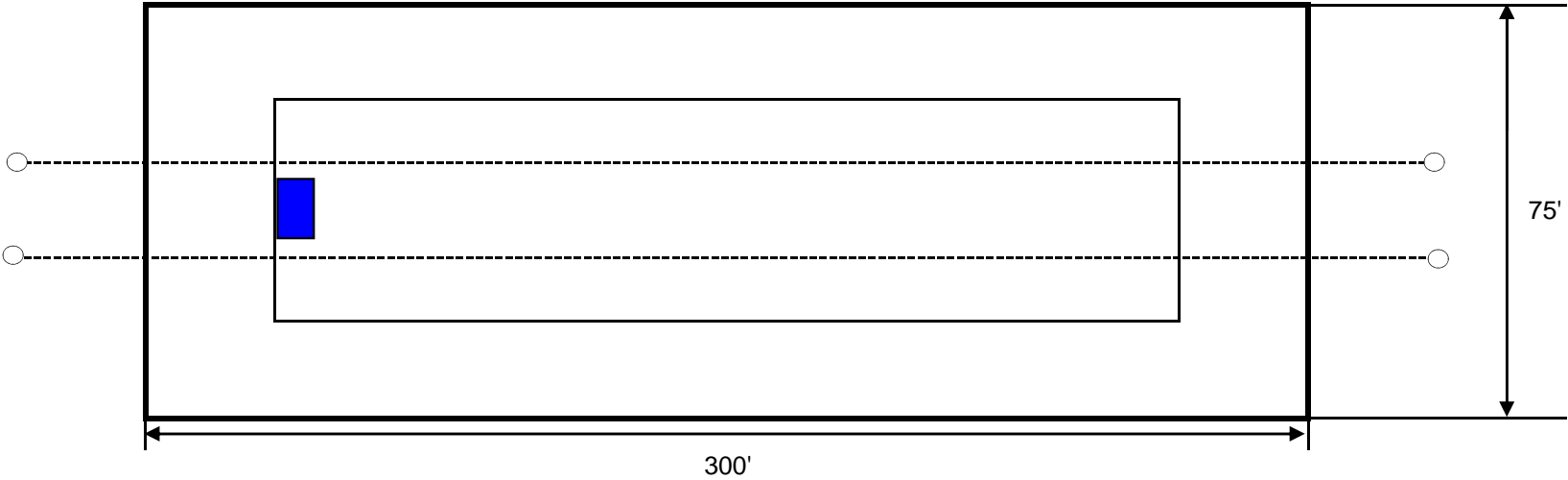
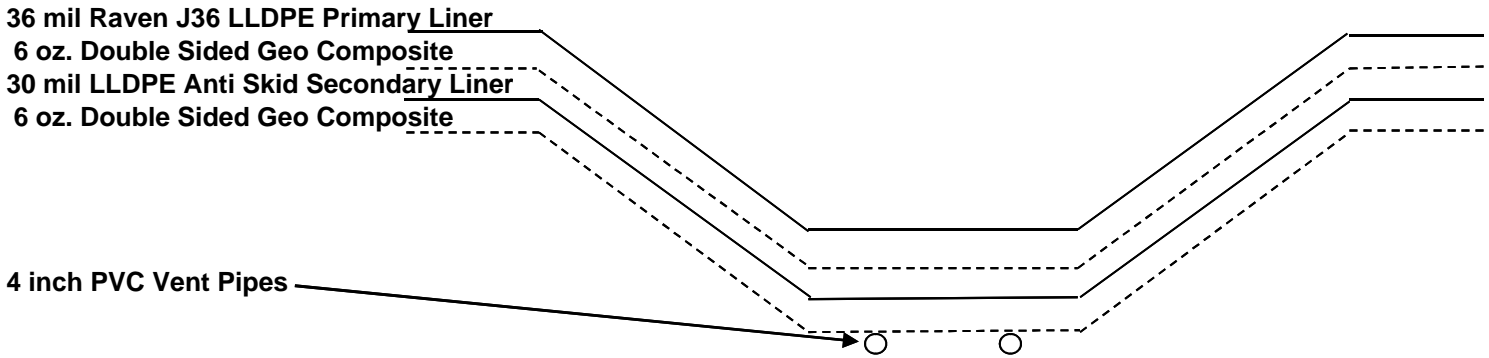
Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Uranium	74.0	50	ug/l	1	06/18/10	06/19/10 JM	SW846 6010B <sup>1</sup>	SW846 3010A <sup>2</sup>

(1) Instrument QC Batch: MA762  
(2) Prep QC Batch: MP2105

RL = Reporting Limit

**APPENDIX C**  
**BBC PIT AS-BUILT DRAWING**

# Construction Details for the Existing Upper BBC Pit



Note:

Suction Line Sump



**APPENDIX D**

**BBC PAD UPPER PIT RELINING DETAIL**

## BBC Upper Pit Relining

The following liner system will be installed on top of the existing liners in place in the pit.

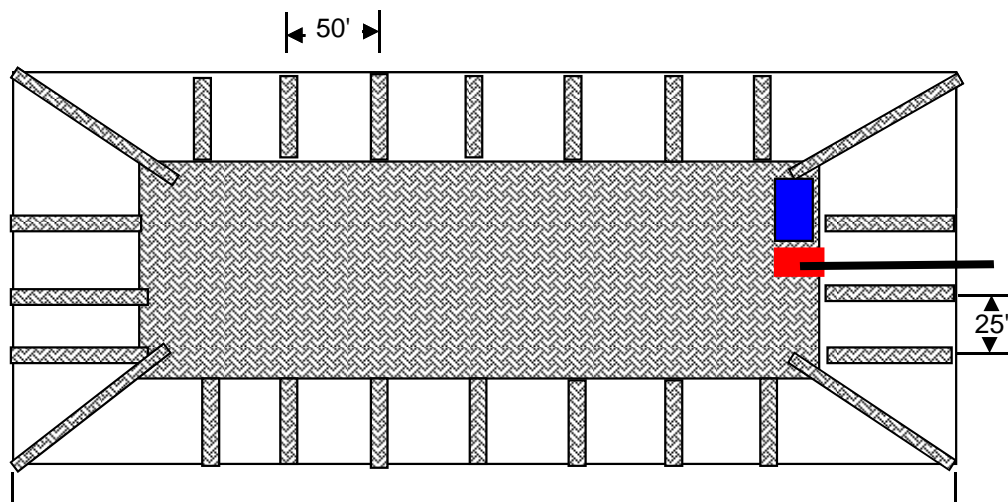
1. 6 oz. double sided Geo composite on 100% of pit from anchor ditch to anchor ditch
2. 30 mil anti skid double E30WBS liner for secundary liner
3. 6 oz. double sided Geo composite on bottom of pit and runners to top of anchor ditch (50' span between on sides 25' span on ends)
4. 45 mil Dura Skrim liner for primary liner
5. Vent pockets at top of every vent grid.

45 mil Dura Skrim

6 oz. double sided Geo composite

30 mil Secondary

6 oz. double sided Geo composite



Note:

Leak Detection Sump Placement

Suction Line Sump



\*Construct suction line sump approximately 6 feet long and leave 2 feet of native soil between leak detection sump to separate.

**APPENDIX E**

**CHEMICALS USED IN COMPLETION WATER**

## MATERIAL SAFETY DATA SHEET

**Product Trade Name:** LoSurf-300D

**Revision Date:** 06-May-2009

### 1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

**Product Trade Name:** LoSurf-300D  
**Synonyms:** None  
**Chemical Family:** Blend  
**Application:** Non-ionic Surfactant

**Manufacturer/Supplier:** Halliburton Energy Services  
P.O. Box 1431  
Duncan, Oklahoma 73536-0431  
Emergency Telephone: (281) 575-5000

**Prepared By:** Chemical Compliance  
Telephone: 1-580-251-4335  
e-mail: fdunexchem@halliburton.com

### 2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Ethanol	64-17-5	30 - 60%	1000 ppm	1000 ppm
Heavy aromatic petroleum naphtha	64742-94-5	10 - 30%	5 mg/m <sup>3</sup>	5 mg/m <sup>3</sup>
Naphthalene	91-20-3	1 - 5%	10 ppm	10 ppm
1,2,4 Trimethylbenzene	95-63-6	0 - 1%	25 ppm	Not applicable
Poly(oxy-1,2-ethanediyl), alpha-(4-nonylphenyl)-omega-hydroxy-, branched	127087-87-0	1 - 5%	Not applicable	Not applicable

### 3. HAZARDS IDENTIFICATION

**Hazard Overview** May cause eye, skin, and respiratory irritation. May cause headache, dizziness, and other central nervous system effects. May be harmful if swallowed. Flammable.

### 4. FIRST AID MEASURES

**Inhalation** If inhaled, remove to fresh air. If not breathing give artificial respiration, preferably mouth-to-mouth. If breathing is difficult give oxygen. Get medical attention.

**Skin** Wash with soap and water. Get medical attention if irritation persists. Remove contaminated clothing and launder before reuse.

**Eyes** Check for and remove contact lenses if present. In case of contact, or suspected contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention immediately after flushing.

<b>Ingestion</b>	Do not induce vomiting. Slowly dilute with 1-2 glasses of water or milk and seek medical attention. Never give anything by mouth to an unconscious person.
<b>Notes to Physician</b>	Not Applicable

## 5. FIRE FIGHTING MEASURES

<b>Flash Point/Range (F):</b>	57
<b>Flash Point/Range (C):</b>	14
<b>Flash Point Method:</b>	PMCC
<b>Autoignition Temperature (F):</b>	Not Determined
<b>Autoignition Temperature (C):</b>	Not Determined
<b>Flammability Limits in Air - Lower (%):</b>	3.3
<b>Flammability Limits in Air - Upper (%):</b>	19

**Fire Extinguishing Media** Carbon Dioxide, Dry Chemicals, Foam.

**Special Exposure Hazards** Use water spray to cool fire exposed surfaces. Closed containers may explode in fire. Decomposition in fire may produce toxic gases.

**Special Protective Equipment for Fire-Fighters** Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

**NFPA Ratings:** Health 2, Flammability 3, Reactivity 0  
**HMIS Ratings:** Health 2, Flammability 3, Physical Hazard 0 , PPE: H

## 6. ACCIDENTAL RELEASE MEASURES

**Personal Precautionary Measures** Use appropriate protective equipment. Wear self-contained breathing apparatus in enclosed areas.

**Environmental Precautionary Measures** Prevent from entering sewers, waterways, or low areas.

**Procedure for Cleaning / Absorption** Remove ignition sources and work with non-sparking tools. Isolate spill and stop leak where safe. Contain spill with sand or other inert materials. Scoop up and remove.

## 7. HANDLING AND STORAGE

**Handling Precautions** Avoid contact with eyes, skin, or clothing. Avoid breathing vapors. Avoid breathing mist. Wash hands after use. Launder contaminated clothing before reuse. Ground and bond containers when transferring from one container to another.

**Storage Information** Keep from heat, sparks, and open flames. Keep container closed when not in use. Store in a cool well ventilated area. Product has a shelf life of 24 months.

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

**Engineering Controls** Use in a well ventilated area. Local exhaust ventilation should be used in areas without good cross ventilation.

**Respiratory Protection**

If engineering controls and work practices cannot keep exposure below occupational exposure limits or if exposure is unknown, wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product. Selection of and instruction on using all personal protective equipment, including respirators, should be performed by an Industrial Hygienist or other qualified professional.

Organic vapor respirator.

**Hand Protection**

Butyl rubber gloves. Neoprene gloves.

**Skin Protection**

Rubber apron.

**Eye Protection**

Chemical goggles; also wear a face shield if splashing hazard exists.

**Other Precautions**

Eyewash fountains and safety showers must be easily accessible.

