



October 7, 2014

John Axelson  
East Environmental Supervisor  
Colorado Oil and Gas Conservation Commission  
1120 Lincoln Street, Suite 801  
Denver, Colorado 80203

DOC 2142380

**RE: Confirmation Soil Sampling, Rice Lease Assessment Report Supplemental Data  
Remediation Project Numbers 8444, 8461 and 8517 Logan County, Colorado**

Dear Mr. Axelson,

Olsson Associates (Olsson) was retained by CM Production, LLC (CM Production) to conduct an environmental assessment of issues pertaining to a notice of alleged violation (NOAV) #2003999090 at the central tank battery located in the southwest quarter of the northwest quarter of Section 33, Township 12 North, Range 54 West, of the 6<sup>th</sup> Principal Meridian, in Logan County, Colorado. This letter presents the results of additional sampling that Olsson conducted on September 3, 2014.

**July 2014 Oily Waste Excavation Confirmation Soil Sampling Summary**

On July 23, 2014 Olsson performed site characterization activities of the oily waste that was excavated adjacent to the northwest corner of the south pit, assessed produced water impacts in the drainage to the east of the site, and also to the south of the south pit. All of the confirmation soil samples collected from the sidewalls and base of the oily waste excavation were submitted for laboratory analysis of the Table 910-1 soil parameters. The analytical results showed that benzene, toluene, ethylbenzene, and xylenes and gasoline range organics (GRO) were not detected above laboratory reporting limits in any of the confirmation samples (TBE-NE@6', TBE-SW@6', TBE-SE@6', TBE-B@8', and TBE-NW@6').

The results for diesel range organics (DRO) showed that DRO was not detected in the bottom confirmation soil sample and three of the four sidewall samples. The DRO result reported for the TBE-NW@6' side wall sample was reported at 8,080 milligrams per kilogram (mg/kg) which was above the Table 910-1 concentration level of 500 mg/kg.

The results for the waste characterization sample, TBE-