**9. PHYSICAL AND CHEMICAL PROPERTIES**

<b>Physical State:</b>	Liquid
<b>Color:</b>	Amber
<b>Odor:</b>	Alcohol
<b>pH:</b>	7
<b>Specific Gravity @ 20 C (Water=1):</b>	.903
<b>Density @ 20 C (lbs./gallon):</b>	7.53
<b>Bulk Density @ 20 C (lbs/ft3):</b>	Not Determined
<b>Boiling Point/Range (F):</b>	173.1
<b>Boiling Point/Range (C):</b>	78.4
<b>Freezing Point/Range (F):</b>	-76.9
<b>Freezing Point/Range (C):</b>	-60.51
<b>Vapor Pressure @ 20 C (mmHg):</b>	40 (etoh)
<b>Vapor Density (Air=1):</b>	> 10
<b>Percent Volatiles:</b>	55-65
<b>Evaporation Rate (Butyl Acetate=1):</b>	< 3.3
<b>Solubility in Water (g/100ml):</b>	Soluble
<b>Solubility in Solvents (g/100ml):</b>	Not Determined
<b>VOCs (lbs./gallon):</b>	Not Determined
<b>Viscosity, Dynamic @ 20 C (centipoise):</b>	Not Determined
<b>Viscosity, Kinematic @ 20 C (centistrokes):</b>	Not Determined
<b>Partition Coefficient/n-Octanol/Water:</b>	Not Determined
<b>Molecular Weight (g/mole):</b>	Not Determined

**10. STABILITY AND REACTIVITY**

<b>Stability Data:</b>	Stable
<b>Hazardous Polymerization:</b>	Will Not Occur
<b>Conditions to Avoid</b>	Keep away from heat, sparks and flame.
<b>Incompatibility (Materials to Avoid)</b>	Strong oxidizers.
<b>Hazardous Decomposition Products</b>	Oxides of nitrogen. Carbon monoxide and carbon dioxide.
<b>Additional Guidelines</b>	Not Applicable

## 11. TOXICOLOGICAL INFORMATION

<b>Principle Route of Exposure</b>	Eye or skin contact, inhalation.
<b>Inhalation</b>	May cause respiratory irritation. May cause central nervous system depression including headache, dizziness, drowsiness, incoordination, slowed reaction time, slurred speech, giddiness and unconsciousness.
<b>Skin Contact</b>	May cause skin irritation.
<b>Eye Contact</b>	May cause eye irritation.
<b>Ingestion</b>	Irritation of the mouth, throat, and stomach. May cause abdominal pain, vomiting, nausea, and diarrhea. Aspiration into the lungs may cause chemical pneumonitis including coughing, difficulty breathing, wheezing, coughing up blood and pneumonia, which can be fatal.
<b>Aggravated Medical Conditions</b>	Skin disorders. Eye ailments.
<b>Chronic Effects/Carcinogenicity</b>	The International Agency for Research on Cancer (IARC) has evaluated naphthalene and determined it to be a possible carcinogen to humans (Group 2B, based on sufficient evidence in experimental animals and inadequate evidence in humans).
<b>Other Information</b>	None known.
<b>Toxicity Tests</b>	
<b>Oral Toxicity:</b>	Not determined
<b>Dermal Toxicity:</b>	Not determined
<b>Inhalation Toxicity:</b>	Not determined
<b>Primary Irritation Effect:</b>	Not determined
<b>Carcinogenicity</b>	Not determined
<b>Genotoxicity:</b>	Not determined
<b>Reproductive / Developmental Toxicity:</b>	Not determined

## 12. ECOLOGICAL INFORMATION

<b>Mobility (Water/Soil/Air)</b>	Not determined
<b>Persistence/Degradability</b>	Not determined
<b>Bio-accumulation</b>	Not Determined

### Ecotoxicological Information

<b>Acute Fish Toxicity:</b>	May be toxic to aquatic life.
<b>Acute Crustaceans Toxicity:</b>	Not determined
<b>Acute Algae Toxicity:</b>	Not determined
<b>Chemical Fate Information</b>	Not determined
<b>Other Information</b>	Not applicable

## 13. DISPOSAL CONSIDERATIONS

<b>Disposal Method</b>	Disposal should be made in accordance with federal, state, and local regulations.
<b>Contaminated Packaging</b>	Follow all applicable national or local regulations.

## 14. TRANSPORT INFORMATION

### Land Transportation

#### DOT

UN1993, Flammable Liquid, N.O.S. (Contains Ethanol, Heavy Aromatic Naphtha), 3, II, (14 C)  
NAERG 128

#### Canadian TDG

Flammable Liquid, N.O.S. (Contains Ethanol, Heavy Aromatic Naphtha), 3, UN1993, II, (14 C)

#### ADR

UN1993, Flammable Liquid, N.O.S. (Contains Ethanol, Heavy Aromatic Naphtha), 3, II

### Air Transportation

#### ICAO/IATA

UN1993, Flammable Liquid, N.O.S., 3, II  
(Contains Ethanol, Heavy Aromatic Naphtha Solution)

### Sea Transportation

#### IMDG

UN1993, Flammable Liquid, N.O.S. (Contains Ethanol, Heavy Aromatic Naphtha), 3, II, (14 C)  
EmS F-E, S-E

### Other Shipping Information

**Labels:** Flammable Liquid

## 15. REGULATORY INFORMATION

### US Regulations

<b>US TSCA Inventory</b>	All components listed on inventory or are exempt.
<b>EPA SARA Title III Extremely Hazardous Substances</b>	Not applicable
<b>EPA SARA (311,312) Hazard Class</b>	Acute Health Hazard Chronic Health Hazard Fire Hazard

<b>EPA SARA (313) Chemicals</b>	This product contains toxic chemical(s) listed below which is(are) subject to the reporting requirements of Section 313 of Title III of SARA and 40 CFR Part 372: Naphthalene//91-20-3 1,2,4-Trimethylbenzene//95-63-6
<b>EPA CERCLA/Superfund Reportable Spill Quantity</b>	EPA Reportable Spill Quantity is 1122 Gallons based on Naphthalene (CAS: 91-20-3).
<b>EPA RCRA Hazardous Waste Classification</b>	If product becomes a waste, it does meet the criteria of a hazardous waste as defined by the US EPA, because of:  Ignitability D001
<b>California Proposition 65</b>	The California Proposition 65 regulations apply to this product.
<b>MA Right-to-Know Law</b>	One or more components listed.
<b>NJ Right-to-Know Law</b>	One or more components listed.
<b>PA Right-to-Know Law</b>	One or more components listed.
<b>Canadian Regulations</b>	
<b>Canadian DSL Inventory</b>	All components listed on inventory.
<b>WHMIS Hazard Class</b>	D2B Toxic Materials B2 Flammable Liquids D2A Very Toxic Materials

## 16. OTHER INFORMATION

### The following sections have been revised since the last issue of this MSDS

Not applicable

#### Additional Information

For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

#### Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

\*\*\*END OF MSDS\*\*\*

## MATERIAL SAFETY DATA SHEET

**Product Trade Name:** Scalechek® HTM Scale Inhibitor

**Revision Date:** 06-May-2009

### 1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

**Product Trade Name:** Scalechek® HTM Scale Inhibitor  
**Synonyms:** None  
**Chemical Family:** Polymer  
**Application:** Scale Inhibitor  
**Manufacturer/Supplier:** Halliburton Energy Services  
P.O. Box 1431  
Duncan, Oklahoma 73536-0431  
Emergency Telephone: (281) 575-5000  
**Prepared By:** Chemical Compliance  
Telephone: 1-580-251-4335  
e-mail: fdunexchem@halliburton.com

### 2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Organic acid salt	Mixture	60 - 100%	Not applicable	Not applicable

### 3. HAZARDS IDENTIFICATION

**Hazard Overview** May cause eye and skin irritation.

### 4. FIRST AID MEASURES

**Inhalation** If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

**Skin** Wash with soap and water. Get medical attention if irritation persists.

**Eyes** In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.

**Ingestion** If swallowed, induce vomiting immediately by giving two glasses of water and sticking fingers down throat; never give anything to an unconscious person. Get medical attention.

**Notes to Physician** None known.

## 5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Min: > 230
Flash Point Method:	Not Determined
Autoignition Temperature (F):	899
Autoignition Temperature (C):	481
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

**Fire Extinguishing Media** Carbon Dioxide, Dry Chemicals, Foam.

**Special Exposure Hazards** Decomposition in fire may produce toxic gases.

**Special Protective Equipment for Fire-Fighters** Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

**NFPA Ratings:** Health 0, Flammability 0, Reactivity 0

**HMIS Ratings:** Health 0, Flammability 0, Physical Hazard 0 , PPE: B

## 6. ACCIDENTAL RELEASE MEASURES

**Personal Precautionary Measures** Use appropriate protective equipment. Avoid creating and breathing dust.

**Environmental Precautionary Measures** Prevent from entering sewers, waterways, or low areas.

**Procedure for Cleaning / Absorption** Scoop up and remove.

## 7. HANDLING AND STORAGE

**Handling Precautions** Avoid contact with eyes, skin, or clothing. Slippery when wet.

**Storage Information** Store away from acids. Store away from oxidizers. Store in a cool well ventilated area. Product has a shelf life of 24 months.

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

**Engineering Controls** Use in a well ventilated area.

**Respiratory Protection** Not normally needed. But if significant exposures are possible then the following respirator is recommended:  
Dust/mist respirator. (95%)

**Hand Protection** Normal work gloves.

**Skin Protection** Normal work coveralls.

**Eye Protection** Safety glasses.

**Other Precautions** None known.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid
Color:	Off white
Odor:	Odorless
pH:	8.27

## 9. PHYSICAL AND CHEMICAL PROPERTIES

Specific Gravity @ 20 C (Water=1):	1.44
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	43.2
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	0.095
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

## 10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None known.
Incompatibility (Materials to Avoid)	Strong oxidizers. Strong acids.
Hazardous Decomposition Products	Carbon monoxide and carbon dioxide. Oxides of nitrogen.
Additional Guidelines	Not Applicable

## 11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	None known.
Skin Contact	May cause skin irritation.
Eye Contact	May cause eye irritation.
Ingestion	None known
Aggravated Medical Conditions	Eye ailments. Skin disorders.
Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards.
Other Information	None known.
Toxicity Tests	
Oral Toxicity:	LD50: 2000 mg/kg (Rat)
Dermal Toxicity:	LD50: > 3000 mg/kg (Rabbit)
Inhalation Toxicity:	Not determined

<b>Primary Irritation Effect:</b>	Not determined
<b>Carcinogenicity</b>	Not determined
<b>Genotoxicity:</b>	Not determined
<b>Reproductive / Developmental Toxicity:</b>	Not determined

## 12. ECOLOGICAL INFORMATION

<b>Mobility (Water/Soil/Air)</b>	Not determined
<b>Persistence/Degradability</b>	Not determined
<b>Bio-accumulation</b>	Not Determined

### Ecotoxicological Information

<b>Acute Fish Toxicity:</b>	Not determined
<b>Acute Crustaceans Toxicity:</b>	Not determined
<b>Acute Algae Toxicity:</b>	Not determined

<b>Chemical Fate Information</b>	Not determined
<b>Other Information</b>	Not applicable

## 13. DISPOSAL CONSIDERATIONS

<b>Disposal Method</b>	Bury in a licensed landfill according to federal, state, and local regulations.
<b>Contaminated Packaging</b>	Follow all applicable national or local regulations.

## 14. TRANSPORT INFORMATION

### Land Transportation

**DOT**  
Not restricted

**Canadian TDG**  
Not restricted

**ADR**  
Not restricted

### Air Transportation

**ICAO/IATA**  
Not restricted

### Sea Transportation

**IMDG**  
Not restricted

## Other Shipping Information

Labels: None

### 15. REGULATORY INFORMATION

#### US Regulations

US TSCA Inventory	All components listed on inventory or are exempt.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	None
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation.
MA Right-to-Know Law	Does not apply.
NJ Right-to-Know Law	Does not apply.
PA Right-to-Know Law	Does not apply.

#### Canadian Regulations

Canadian DSL Inventory	All components listed on inventory.
WHMIS Hazard Class	Un-Controlled

### 16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS  
Not applicable

**Additional Information**

For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

**Disclaimer Statement**

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

\*\*\*END OF MSDS\*\*\*

# HALLIBURTON

## MATERIAL SAFETY DATA SHEET

**Product Trade Name:** FR-66

**Revision Date:** 24-Jun-2009

### 1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

**Product Trade Name:** FR-66  
**Synonyms:** None  
**Chemical Family:** Blend  
**Application:** Friction Reducer  
**Manufacturer/Supplier:** Halliburton Energy Services  
P.O. Box 1431  
Duncan, Oklahoma 73536-0431  
Emergency Telephone: (281) 575-5000  
**Prepared By:** Chemical Compliance  
Telephone: 1-580-251-4335  
e-mail: fdunexchem@halliburton.com

### 2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Hydrotreated light petroleum distillate	64742-47-8	10 - 30%	200 mg/m <sup>3</sup>	Not applicable

### 3. HAZARDS IDENTIFICATION

**Hazard Overview** May cause eye irritation. May be harmful if swallowed.

### 4. FIRST AID MEASURES

**Inhalation** If inhaled, remove to fresh air. If not breathing give artificial respiration, preferably mouth-to-mouth. If breathing is difficult give oxygen. Get medical attention.

**Skin** Wash with soap and water. Get medical attention if irritation persists. Remove contaminated clothing and launder before reuse.

**Eyes** In case of contact, or suspected contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention immediately after flushing.

**Ingestion** Get medical attention! If vomiting occurs, keep head lower than hips to prevent aspiration.

**Notes to Physician** Not Applicable

## 5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	> 200
Flash Point/Range (C):	> 93
Flash Point Method:	PMCC
Autoignition Temperature (F):	> 419
Autoignition Temperature (C):	> 215
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

**Fire Extinguishing Media** Water fog, carbon dioxide, foam, dry chemical.

**Special Exposure Hazards** Decomposition in fire may produce toxic gases. Use water spray to cool fire exposed surfaces.

**Special Protective Equipment for Fire-Fighters** Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

**NFPA Ratings:** Health 1, Flammability 0, Reactivity 0

**HMIS Ratings:** Health 1, Flammability 0, Physical Hazard 0 , PPE: C

## 6. ACCIDENTAL RELEASE MEASURES

**Personal Precautionary Measures** Use appropriate protective equipment.

**Environmental Precautionary Measures** Prevent from entering sewers, waterways, or low areas.

**Procedure for Cleaning / Absorption** Isolate spill and stop leak where safe. Contain spill with sand or other inert materials. Scoop up and remove.

## 7. HANDLING AND STORAGE

**Handling Precautions** Avoid contact with eyes, skin, or clothing. Avoid breathing vapors. Wash hands after use. Launder contaminated clothing before reuse. Material is slippery underfoot. Avoid breathing mist.

**Storage Information** Store away from oxidizers. Keep container closed when not in use. Store in a cool, dry location. Store in a well ventilated area. Keep from freezing.

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

**Engineering Controls** Use in a well ventilated area. Local exhaust ventilation should be used in areas without good cross ventilation.

**Respiratory Protection** Not normally needed. But if significant exposures are possible then the following respirator is recommended:  
Organic vapor respirator.

**Hand Protection** Impervious rubber gloves.

**Skin Protection** Rubber apron.

**Eye Protection** Chemical goggles; also wear a face shield if splashing hazard exists.

**Other Precautions** Eyewash fountains and safety showers must be easily accessible.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Liquid
Color:	White
Odor:	Sweet hydrocarbon
pH:	Not Determined
Specific Gravity @ 20 C (Water=1):	1.06
Density @ 20 C (lbs./gallon):	8.83
Bulk Density @ 20 C (lbs/ft3):	65.4
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	< 14
Freezing Point/Range (C):	< -10
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	50
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Soluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

## 10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Strong oxidizers.
Hazardous Decomposition Products	Oxides of nitrogen. Carbon monoxide and carbon dioxide. Chlorine.
Additional Guidelines	Not Applicable

## 11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	Inhalation of mist or heated vapors may cause respiratory irritation.
Skin Contact	May cause skin defatting with prolonged exposure.
Eye Contact	May cause moderate eye irritation.
Ingestion	Aspiration into the lungs may cause chemical pneumonitis including coughing, difficulty breathing, wheezing, coughing up blood and pneumonia, which can be fatal.
Aggravated Medical Conditions	None known.
Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards.
Other Information	None known.

## Toxicity Tests

<b>Oral Toxicity:</b>	Not determined
<b>Dermal Toxicity:</b>	Not determined
<b>Inhalation Toxicity:</b>	Not determined
<b>Primary Irritation Effect:</b>	Not determined
<b>Carcinogenicity</b>	Not determined
<b>Genotoxicity:</b>	Not determined
<b>Reproductive / Developmental Toxicity:</b>	Not determined

## 12. ECOLOGICAL INFORMATION

<b>Mobility (Water/Soil/Air)</b>	Not determined
<b>Persistence/Degradability</b>	Not determined
<b>Bio-accumulation</b>	Not Determined

### Ecotoxicological Information

<b>Acute Fish Toxicity:</b>	Not determined
<b>Acute Crustaceans Toxicity:</b>	Not determined
<b>Acute Algae Toxicity:</b>	Not determined

<b>Chemical Fate Information</b>	Not determined
<b>Other Information</b>	Not applicable

## 13. DISPOSAL CONSIDERATIONS

<b>Disposal Method</b>	Disposal should be made in accordance with federal, state, and local regulations.
<b>Contaminated Packaging</b>	Follow all applicable national or local regulations.

## 14. TRANSPORT INFORMATION

### Land Transportation

**DOT**  
Not restricted

**Canadian TDG**  
Not restricted

**ADR**  
Not restricted

### Air Transportation

ICAO/IATA  
Not restricted

## Sea Transportation

IMDG  
Not restricted

## Other Shipping Information

Labels: None

## 15. REGULATORY INFORMATION

### US Regulations

US TSCA Inventory	All components listed on inventory or are exempt.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	None
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation.
MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	One or more components listed.

### Canadian Regulations

Canadian DSL Inventory	All components listed on inventory.
WHMIS Hazard Class	Un-Controlled

## 16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS  
Not applicable

**Additional Information** For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

**Disclaimer Statement**

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

**\*\*\*END OF MSDS\*\*\***

# HALLIBURTON

## MATERIAL SAFETY DATA SHEET

**Product Trade Name:** FE-1A ACIDIZING COMPOSITION

**Revision Date:** 05-Jan-2009

### 1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

**Product Trade Name:** FE-1A ACIDIZING COMPOSITION  
**Synonyms:** None  
**Chemical Family:** Organic acid Anhydride  
**Application:** Additive  
**Manufacturer/Supplier:** Halliburton Energy Services  
P.O. Box 1431  
Duncan, Oklahoma 73536-0431  
Emergency Telephone: (281) 575-5000  
**Prepared By:** Chemical Compliance  
Telephone: 1-580-251-4335  
e-mail: fdunexchem@halliburton.com

### 2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Acetic anhydride	108-24-7	60 - 100%	5 ppm	5 ppm
Acetic acid	64-19-7	30 - 60%	10 ppm	10 ppm

### 3. HAZARDS IDENTIFICATION

**Hazard Overview** May cause eye, skin, and respiratory burns. May be harmful if swallowed. Combustible. Reacts violently with water.

### 4. FIRST AID MEASURES

**Inhalation** If inhaled, remove to fresh air. If not breathing give artificial respiration, preferably mouth-to-mouth. If breathing is difficult give oxygen. Get medical attention.

**Skin** In case of contact, immediately flush skin with plenty of soap and water for at least 15 minutes. Get medical attention. Remove contaminated clothing and launder before reuse. Destroy or properly dispose of contaminated shoes.

**Eyes** In case of contact, or suspected contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention immediately after flushing.

**Ingestion** Do not induce vomiting. Slowly dilute with 1-2 glasses of water or milk and seek medical attention. Never give anything by mouth to an unconscious person.

**Notes to Physician** Not Applicable

## 5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	103
Flash Point/Range (C):	39
Flash Point Method:	PMCC
Autoignition Temperature (F):	630
Autoignition Temperature (C):	332
Flammability Limits in Air - Lower (%):	3
Flammability Limits in Air - Upper (%):	19

Fire Extinguishing Media	Carbon Dioxide, Dry Chemicals, Foam. Water must not be used with open containers.
Special Exposure Hazards	May be ignited by heat, sparks or flames. Closed containers may explode in fire. Decomposition in fire may produce toxic gases. Reaction with water may be highly exothermic.
Special Protective Equipment for Fire-Fighters	Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.
NFPA Ratings:	Health 3, Flammability 2, Reactivity 2
HMIS Ratings:	Health 3, Flammability 2, Physical Hazard 2

## 6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures	Use appropriate protective equipment.
Environmental Precautionary Measures	Prevent from entering sewers, waterways, or low areas.
Procedure for Cleaning / Absorption	Isolate spill and stop leak where safe. Contain spill with sand or other inert materials. Neutralize to pH of 6-8. Scoop up and remove.

## 7. HANDLING AND STORAGE

Handling Precautions	Avoid contact with eyes, skin, or clothing. Avoid breathing vapors. Wash hands after use. Launder contaminated clothing before reuse.
Storage Information	Store away from alkalis. Store away from oxidizers. Store away from water. Keep from heat, sparks, and open flames. Keep container closed when not in use. Product has a shelf life of 60 months.

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls	Use in a well ventilated area. Local exhaust ventilation should be used in areas without good cross ventilation.
Respiratory Protection	Organic vapor/acid gas respirator.
Hand Protection	Impervious rubber gloves.
Skin Protection	Rubber boots. Full protective chemical resistant clothing.
Eye Protection	Chemical goggles; also wear a face shield if splashing hazard exists.
Other Precautions	Eyewash fountains and safety showers must be easily accessible.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Liquid
Color:	Clear colorless
Odor:	Pungent acrid
pH:	< 2
Specific Gravity @ 20 C (Water=1):	1.0753
Density @ 20 C (lbs./gallon):	8.962
Bulk Density @ 20 C (lbs/ft3):	Not Determined
Boiling Point/Range (F):	259
Boiling Point/Range (C):	126
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	11.7
Vapor Density (Air=1):	3.5
Percent Volatiles:	100
Evaporation Rate (Butyl Acetate=1):	0.97
Solubility in Water (g/100ml):	Soluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

## 10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	Keep away from heat, sparks and flame. Do not allow water to get into container because of violent reaction.
Incompatibility (Materials to Avoid)	Strong alkalis. Strong oxidizers. Reacts with water.
Hazardous Decomposition Products	Carbon monoxide and carbon dioxide.
Additional Guidelines	Not Applicable

## 11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	Causes severe respiratory irritation.
Skin Contact	Causes severe burns.
Eye Contact	Causes severe eye burns.
Ingestion	Causes burns of the mouth, throat and stomach.
Aggravated Medical Conditions	Skin disorders. Eye ailments.
Chronic Effects/Carcinogenicity	Prolonged, excessive exposure may cause erosion of the teeth.
Other Information	None known.
Toxicity Tests	

<b>Oral Toxicity:</b>	Not determined
<b>Dermal Toxicity:</b>	Not determined
<b>Inhalation Toxicity:</b>	Not determined
<b>Primary Irritation Effect:</b>	Not determined
<b>Carcinogenicity</b>	Not determined
<b>Genotoxicity:</b>	Not determined
<b>Reproductive / Developmental Toxicity:</b>	Not determined

## 12. ECOLOGICAL INFORMATION

<b>Mobility (Water/Soil/Air)</b>	Not determined
<b>Persistence/Degradability</b>	Readily biodegradable
<b>Bio-accumulation</b>	Not Determined

### Ecotoxicological Information

<b>Acute Fish Toxicity:</b>	Not determined
<b>Acute Crustaceans Toxicity:</b>	Not determined
<b>Acute Algae Toxicity:</b>	Not determined

<b>Chemical Fate Information</b>	Not determined
<b>Other Information</b>	Not applicable

## 13. DISPOSAL CONSIDERATIONS

<b>Disposal Method</b>	Disposal should be made in accordance with federal, state, and local regulations.
<b>Contaminated Packaging</b>	Follow all applicable national or local regulations.

## 14. TRANSPORT INFORMATION

### Land Transportation

#### DOT

UN2920, Corrosive Liquid, Flammable, N.O.S. (Contains Acetic Anhydride, Acetic Acid) , 8, (3), II, (39.4 C)  
NAERG 132

#### Canadian TDG

Corrosive Liquid, Flammable, N.O.S. (Contains Acetic Anhydride, Acetic Acid) , 8, (3), UN2920, II, (39.4 C)

#### ADR

UN2920, Corrosive Liquid, Flammable, N.O.S. (Contains Acetic Anhydride, Acetic Acid) , 8, (3), II

### Air Transportation

## ICAO/IATA

UN2920, Corrosive Liquid, Flammable, N.O.S., 8, (3), II  
(Contains Acetic Anhydride, Acetic Acid Solution)

## Sea Transportation

### IMDG

UN2920, Corrosive Liquid, Flammable, N.O.S. (Contains Acetic Anhydride, Acetic Acid) , 8, (3), II, (39.4 C)  
EmS F-E, S-C

## Other Shipping Information

Labels: Corrosive  
Flammable Liquid

## 15. REGULATORY INFORMATION

### US Regulations

US TSCA Inventory	All components listed on inventory or are exempt.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard Fire Hazard
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	EPA Reportable Spill Quantity is 1409 Gallons based on Acetic acid (CAS: 64-19-7).
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does meet the criteria of a hazardous waste as defined by the US EPA, because of:  Ignitability D001 Corrosivity D002
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation.
MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	One or more components listed.

### Canadian Regulations

Canadian DSL Inventory	All components listed on inventory.
WHMIS Hazard Class	B3 Combustible Liquids E Corrosive Material

## 16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS

Not applicable

### Additional Information

For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

### Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

\*\*\*END OF MSDS\*\*\*

# HALLIBURTON

## MATERIAL SAFETY DATA SHEET

**Product Trade Name:** HAI-404M™

**Revision Date:** 05-Jan-2009

### 1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

**Product Trade Name:** HAI-404M™  
**Synonyms:** None  
**Chemical Family:** Blend  
**Application:** Corrosion Inhibitor

**Manufacturer/Supplier** Halliburton Energy Services  
P.O. Box 1431  
Duncan, Oklahoma 73536-0431  
Emergency Telephone: (281) 575-5000

**Prepared By** Chemical Compliance  
Telephone: 1-580-251-4335  
e-mail: fdunexchem@halliburton.com

### 2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Aldehyde		10 - 30%	Not applicable	Not applicable
Chloromethylnaphthalene quinoline quaternary amine	15619-48-4	5 - 10%	Not applicable	Not applicable
Methanol	67-56-1	10 - 30%	200 ppm	200 ppm (S)
Isopropanol	67-63-0	10 - 30%	200 ppm	400 ppm

### 3. HAZARDS IDENTIFICATION

**Hazard Overview** May cause eye, skin, and respiratory irritation. May cause headache, dizziness, and other central nervous system effects. May be fatal if swallowed. May cause blindness. May be absorbed through the skin. Repeated overexposure may cause liver and kidney effects. Flammable.

### 4. FIRST AID MEASURES

**Inhalation** If inhaled, remove to fresh air. If not breathing give artificial respiration, preferably mouth-to-mouth. If breathing is difficult give oxygen. Get medical attention.

**Skin** In case of contact, immediately flush skin with plenty of soap and water for at least 15 minutes. Get medical attention. Remove contaminated clothing and launder before reuse.

**Eyes** In case of contact, or suspected contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention immediately after flushing.

<b>Ingestion</b>	Do not induce vomiting. Slowly dilute with 1-2 glasses of water or milk and seek medical attention. Never give anything by mouth to an unconscious person.
<b>Notes to Physician</b>	Not Applicable

## 5. FIRE FIGHTING MEASURES

<b>Flash Point/Range (F):</b>	69
<b>Flash Point/Range (C):</b>	20.6
<b>Flash Point Method:</b>	PMCC
<b>Autoignition Temperature (F):</b>	Not Determined
<b>Autoignition Temperature (C):</b>	Not Determined
<b>Flammability Limits in Air - Lower (%):</b>	Not Determined
<b>Flammability Limits in Air - Upper (%):</b>	Not Determined

**Fire Extinguishing Media** Carbon Dioxide, Dry Chemicals, Foam.

**Special Exposure Hazards** May be ignited by heat, sparks or flames. Use water spray to cool fire exposed surfaces. Closed containers may explode in fire. Decomposition in fire may produce toxic gases. Runoff to sewer may cause fire or explosion hazard.

**Special Protective Equipment for Fire-Fighters** Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

**NFPA Ratings:** Health 2, Flammability 3, Reactivity 0  
**HMIS Ratings:** Health 2, Flammability 3, Reactivity 0

## 6. ACCIDENTAL RELEASE MEASURES

**Personal Precautionary Measures** Use appropriate protective equipment. Wear self-contained breathing apparatus in enclosed areas.

**Environmental Precautionary Measures** Prevent from entering sewers, waterways, or low areas.

**Procedure for Cleaning / Absorption** Isolate spill and stop leak where safe. Remove ignition sources and work with non-sparking tools. Contain spill with sand or other inert materials. Scoop up and remove.

## 7. HANDLING AND STORAGE

**Handling Precautions** Avoid contact with eyes, skin, or clothing. Avoid breathing vapors. Wash hands after use. Launder contaminated clothing before reuse. Ground and bond containers when transferring from one container to another.

**Storage Information** Store away from oxidizers. Keep from heat, sparks, and open flames. Keep container closed when not in use. Product has a shelf life of 24 months.

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

**Engineering Controls** Use in a well ventilated area. Local exhaust ventilation should be used in areas without good cross ventilation.

**Respiratory Protection** Positive pressure self-contained breathing apparatus if methanol is released.

**Hand Protection** Impervious rubber gloves.

**Skin Protection** Rubber apron.

<b>Eye Protection</b>	Chemical goggles; also wear a face shield if splashing hazard exists.
<b>Other Precautions</b>	Eyewash fountains and safety showers must be easily accessible.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

<b>Physical State:</b>	Liquid
<b>Color:</b>	Dark brown
<b>Odor:</b>	Alcohol
<b>pH:</b>	3.72
<b>Specific Gravity @ 20 C (Water=1):</b>	0.988
<b>Density @ 20 C (lbs./gallon):</b>	8.23
<b>Bulk Density @ 20 C (lbs/ft<sup>3</sup>):</b>	Not Determined
<b>Boiling Point/Range (F):</b>	Not Determined
<b>Boiling Point/Range (C):</b>	Not Determined
<b>Freezing Point/Range (F):</b>	< -20
<b>Freezing Point/Range (C):</b>	< -20
<b>Vapor Pressure @ 20 C (mmHg):</b>	Not Determined
<b>Vapor Density (Air=1):</b>	Not Determined
<b>Percent Volatiles:</b>	Not Determined
<b>Evaporation Rate (Butyl Acetate=1):</b>	Not Determined
<b>Solubility in Water (g/100ml):</b>	Soluble
<b>Solubility in Solvents (g/100ml):</b>	Not Determined
<b>VOCs (lbs./gallon):</b>	Not Determined
<b>Viscosity, Dynamic @ 20 C (centipoise):</b>	Not Determined
<b>Viscosity, Kinematic @ 20 C (centistokes):</b>	Not Determined
<b>Partition Coefficient/n-Octanol/Water:</b>	Not Determined
<b>Molecular Weight (g/mole):</b>	Not Determined

## 10. STABILITY AND REACTIVITY

<b>Stability Data:</b>	Stable
<b>Hazardous Polymerization:</b>	Will Not Occur
<b>Conditions to Avoid</b>	Keep away from heat, sparks and flame.
<b>Incompatibility (Materials to Avoid)</b>	Strong oxidizers.
<b>Hazardous Decomposition Products</b>	Ammonia. Oxides of nitrogen. Oxides of phosphorus. Hydrocarbons. Carbon monoxide and carbon dioxide.
<b>Additional Guidelines</b>	Not Applicable

## 11. TOXICOLOGICAL INFORMATION

<b>Principle Route of Exposure</b>	Eye or skin contact, inhalation.
<b>Inhalation</b>	May cause respiratory irritation. May cause central nervous system depression including headache, dizziness, drowsiness, incoordination, slowed reaction time, slurred speech, giddiness and unconsciousness.
<b>Skin Contact</b>	May cause skin irritation. May be absorbed through the skin and produce effects similar to those caused by inhalation and/or ingestion.
<b>Eye Contact</b>	May cause eye irritation.

<b>Ingestion</b>	May be fatal or cause blindness if swallowed. May cause central nervous system depression including headache, dizziness, drowsiness, muscular weakness, incoordination, slowed reaction time, fatigue blurred vision, slurred speech, giddiness, tremors and convulsions. May cause liver and kidney damage.
<b>Aggravated Medical Conditions</b>	Skin disorders. Eye ailments.
<b>Chronic Effects/Carcinogenicity</b>	Prolonged or repeated exposure may cause eye, blood, lung, liver, kidney, heart, central nervous system and spleen damage.
<b>Other Information</b>	None known.
<b>Toxicity Tests</b>	
<b>Oral Toxicity:</b>	Not determined
<b>Dermal Toxicity:</b>	Not determined
<b>Inhalation Toxicity:</b>	Not determined
<b>Primary Irritation Effect:</b>	Not determined
<b>Carcinogenicity</b>	Not determined
<b>Genotoxicity:</b>	Not determined
<b>Reproductive / Developmental Toxicity:</b>	Not determined

## 12. ECOLOGICAL INFORMATION

<b>Mobility (Water/Soil/Air)</b>	Not determined
<b>Persistence/Degradability</b>	Not determined
<b>Bio-accumulation</b>	Not Determined

### Ecotoxicological Information

<b>Acute Fish Toxicity:</b>	Not determined
<b>Acute Crustaceans Toxicity:</b>	Not determined
<b>Acute Algae Toxicity:</b>	Not determined
<b>Chemical Fate Information</b>	Not determined
<b>Other Information</b>	Not applicable

## 13. DISPOSAL CONSIDERATIONS

<b>Disposal Method</b>	Disposal should be made in accordance with federal, state, and local regulations.
<b>Contaminated Packaging</b>	Follow all applicable national or local regulations.

## 14. TRANSPORT INFORMATION

### Land Transportation

**DOT**  
UN1993, Flammable Liquid, N.O.S. (Contains Isopropanol, Methanol), 3, II, (20.6 C)

**Canadian TDG**

Flammable Liquid, N.O.S.(Contains Isopropanol, Methanol), 3, UN1993, II, (20.6 C)

**ADR**

UN1993, Flammable Liquid, N.O.S.(Contains Isopropanol, Methanol), 3, II

**Air Transportation**

**ICAO/IATA**

UN1993, Flammable Liquid, N.O.S., 3, II  
(Contains Isopropanol, Methanol Solution)

**Sea Transportation**

**IMDG**

UN1993, Flammable Liquid, N.O.S.(Contains Isopropanol, Methanol), 3, II, (20.6 C)  
EmS F-E, S-E

**Other Shipping Information**

**Labels:** Flammable Liquid

**15. REGULATORY INFORMATION**

**US Regulations**

<b>US TSCA Inventory</b>	All components listed on inventory or are exempt.
<b>EPA SARA Title III Extremely Hazardous Substances</b>	Not applicable
<b>EPA SARA (311,312) Hazard Class</b>	Acute Health Hazard Chronic Health Hazard Fire Hazard
<b>EPA SARA (313) Chemicals</b>	This product contains toxic chemical(s) listed below which is(are) subject to the reporting requirements of Section 313 of Title III of SARA and 40 CFR Part 372: Methanol//67-56-1
<b>EPA CERCLA/Superfund Reportable Spill Quantity</b>	EPA Reportable Spill Quantity is 2612 Gallons based on Methanol (CAS: 67-56-1).
<b>EPA RCRA Hazardous Waste Classification</b>	If product becomes a waste, it does meet the criteria of a hazardous waste as defined by the US EPA, because of:  Ignitability D001
<b>California Proposition 65</b>	All components listed do not apply to the California Proposition 65 Regulation.
<b>MA Right-to-Know Law</b>	One or more components listed.
<b>NJ Right-to-Know Law</b>	One or more components listed.
<b>PA Right-to-Know Law</b>	One or more components listed.

## Canadian Regulations

<b>Canadian DSL Inventory</b>	All components listed on inventory.
<b>WHMIS Hazard Class</b>	B2 Flammable Liquids D1A Very Toxic Materials D1B Toxic Materials

## 16. OTHER INFORMATION

**The following sections have been revised since the last issue of this MSDS**

Not applicable

**Additional Information** For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

**Disclaimer Statement** This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

**\*\*\*END OF MSDS\*\*\***

Material Safety Data Sheet  
Product: Sodium Hypochlorite

Page 1 of 3  
Revised: MARCH 09'

---

SECTION 1 - IDENTIFICATION

---

H & M PRECISION PRODUCTS INC. 1-505-326-4900  
P.O. BOX 1740, #17 CR 5859 FARMINGTON, NM 87499  
1-800-424-9300 Chemtrac

Trade Name:                Liquichlor / Sodium Hypochlorite  
Chemical:                 Sodium Hypochlorite

---

SECTION 2 - HAZARDOUS INGREDIENTS

---

Component Name	CAS#	%WT	OSHA (PEL)
Sodium Hypochlorite	7681-52-9	9.16	NA
Sodium Hydroxide	1310-73-2	0.1-2.0	2mg/m3

---

SECTION 3 - PHYSICAL & CHEMICAL CHARACTERISTICS

---

Boiling Point, F:	219F	Vapor Pressure:	Variable water plus products of decomposition
Specific Gravity:	1.196 @ 20C	Viscosity:	2.15 @ 23C
Solubility in Water:	Complete	pH:	12.5-13.5 s.u. @ 25C
Appearance & Odor:	Yellow-green liquid, Chlorine Odor	Evaporation Rate:	ND

---

SECTION 4 - FIRE & EXPLOSION DATA

---

Flash Point:	Flammable limits:	LEL %	VOL%
NA	NA		

---

EXTINGUISHING MEDIA

Flood with water or carbon dioxide.

FIRE FIGHTING PROCEDURES

Wear NIOSH approved respirator with acid type canister or use self-contained breathing apparatus.  
Unusual fire and explosion hazards/: material is a strong oxidizer. Contact with combustibles may initiate or promote combustion. Acid and heat accelerate decomposition. Decomposition products may include chlorine.

---

SECTION 5 - PHYSICAL HAZARD (REACTIVITY DATA)

---

Chemical Stability: Solutions are fairly stable in concentrations below 10%. Stability decreases with concentration, heat, light, exposure, decrease in pH and contamination with heavy metals, such as nickel, cobalt, copper, and iron.

Conditions to avoid: NA

Incompatibility (material to avoid): Acid's, alcohols, amines, ammonia, chlorinated isocyanurates, combustibles, cyanides, detergents, ethers, hydrocarbons, oxidizable materials, reducing agents. Corrosive to most metals.

Hazardous Decomposition: Hypochlorous Acid, Chlorine, Hydrochloric acid. Composition depends upon temperature and decrease in pH. Additional decomposition products, which depend upon pH, temperature and time, are sodium chloride, sodium chlorate and oxygen.

Hazardous Polymerization: Will not occur.

Hazard rating scale: HEALTH: 3      FIRE: 0      REACTIVITY: 1  
(4-severe 3-serious 2-moderate 1-slight 0-minimal)

---

#### SECTION 6 - HEALTH HAZARDS

---

##### PRIMARY ROUTES OF ENTRY

Inhalation: X Absorption: X Ingestion: X Injection: NA

##### HEALTH HAZARDS:

May be hazardous if inhaled, ingested or absorbed through the skin. Direct contact with eyes and skin may cause severe damage and burns. Vapors or mist may cause irritation of mucous membranes. Ingestion and inhalation may cause headaches, nausea, dizziness and other symptoms of central nervous system depression. The toxic effects are exerted on the central nervous system, especially upon the optic nerve. Prolonged exposure may result in central nervous system damage, blindness and damage to the pancreas, liver or kidneys.

##### EMERGENCY & FIRST AID PROCEDURES:

In case of eye contact, immediately flush eyes with running water and continue washing for at least 15 minutes. In case of INGESTION, INDUCE VOMITING AND GIVE WATER. Obtain medical attention without delay. In case of SKIN contact, remove contaminated clothing and wash skin with soap and water. Obtain medical attention if irritation persists. Wash clothing before rewearing. In case of INHALATION, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, oxygen may be given by qualified personnel. In case of INGESTION, dilute with water or milk and induce vomiting.

IF CONDITIONS PERSIST, SEEK MEDICAL ATTENTION.

Carcinogenicity?    NTP? No    IARC Monograph? No    OSHA Regulated? No

---

#### SECTION 7 - SPECIAL PRECAUTIONS & SPILL/LEAK PROCEDURES

---

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Cleanup personnel must wear proper protective equipment. Neutralize with sodium bisulfate or ferrous salt solutions. Place neutralized material in DOT specification approved containers. Flush area with large amounts of water. Comply with all Federal, State and Local reporting requirements.

WASTE DISPOSAL METHOD:

Contact an EPA or State Approved Disposal Facility.

---

## SECTION 8 - SPECIAL PROTECTION INFORMATION/CONTROL MEASURES

---

Respiratory Protection: NIOSH APPROVED RESPIRATOR IF PEL IS EXCEEDED

Ventilation: Local exhaust is recommended.

Protective Gloves: Use chemical resistant rubber, plastic or neoprene gloves.

Eye Protection: Use chemical goggles and face shield.

Other Protective Clothing or Equipment: Eye Wash, Safety Shower, splash aprons and boots.

Work/Hygienic Practices: Clean up Spills Promptly, Wash contaminated clothing

---

## SECTION 9 - SHIPPING DATA

---

Hazard Classification:	UN/NA No.:	Labels Required:	DOT ER Guide #
8	UN 1791	Corrosive	

Proper Shipping Name/Description:  
Corrosive Liquid, Chlorite Solution, 8, UN1791, III

RQ in lbs.	RQ in gallons	PH:	Flash Point, F:	Pkg. Group:	INDG Pg. #
100 LBS	NA	12.5-13.5	NA	III	

---

This information is based on data believed by H&M PRECISION PRODUCTS INC. to be accurate, but no warranty, express or implied is made.

# Material Safety Data Sheet

MSDS Revision Date: 01/15/2008  
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## 1. Product Identification

**Product Identity:** Methyl Alcohol

**Technical Information:** 270-830-1200

**Molecular Weight:** 32.04

**Emergency Number:** 800-424-9300 (CHEMTREC)

**Chemical Formula:** (CH<sub>3</sub>OH)

**Synonyms:** Methyl Alcohol; methyl hydrate; wood spirit; methyl hydroxide

### Distributed By Brenntag

Brenntag Great Lakes LLC.  
4420 N. Harley Davidson Ave  
Wauwatosa, WI 53225

Brenntag Mid-South Inc.  
1405 Hwy 136 W  
Henderson, KY 42420

Brenntag Northeast, Inc.  
81 West Huller Lane  
Reading, PA 19605

Brenntag Southeast, Inc.  
2000 East Pettigrew Street  
Durham, NC 27703

Brenntag Southwest, Inc.  
610 Fisher Road  
Longview, TX 75604

Brenntag Pacific, Inc.  
10747 Patterson Place  
Santa Fe Springs, CA 90670

## 2. Hazards Identification

### Emergency Overview

#### **DANGER!**

**FLAMMABLE LIQUID AND VAPOR, MODERATE IRRITANT**

Harmful if Swallowed, Inhaled or Absorbed through the skin.

Causes Irritation to Eyes, and Respiratory System. Affects central nervous system. May be harmful if absorbed through skin. May cause irritation to skin. Repeated exposure by inhalation or absorption may cause systemic poisoning, brain disorders, impaired vision and blindness. Inhalation may worsen conditions such as emphysema or bronchitis. Repeated skin contact may cause dermal irritation, dryness and cracking.

### Potential Health Effects

#### **Inhalation:**

Inhalation of vapors irritates the mucous membrane. Exposure to high concentrations has a can also irritate mucous membrane, producing symptoms of dizziness, drowsiness, headache, staggering, unconsciousness, digestive and visual disturbances and possibly death.

#### **Ingestion:**

Swallowing even small amounts can cause blindness, unconsciousness and death. Effects of sub lethal doses may be, abdominal pain, nausea, vomiting, visual disturbances ranging from blurred vision to light sensitivity.

# Material Safety Data Sheet

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## Skin Contact:

May cause irritation, redness and pain. May be absorbed through the skin with toxic or lethal effects.

## Eye Contact:

Vapors cause eye irritation tearing and burning. Splashes cause severe eye irritation, possible corneal burns and eye damage.

## 3. Composition/Information on Ingredients

CAS#	Chemical Name	Percent by Weight
67-56-1	Methyl Alcohol	99.85 - 100%
7732-18-5	Water	0 -1%

## 4. First Aid Measures

### Inhalation:

If a person breathes in chemical dust, remove exposed person promptly to fresh air. If breathing has stopped, perform artificial respiration. Oxygen should be provided for a person having difficulty breathing (but only administered by an authorized individual) until the person is able to breath easily by themselves. Keep the affected person warm and at rest. Get medical attention as soon as possible.

### Ingestion:

Swallowing methanol is life threatening. Onset of symptoms may be delayed for 18 to 24 hours after ingestion. Do NOT induce vomiting. A physician should be contacted immediately.

### Skin Contact:

Promptly wash the contaminated skin using soap or mild detergent and water. If chemical, or solution containing chemical, soaks through clothing, remove the clothing promptly and wash the skin using soap or mild detergent and water. Medical attention should be given as soon as possible for all burns, regardless of how minor they seem.

### Eye Contact:

## Material Safety Data Sheet

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Flush eyes with large amounts of water, lifting the upper and lower lids at periodic intervals to insure contact of water with all accessible tissue of the eyes and lids. Medical attention should be given as soon as possible, preferably an eye specialist.

### 5. Fire Fighting Measures

**Go to Section 9 for Flammable Properties.**

#### **Fire:**

**In the presence of an ignition source.**

Flash point: 11C (52F) TCC

Autoignition temperature: 385C

Flammable limits in air % by volume: lel 6.0%, uel: 36.5%

#### **Explosion:**

Above the flash point, explosion vapor-air mixtures are explosive within flammable limits noted above. Moderate explosion hazard and dangerous fire hazard when exposed to heat, sparks or flames. Sensitive to static discharge.

#### **Fire Extinguishing Media:**

Use any means suitable for extinguishing surrounding fire. Dry chemicals, alcohol foam or carbon dioxide.

#### **Special Considerations:**

Firefighters should avoid all bodily contact; wear full protective clothing and self-contained breathing apparatus. Use water spray to blanket fire, cool fire exposed containers, and to flush non-ignited spills or vapors away from fire. Vapors can flow along surfaces to distant ignition sources and flash back.

### 6. Accidental Release Measures

Remove all sources of ignition. Ventilate area of leak or spill. Wear appropriate personal protective equipment. Contain and recover liquid when possible. Use non-sparking tools and equipment. Pick up and place in a suitable container for reclamation or disposal, using a method that does not generate dust. Do not use combustible materials, such as saw dust. Do not flush to sewer! If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

# Material Safety Data Sheet

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## 7. Handling and Storage

Protect against physical damage. Store in a cool, dry place. Outside or detached storage is preferred. Separate from incompatibles. Containers should be bonded and grounded for transfer to avoid static sparks. Storage and use areas should be No Smoking areas. Use only non-sparking tools and equipment, including explosion proof ventilation. Containers of this material may be hazardous when empty since they retain residue (vapors/liquid); observe all warnings and precautions listed for the product. Do not attempt to clean empty containers since residue is difficult to remove. Do not pressurize, cut weld, braze, solder, drill, grind, or exposed such containers to heat, sparks, flames, static electricity or other sources of ignition: they may explode and cause injury or death. Use only with adequate ventilation, dust mask or self-contained breathing apparatus. Protective clothing should always be worn. Contained and collect liquid when possible. Avoid contact with eyes, skin, and clothing. Keep container closed when not in use. Avoid breathing mist. Do not get on skin, clothing, or in eyes. Wash off with water. Do not take internally.

## 8. Exposure Controls/Personal Protection

OSHA Permissible Exposure Limit (PEL): 200 ppm (TWA)

ACGIH Threshold Limit Value (TLV): 200 ppm (TWA); 250 ppm (STEL)

### Ventilation System:

A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, a Manual of Recommended Practices*, most recent edition, for details. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

### Skin Protection:

Impervious gloves (rubber or neoprene) should be worn. Protective, impervious clothing should be worn in presence to prevent contact with skin (coveralls, boots, etc.).

### Eye Protection:

Splash-proof goggles should be worn when there is danger of splash from solution containing chemical. Protection against splash or mist from solution containing chemical with 8-inch minimum face shield is recommended. Eye protection should be worn in presence of dry chemical, or solution containing chemical, at all times. Maintain eye wash fountain and quick-drench facilities in work area.

## Material Safety Data Sheet

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### 9. Physical and Chemical Properties

Appearance:	Clear colorless liquid
Odor:	Characteristic odor
Physical State:	liquid
PH of water solutions:	N/A
Melting Point:	-98C (-144F)
Boiling Point:	64.5C (147F)
Flash Point:	11C (52F) TCC
Upper Explosive Limit:	36%
Lower Explosive Limit:	6.0%
Vapor Pressure:	97 @ 20C (68F)
Vapor Density:	1.1
Specific Gravity:	0.792
Solubility in Water:	Soluble in Water

### 10. Stability and Reactivity

**Chemical Stability:** Stable under normal conditions of use and storage.

**Conditions to Avoid:** Incompatibles, heat, flames and ignition sources.

**Incompatible Materials:** Strong oxidizing agents such as nitrates, perchlorates or sulfuric acid. Will attack some forms of plastics, rubber and coatings. May react with metallic aluminum and generate hydrogen gas.

**Hazardous Decomposition Products:** Carbon dioxide and carbon monoxide and formaldehyde may form when heated to decomposition.

### 11. Toxicological Information

**LD50 Oral Rat:** 5628 mg/kg

**LD50 Skin Rabbit:** 15800 gm/kg

**Investigated as a mutagen and reproductive effectors.**

**Acute: DANGER!**

**FLAMMABLE LIQUID AND VAPOR, MODERATE IRRITANT**

Harmful if Swallowed, Inhaled or Absorbed through the skin.

Causes Irritation to Eyes, and Respiratory System. Affects central nervous system. May be harmful if absorbed through skin. May cause irritation to skin. Repeated exposure by inhalation or absorption may cause systemic poisoning, brain disorders, impaired vision and blindness.

## Material Safety Data Sheet

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Inhalation may worsen conditions such as emphysema or bronchitis. Repeated skin contact may cause dermal irritation, dryness and cracking.

Inhalation of vapors irritates the mucous membrane. Exposure to high concentrations has a can also irritate mucous membrane, producing symptoms of dizziness, drowsiness, headache, staggering, unconsciousness, digestive and visual disturbances and possibly death.

Swallowing even small amounts can cause blindness, unconsciousness and death. Effects of sub lethal doses may be, abdominal pain, nausea, vomiting, visual disturbances ranging from blurred vision to light sensitivity.

May cause irritation, redness and pain. May be absorbed through the skin with toxic or lethal effects.

Vapors cause eye irritation tearing and burning. Splashes cause severe eye irritation, possible corneal burns and eye damage.

**Chronic:** Repeated exposure by inhalation or absorption may cause systemic poisoning, brain disorders, impaired vision and blindness. Inhalation may worsen conditions such as emphysema or bronchitis. Repeated skin contact may cause dermal irritation, dryness and cracking.

Inhalation of vapors irritates the mucous membrane. Exposure to high concentrations has a can also irritate mucous membrane, producing symptoms of dizziness, drowsiness, headache, staggering, unconsciousness, digestive and visual disturbances and possibly death.

Swallowing even small amounts can cause blindness, unconsciousness and death. Effects of sub lethal doses may be, abdominal pain, nausea, vomiting, visual disturbances ranging from blurred vision to light sensitivity.

## 12. Ecological Information

When released into the soil, this material is expected to readily biodegrade. When released into the soil, this material may leach into groundwater. When released into the soil, this material may quickly evaporate. When released into water, this material is expected to quickly evaporate significantly. When released into water this material is expected to have a half-life between 1 and 10 days. When released into water, this material may biodegrade to a moderate extent. This material is not expected to significantly bioaccumulate. When released into the air, this material is expected to be readily degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to exist in the aerosol phase with a short half-life. When released into the air, this material is expected to have a half-life between 10 and 30 days. When released into the air, this material may be removed from the atmosphere to a moderate extent by wet deposition.

### ENVIRONMENTAL TOXICITY:

This material is expected to be slightly toxic to aquatic life.

## Material Safety Data Sheet

MSDS Revision Date: 01/15/2008  
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### 13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

### 14. Transport Information

#### US DOT (ground)

Proper Shipping Name: METHANOL  
Hazard Class: 3  
UN/NA: UN1230  
Packing Group: II  
Marine Pollutant: No  
RQ Amount: N/A

#### IMDG (water)

Proper Shipping Name: METHANOL  
Hazard Class: 3 (6.1)  
UN/NA: UN1219  
Packing Group: II  
Marine Pollutant: No  
RQ Amount: N/A

### 15. Regulatory Information

#### SARA 302

Not Listed

#### SARA 304

Not Listed

#### SARA 313

Listed

#### CERCLA

Listed 5000lbs

#### TSCA Inventory

Yes

#### California Proposition 65

Not Listed

### 16. Other Information

This MSDS is provided as an information resource only. It should not be taken as a warranty or representation for which Brenntag assumes legal liability. While Brenntag believes the information contained herein is accurate and compiled from sources believed to be reliable, it is the responsibility of the user to investigate and verify its identity. The buyer assumes all responsibility for using and handling the product in accordance with applicable federal, state, and local regulations.

**Distributed By Brenntag**

## **Material Safety Data Sheet**

MSDS Revision Date: 01/15/2008  
Page 8 of 8



Brenntag Great Lakes LLC.  
4420 N. Harley Davidson Ave  
Wauwatosa, WI 53225

Brenntag Mid-South Inc.  
1405 Hwy 136 W  
Henderson, KY 42420

Brenntag Northeast, Inc.  
81 West Huller Lane  
Reading, PA 19605

Brenntag Southeast, Inc.  
2000 East Pettigrew Street  
Durham, NC 27703

Brenntag Southwest, Inc.  
610 Fisher Road  
Longview, TX 75604

Brenntag Pacific, Inc.  
10747 Patterson Place  
Santa Fe Springs, CA  
90670



## 1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

**Trade Name:** MC C-6252  
**Chemical description/Application:** Corrosion Inhibitor  
**Supplier:** Multi-Chem Production Chemicals®  
5301 Knickerbocker Road Suite #200  
San Angelo, TX 76904  
1 325 223 6200  
**Emergency Telephone:** 1 800 535 5053  
1 352 323 3500 (Outside United States)

## 2. HAZARDS IDENTIFICATION

Harmful if inhaled. May cause respiratory distress. Harmful if swallowed and may cause gastrointestinal distress. Ingestion may cause blindness due to the presence of methanol. Causes mild skin irritation to include redness, burning, drying and cracking, and skin burns. May cause mild eye irritation including stinging, tearing, and redness.

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

Name	EINECS No	CAS No	Content
Methanol		67-56-1	10-20%
Isopropanol		67-63-0	1-10%
2-Aminoethanol		141-43-5	1-10%

## 4. FIRST AID MEASURES

### Inhalation

If exposure by inhalation is suspected, immediately move exposed individual to fresh air. Oxygen may be administered if breathing is difficult. If individual experiences nausea, headache, dizziness, has difficulty in breathing seek a health care professional immediately.

### Skin Contact

Remove contaminated clothing. Wash the skin immediately with soap and water. Get medical attention if any discomfort continues.

### Eye Contact

Make sure to remove any contact lenses from the eyes before rinsing. Promptly wash eyes with plenty of water while lifting the eye lids. Continue to rinse for at least 15 minutes and get medical attention immediately.

### Ingestion

NEVER MAKE AN UNCONSCIOUS PERSON VOMIT OR DRINK FLUIDS. Immediately rinse mouth with water. Do not induce vomiting. Seek medical attention immediately.

## 5. FIRE-FIGHTING MEASURES

### Extinguishing Media

Foam, carbon dioxide, dry chemical. Water spray may be used to keep fire-exposed containers cool.

### Special Fire Fighting Procedures

Fire fighters should wear positive pressure self-contained breathing apparatus (SCBA) and full turnout gear.

### Products of Combustion

Oxides of Carbon, Nitrogen, May produce toxic organic vapors

### Unusual Fire and Explosion Hazards

N/A



## 6. ACCIDENTAL RELEASE MEASURES

### Personal Precautions

Wear protective PPE as described in Section 8; remove sources of ignition; avoid contact with skin and eyes.

### Environmental Precautions

Do not discharge into drains, water courses or onto the ground.

### Spill Clean-Up Procedure

Absorb spillage with suitable absorbent material. Transfer liquid to salvage tank if possible, absorb residues and sweep into suitable containers for waste disposal. Flush area clean with lots of water.

## 7. HANDLING AND STORAGE

### Usage Precautions

Avoid contact with skin and eyes. Prevent accidental ingestion or inhalation.

### Storage Precautions

Store in tightly closed original container in cool temperatures and well ventilated areas. Keep away from heat, sparks and flame. Keep away from incompatibles. Ground container equipment and personnel before handling product.

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### Exposure Standards

#### Methanol

OSHA Permissible Exposure Limit (PEL): 200 ppm (TWA)

ACGIH Threshold Limit Value (TLV): 200 ppm (TWA), 250 ppm (STEL) skin

#### Isopropanol

OSHA PEL 400 ppm TWA; ACGIH TLV 400 ppm TWA

#### 2-Aminoethanol

ACGIH 3 ppm (TWA); 6 ppm (STEL)

### Engineering Measures

Use local exhaust to control mists or vapors. Additional ventilation or exhaust may be required to maintain air concentrations below recommended exposure limits. Use explosion proof equipment.

### Respiratory Equipment

Type approved RPE for organic vapors and mists if required.

### Hand Protection

Impermeable gloves, change regularly to avoid permeation problems.

### Eye Protection

Wear goggles/face shield.

### Other Protection

Wear suitable protective clothing as protecting against splashing or contamination

### Hygiene Measures

Promptly remove any clothing that becomes contaminated. Always wash thoroughly after handling chemicals.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### Appearance

Dark Amber

### Specific Gravity

0.9928

### Flash Point

93°F

### pH Value

9-10

### Odor

Pungent ammonia

### Solubility

Water soluble

### Pour Point

-20°F

### Density

8.2733 lbs/gal



## 10. STABILITY AND REACTIVITY

### Stability

Normally stable.

### Materials to Avoid

Avoid oxidizing agents, strong acids, strong bases

### Hazardous Decomposition Products

Oxides of Carbon, Nitrogen, May produce toxic organic vapors

### Hazardous Polymerization

Not expected to occur.

## 11. TOXICOLOGICAL INFORMATION

### Methanol

LD<sub>50</sub> ca 15ml (oral, man)

*Effects:* Toxic by inhalation and if swallowed. The vapour has anesthetic properties and when inhaled in concentrations above the OES may cause headache, fatigue, dizziness, lack of coordination and loss of consciousness. Higher concentrations may cause visual disturbances and damage to the heart, liver and kidneys. Methanol may be absorbed through the skin giving systemic effects similar to inhalation. It is not a skin sensitizer. Ingestion of as little as 10ml may cause blindness.

### Isopropanol

LD<sub>50</sub> 5045 mg/kg (oral, rat)

12.8 gm/kg (dermal, rat)

LC<sub>50</sub> 16,000 ppm/8H (inhalation, rat)

*Effects:* Investigated as a tumorigen, mutagen, reproductive effector.

### 2-Aminoethanol

Oral rat LD<sub>50</sub>: 1720 mg/kg

Inhalation mouse LC<sub>50</sub>: 2420 mg/m<sup>3</sup>/2hr

Skin rabbit LD<sub>50</sub>: 1000 mg/kg

Irritation data: Skin rabbit - 505 mg moderate; Eye rabbit - 0.250 mg severe.

*Effects:* Investigated as a mutagen and reproductive effector.

## 12. ECOLOGICAL INFORMATION

### Methanol

#### Mobility

Highly volatile liquid, soluble in water. Predicted to have high mobility in soil.

#### Degradability

Evidence of photodegradation in air and degradation in soil

BOD<sub>5</sub> approx 70%

#### Bioaccumulative potential

Low potential for bioaccumulation

#### Aquatic toxicity

Low toxicity to aquatic organisms

LC<sub>50</sub> Rainbow trout, 96h >20 000 mg/l

LC<sub>50</sub> Brown shrimp, 48h 1975 mg/l

EC<sub>50</sub> Daphnia magna, 48h >10 000 mg/l

### Isopropanol

#### Aquatic toxicity

This material is not expected to be toxic to aquatic life.

LC<sub>50</sub> Fish, 96h 100 mg/l

### 2-Aminoethanol

#### Mobility

Moderate

#### Degradability

Moderate

BCF <100

#### Bioaccumulative potential

Low potential for bioaccumulation



### 13. DISPOSAL CONSIDERATIONS

**Substance**

Dispose of waste and residue in accordance with local authority requirements.

**Container**

As a substance. Used containers must not be cut up or punctured until completely purged of product residues.

### 14. TRANSPORT INFORMATION

<b>Emergency Response Guidebook</b>	128
<b>DOT Non-Bulk Shipping Name</b>	Flammable liquids, n.o.s. (Methanol, Isopropanol), Class 3, UN1993, PG-III
<b>DOT Bulk Shipping Name</b>	Flammable liquids, n.o.s. (Methanol, Isopropanol), Class 3, UN1993, PG-III
<b>DOT Label(s)</b>	Flammable Liquid
<b>IATA Classification</b>	Flammable liquid, n.o.s. (Methanol, Isopropanol), Class 3, UN1993, PG-III
<b>IATA Label(s)</b>	Flammable Liquid
<b>IMDG Classification</b>	Flammable liquid, n.o.s. (Methanol, Isopropanol), Class 3, UN1993, PG-III
<b>IMDG Label(s)</b>	Flammable Liquid
<b>Marine Pollutant</b>	No

### 15. REGULATORY INFORMATION

**DOT/CERCLA Reportable Quantity**

SARA SECTION 313: This product contains the following substances subject to the reporting requirements of sections 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372:

Methanol CERCLA: 5000 lbs

<b><u>HMIS/NPCA Rating</u></b>	Health	2	Flammability	3	Reactivity	0
<b><u>NEPA Ratings</u></b>	Health	2	Flammability	3	Reactivity	0

### 16. OTHER INFORMATION

**Revision Date**

13-July-07

**Disclaimer**

This product's safety information is provided to assist our customers in assessing compliance with health, safety and environmental regulations. The information contained herein is based on data available to us and is believed to be accurate, although the company in this respect provides no guarantee or warranty. Since the use of this product is within the exclusive control of the user, it is the user's obligation to determine the conditions of safe use of this product. Such conditions should comply with all federal regulations concerning the product.

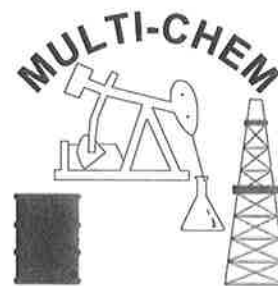
This MSDS was prepared and is to be used only for this product. If the product is used as a component in another product, this MSDS information may not be applicable.

# PRODUCT DATA

## PRODUCTION FOAMER

### MC FA-4013

**Combination Foaming Agent with Corrosion/Scale Inhibitor**



PRODUCTION CHEMICALS

A Division of  
Multi-Chem Group, LLC

#### PRODUCT BENEFITS

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Excellent stability and good hydrocarbon tolerance.  
Performs best as a continuous fluid remover in production wells.  
Cost-effective product to increase gas production.  
Performs well in fresh waters, KCL, and brines up to 150,000 mg/l chlorides  
Formulated with corrosion and scale inhibitor  
Winterized to <-35°F

#### TYPICAL PHYSICAL PROPERTIES

Form @ 70° F:	light yellow liquid
Specific Gravity:	0.978
pH (as is):	7.0 - 7.5
Pour Point:	<-40°F
Flash Point:	88°F

#### SOLUBILITY

Hydrocarbon:	Dispersible
High TDS Brines:	Soluble
Fresh water:	Soluble
HCL (15-28%):	Dispersible

#### DESCRIPTION

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MC FA-4013 is a anionic solution designed to be injected continuously down annulus to unload produced fluids from gas wells. MC FA-4013 provides improved performance in gas volumes produced from wells with lower bottom hole pressures. This product offers a cost-effective option to other lift methods, such as plunger lifts, pumping units, and soap sticks to lift fluids from produced wells. Effective in fresh waters, KCL and produced brines with chloride levels up to 150,000 mg/l. Good corrosion inhibition in both sweet and sour

#### APPLICATION METHODS

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MC FA-4013 should be applied continuously or via batch treatment. This product will provide a consistent foaming of tubulars and allow gas to be produced to surface. MC FA-4013 provides excellent lifting capabilities at 1/2 to 2%.

#### SHIPPING AND HANDLING INSTRUCTIONS

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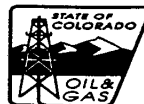
MC FA-4013 is a Flammable Liquid N.O.S. It can be shipped in 55 gallon epoxy lined steel drums or in bulk. A Material Safety Data Sheet (MSDS) outlines all recommended safe handling procedures.

**APPENDIX F**

**REMEDIATION WORK PLAN**

State of Colorado  
Oil and Gas Conservation Commission

1120 Lincoln Street, Suite 801, Denver, Colorado 80203 (303) 894-2100 Fax 894-2109



FOR OGCC USE ONLY

**SITE INVESTIGATION AND REMEDIATION WORKPLAN**

This form shall be submitted to the Director for approval prior to the initiation of site investigation and remediation activities. Form 27 is intended to be used whenever possible. Additional documentation will be required when large volumes of soil and groundwater have been impacted or involve large facilities with multiple source areas. See Rule 910. Attach as many pages as needed to fully describe the proposed work.

OGCC Employee:

☐ Spill ☐ Complaint  
☐ Inspection ☐ NOAV

Tracking No:

**CAUSE OF CONDITION BEING INVESTIGATED AND REMEDIATED**

☒ Spill or Release ☐ Plug & Abandon ☐ Central Facility Closure ☐ Site/Facility Closure ☐ Other (describe):

**GENERAL INFORMATION**

<b>OGCC Operator Number:</b> 10071 Name of Operator: <u>Bill Barrett Corporation (BBC)</u> Address: <u>1099 18th Street, Suite 2300</u> City: <u>Denver</u> State: <u>CO</u> Zip: <u>80202</u>		Contact Name and Telephone Name: <u>Scott Ghan</u> No: <u>970-876-1959</u> Fax: <u>970-876-0981</u>	
API/Facility No: <u>05-045-17690</u> Facility Name: <u>Upper BBC Pit</u> Well Name: <u>BBC 12A-24-692</u> Location (QtrQtr, Sec, Twp, Rng, Meridian): <u>SENE, Sec 23, T6S, R92W, 6th PM</u>		County: <u>Garfield</u> Facility Number: <u>417356</u> Well Number: <u>12A-24-692</u> Latitude: <u>39.513516</u> Longitude: <u>-107.625603</u>	

**TECHNICAL CONDITIONS**

Type of Waste Causing Impact (crude oil, condensate, produced water, etc.): Produced water

Site Conditions: Is location within a sensitive area (according to Rule 901e)? ☐ Y ☒ N If yes, attach evaluation.

Adjacent land use (cultivated, irrigated, dry land farming, industrial, residential, etc.): Open range land, undeveloped

Soil type, if not previously identified on Form 2A or Federal Surface Use Plan: Torriorthents-Camborthids-rock outcrop complex; Potts loam with 6 to 12% slopes

Potential receptors (water wells within 1/4 mi, surface waters, etc.): Two domestic water wells are located approximately 598' NW and 656' N of the pad; Several residences are also located N and NW of the pad.

Description of Impact (if previously provided, refer to that form or document): Both the vertical and horizontal extents of impacts are unknown at this time.

Impacted Media (check):	Extent of Impact:	How Determined:
<input checked="" type="checkbox"/> Soils	<u>unknown</u>	<u>Will be determined as part of this investigation.</u>
<input type="checkbox"/> Vegetation		
<input checked="" type="checkbox"/> Groundwater	<u>unknown</u>	<u>Will be determined as part of this investigation.</u>
<input type="checkbox"/> Surface water		

**REMEDIALATION WORKPLAN**

Describe initial action taken (if previously provided, refer to that form or document):

As discussed in the Form 19 submitted to the COGCC on May 20, 2010, a seep was indentified on the down-gradient side of the Upper BBC Pit. The seep is located between the Upper BBC pit and the Lower BBC pit at the base of the cut slope. Water samples were collected from the seep and the Upper BBC pit for comparison. The analytical results are provided in Appendix B of the NOAV Response Document. Based on the analytical results, the COGCC was notified on 5/18/10 that there were potential impacts to the subsurface soils. Draining of the pit commenced on 5/19/10 to mitigate any additional release of pit water. A second water sample was collected from the seep on 5/24/10 and analyzed for analyte list requested by the COGCC. The results from this sample are also attached. A second water sample was also requested from the pit, but was not feasible since the pit had already been drained.

Describe how source is to be removed:

As previously discussed in our conference call with Linda Spry O'Rourke on May 19, 2010, the pit was drained to mitigate the release of any additional water from the pit. Once the existing top liner has been properly cleaned, a new 30 mil. liner will be installed over the existing liners. A leak detection system will then be installed which will consist of a six-inch slotted pipe seated in a gravel sump at the west end of the pit and extending to the ground surface for access during periodic monitoring events. A second 45 mil. primary liner will then be installed over the secondary liner and the leak detection system. All field welds will utilize a combination of fusion welding and extrusion welding processes. All field welds will be tested utilizing a air lance test in which a concentrated stream of air, at minimum pressure of 60 psi, is blown across the field welds to check for weld separation. While the upper pit is being relined, the lower BBC pit will continue to be utilized to accommodate ongoing fracing operations.

Describe how remediation of existing impacts is to be accomplished, including removal and disposal at an injection well or licensed facility, land treatment on site, removal of impacted groundwater, insitu bioremediation, burning of oily vegetation, etc.:

Water removed from the pit was transferred to another BBC water storage facility. The remediation or disposal of any potentially impacted soils will be determined based on laboratory analytical results and will be reported on an update to this Form 27.

State of Colorado  
Oil and Gas Conservation Commission

1120 Lincoln Street, Suite 801, Denver, Colorado  
(303) 894-2100 Fax 894-2109



# REMEDIATION WORKPLAN (CONT.)

OGCC Employee:

Tracking Number: 2606777

Name of Operator: BBC

OGCC Operator No: 10071

Received Date:

Well Name &amp; No: BBC 12A-24-692

Facility Name &amp; No.: Upper BBC Pit 417356

If groundwater has been impacted, describe proposed monitoring plan (# of wells or sample points, sampling schedule, analytical methods, etc.):

It is unknown at this time if groundwater has been impacted. As discussed below and in the conference call with Linda Spry O'Rourke on May 19, 2010, the investigation of this pit will be conducted in stages and documented in updates to this Form 27. During the ongoing investigation, the vertical extent of the potential impacts will be defined and if groundwater is encountered a monitoring/remediation plan will be developed. Based on topography and information from nearby water wells, the depth to groundwater is estimated to be about 100 feet bgs (below ground surface). For more information please see Attachment 1.

Describe reclamation plan. Discuss existing and new grade recontouring; method and testing of compaction alleviation; and reseeding program, including location of new seed, seed mix and noxious weed prevention. Attach diagram or drawing. Use additional sheet for description if required.

After the pit closure activities are complete and any remediation that may be required, the pit location will be recontoured and reseeded in accordance with the interim reclamation specified in the APDs for wells at this location. BBC's field-wide weed management plan will continue to be implemented at this facility.

Attach samples and analytical results taken to verify remediation of impacts. Show locations of samples on an onsite schematic or drawing.

Is further site investigation required? ☒ Y ☐ N If yes, describe:

Please see Attachment 1.

Final disposition of E&P waste (landtreated and disposed onsite, name of licensed disposal facility, recycling, reuse, etc.):

All water removed from the pit was transported to other BBC water storage facilities for reuse. The existing top liner in the pit will be steam cleaned prior to installation of the new liners and all resulting liquid will be removed from the pit with a vac truck and disposed of in the appropriate manner. If impacted soils are encountered during the site investigation detailed above, the soils will be stockpiled onsite until analytical results are received. Based on those results, final deposition of the soils (e.g., land treatment or offsite disposal) will be documented in an update to this Form 27.

## IMPLEMENTATION SCHEDULE

Date Site Investigation Began: 5/13/10 Date Site Investigation Completed: 10/15/10 Remediation Plan Submitted: 6/21/10

Remediation Start Date: 5/19/10 Anticipated Completion Date: 10/15/10 Actual Completion Date:

I hereby certify that the statements made in this form are, to the best of my knowledge, true, correct, and complete.

Print Name: Scott Ghan

Signed:

Title: EH&amp;S Coordinator

Date: 6/18/10

OGCC Approved: Title: Date:

**ATTACHMENT 1  
FORM 27 – ADDITIONAL INFORMATION  
TRACKING NUMBER 2606777  
BILL BARRETT CORPORATION**

**SUBSURFACE INVESTIGATION**

In addition to installing two new liners over the existing liners and a leak detection system between the new liners, BBC will proceed with a subsurface investigation down-gradient of the Upper BBC pit. This investigation will be limited by the accessibility issues on the location due to the close proximity of the Upper and Lower pit and the steep cut slope in between.

A pothole excavation will be advanced on the northern and down-gradient side of the Lower pit. Soil samples will be collected at five foot intervals within the excavation and analyzed for TPH-GRO/DRO, BTEX, and PAHs. This excavation will be advanced to the maximum reach (approximately 20' bgs) of the excavator or until bedrock is encountered. Additional potholes will be excavated to determine the lateral extent of the impacts down-gradient of the pits, as needed and access allows. If potential impacts are found to extend beyond the reach of the excavator, a rotary drill rig, etc. will be utilized to define the vertical extent. The analytical results of the excavation/boring activities will be presented to the COGCC in an update to this Form 27.

The Upper pit is expected to remain in use until September of this year. During the pit closure activities, soils in the bottom of the Upper pit will be screened visually and with a Photo-ionization Detector (PID) to identify areas with potential hydrocarbon impacts. Any potentially impacted soils will be excavated from the pit and stockpiled in a lined containment on the adjacent well pad. When all impacted soils have been excavated, discrete soil samples will be collected at 50 foot intervals along the centerline of the pit. This centerline should be lowest area of the pit. If a lower area is determined during pit closure, sampling will be conducted in that area. Area soil background levels will be determined by sampling for SAR, EC, and pH. In addition, any stockpiled soil will be sampled with a representative composite sample or samples to determine the appropriate disposition for the impacted soil.

All samples will be analyzed for the soil parameters defined by COGCC Table 910-1. Upon receipt of the analytical data of these samples, the results will be presented to the COGCC in an update to this Form 27.

**GROUNDWATER INVESTIGATION**

In addition to the pit investigation, all existing groundwater wells and springs within one half mile downgradient of the pit will be sampled. See Figure 1 for the Study Area. The number of sample locations is estimated between five and ten. The analytical suite will consist of those constituents of concern requested by Linda Spry O'Rourke. However, those analytes that were not detected in the seep above the concentrations reported for baseline groundwater samples in the area, have been removed from the analytical list for this study (A list of analytes that will not be tested during future groundwater sampling is listed at the end of this attachment). This will not be the case for specific Volatile and Semivolatile Organic Compounds. The full list of each will be analyzed. A copy of the

Sampling Plan associated with this groundwater investigation can be found as Attachment 2.

Upon receipt of the analytical data of these samples, the results will be presented to the COGCC in an update to this Form 27 and also provided to the appropriate landowners.

## **TIMELINE**

All work for this investigation will be done as soon as practicable following approval of this plan by the COGCC. The subsurface investigation will take approximately four months. This timeline includes the excavation to determine the vertical and lateral extent of contamination downgradient of the pit and the pit closure work scheduled for September.

The groundwater sampling portion will take approximately one month. This estimate includes the initial record review, field work and laboratory analysis. This timeline does not include landowner data reporting or any follow on work deemed necessary by BBC or the COGCC. This schedule may be affected by landowner contact problems, and any access limits to private wells and springs.

### ***Analytes removed from the list requested by the COGCC in the groundwater study include:***

TPH	Be	Cd
NO <sub>2</sub>	Fe	Pb
NO <sub>3</sub>	Si	Se
o-Phosphate	V	Ag
SO <sub>4</sub>	Sb	Tl
U	Carbonate	Chlorate

**ATTACHMENT 2  
SAMPLING AND ANALYSIS PLAN FOR DOMESTIC WELLS  
TRACKING NUMBER 2606777  
BILL BARRETT CORPORATION**

**Project: BBC Pad Radius Sampling**  
OA 010-0974

**Objectives**

To ensure that groundwater in the area of the BBC-66S92W/23SENE pad (the site) has not been impacted by pit operations at the site, which is operated by Bill Barrett Corporation (BBC).

The data provided by this sampling will help to identify:

- any potential impacts that may have occurred,
- the general extent of any impacts found, and
- to indicate if any remediation may be necessary.

All groundwater samples will be collected from existing water wells and springs. Every effort will be made to locate and sample all groundwater sources within one half mile downgradient of the site. This sampling effort will be a onetime event, unless any reported data indicates that further study is needed. Figure 1 is a map of the study area.

Olsson Associates (Olsson) personnel will utilize available records (State Engineer, BBC, and Olsson), landowner interviews and site reconnaissance to determine all appropriate sampling locations.

**Schedule**

The sampling will begin as soon as practicable following approval of the Form 27, Remediation Workplan, by the Colorado Oil and Gas Conservation Commission (COGCC). Fluids from the pit and a seep have already been collected. This data along with existing baseline groundwater data will be used to indicate if impacts to area groundwater exist.

**Site Location and History**

The site is located in Garfield County, Colorado. The site legal location is the SE NE of Section 23, Township 6 South, Range 92 West.

This site consists of 2 adjacent pads. The pads are located at different elevations and are separated by a cut slope. On each pad is a lined completions pit. Recently, water was discovered seeping from the cut slope between the pits. Sample results have shown that this water contains minor amounts of hydrocarbon constituents. The upper pit has been drained to eliminate any further release of pit water to the subsurface while the investigation and remediation work is being conducted.

## **Qualifications**

The sampling and oversight work will be performed by personnel whom are proficient in appropriate groundwater sampling and analytical methodologies, including those methodologies appropriate for obtaining representative groundwater samples from domestic water wells.

## **Groundwater Sampling Methodology**

The following procedures will apply to the collection of groundwater samples from domestic water wells.

Prior to collecting a groundwater sample, all water wells should be purged of at least three casing volumes of water. In some cases, specific wells will be dewatered before three casing volumes can be purged. If this occurs, the sample will be collected after the well recharges to within 90% of the original water level. In other cases, specific landowners may only allow small purge volumes. All landowner requirements and purge volumes will be noted in the field log book or site specific sampling forms.

If available, the groundwater samples collected from domestic wells will be collected from the wellhead tap or other sampling port located upstream of any water treatment system or holding tank used for the water supply system. Samples collected from domestic wells will follow the protocols established by the state engineers' office. Existing pumps will be used to purge and sample water wells. If no pump is installed, a low-flow submersible sampling pump will be used to purge the well and collect samples.

The individual collecting the samples will wear disposable nitrile gloves to prevent cross contamination of the samples and/or the domestic water supply. The gloves should be changed following the collection of each sample from each sample location. Any equipment used in collecting the sample or other parameters will be decontaminated between each well.

Field parameters including pH, temperature, conductivity, total dissolved solids, dissolved oxygen and turbidity, when possible, should be measured and recorded prior to the collection of the sample. Any instrument used to collect field parameters will be calibrated according to respective manufacturer specifications and the calibration and response the instrument will be checked daily before sampling activities begin.

Each sample will be given a distinct ID (i.e. sample location or well number) and labeled with the requested analyses, date, time and initials of the sampler. All pertinent sample information will be entered onto the chain-of-custody (COC) form and detailed in the field log book or site specific sampling form.

The groundwater samples collected for volatile analyses will be placed in clean non-preserved sample containers with zero headspace, labeled, and placed into an iced cooler immediately. (Note: Current CDPHE sampling guidance states that no volatile samples should be preserved with HCl, primarily due to the potential of off gassing caused by carbonate water generally found in Colorado.) Samples collected for other analyses will be placed into the appropriate sample containers that contain the appropriate sample preservative as designated by the laboratory. All samples will be shipped in iced coolers and delivered to lab.

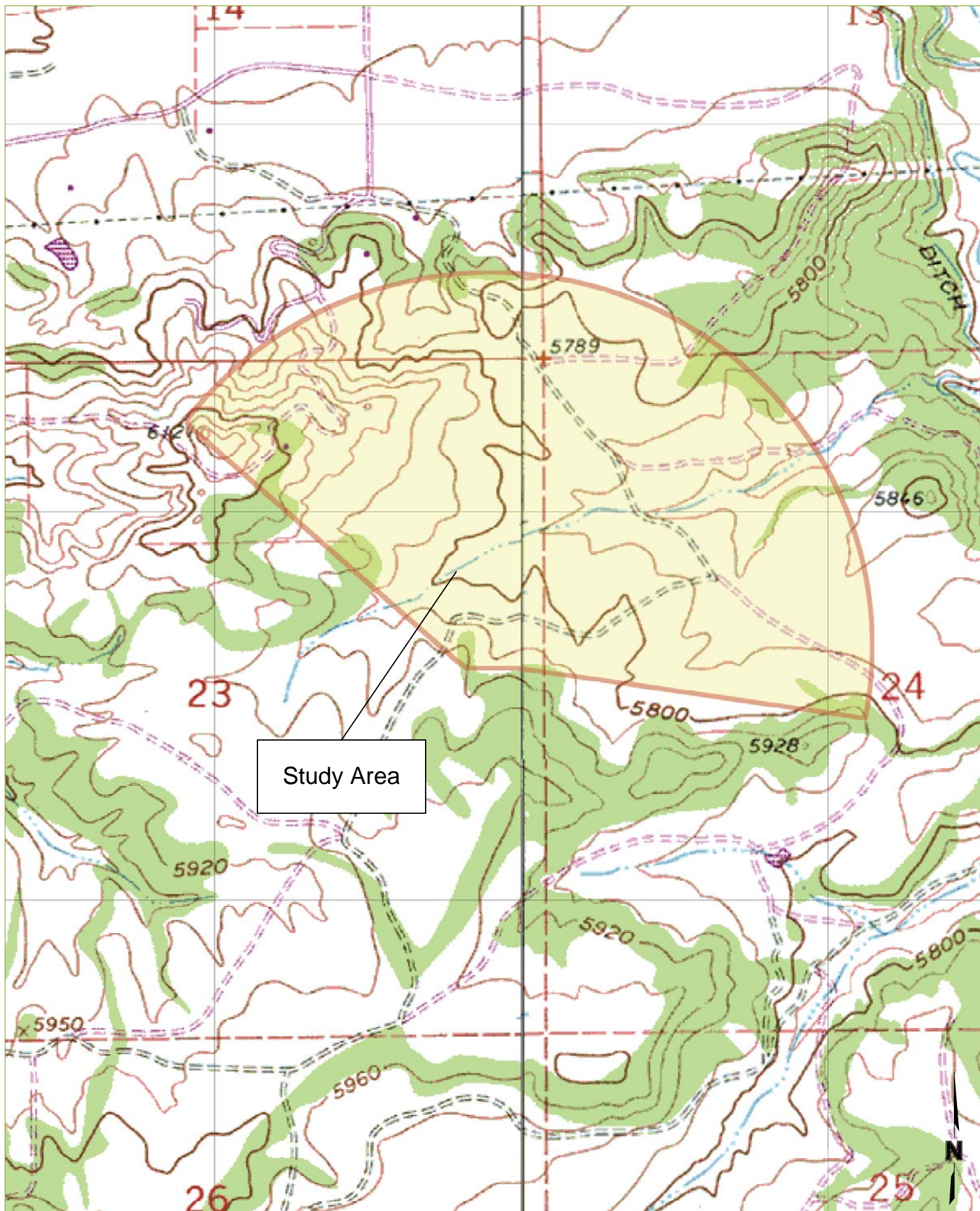
### **Laboratory Analysis**

Table 1 lists the analyses that will be performed on the samples collected for this project. This list includes the details of the specific analytical method to be used, required sample containers, preservation techniques and sample holding for each analysis.

All samples will be held and shipped under strict Chain-of-Custody protocol. Samples will be submitted to Accutest Mountain States, of Wheat Ridge, Colorado, for analysis.

### **Health and Safety**

Project work will be conducted in a manner not to jeopardize the health and safety of Olsson staff or other site personnel/visitors.



PROJECT NO: 010-0974  
DRAWN BY: KLK  
DATE: 06/01/2010

GROUNDWATER STUDY AREA  
BBC PIT INVESTIGATION  
BILL BARRETT CORPORATION

**OLSSON**  
ASSOCIATES

826 21 $\frac{1}{2}$  Road  
Grand Junction, CO 81505  
TEL 970.263.7800  
FAX 970.263.7456

FIGURE

1

**TABLE 1 - Analytical List**

<b>Analyte</b>	<b>Method</b>	<b>Sample Container</b>	<b>Preservative</b>	<b>Holding time</b>
Volatile Organics, 8260 full list	8260	(3) 40ml vials	HCL	14 days
Semi-Volatile Organics, 8270 full list	8270	(2) 1L ambers	None	7 days*
Anions (Br, Cl, B, F)	300	(1) 125ml poly	None	28 days
Anions by E 300.0 (chlorate and chlorite)	300	(1) 125ml poly	None	28 days
Dissolved Metals (Ba, B, Ca, Cr, Co, Cu, Li, Mg, Mn, Ni, K, Sr, Zn, As, Mo, U)	200.7/6010	(1) 250ml	None	6 mos
Alkalinity Series (Carbonate, Bicarbonate, Hydroxide, and Total Alkalinity)	SM2320B	(1) 250ml	None	28 days
Total Dissolved Solids	SM19 2540C	(1) 500ml poly	None	7 days
Specific Conductance	EPA 120.1	(1) 125ml poly	None	28 days
pH	SM20 4500H	(1) 125ml poly	None	Immediate

\*SVOCs need to be extracted within 7 days of collection. Once extracted they have a 40 day holding time.

Certain parameters can be combined if they are collected for the same sampling location. pH can be combined with any unpreserved volume.

All of the anions can be combined together.

Conductance can be combined with any unpreserved volume (TDS, etc)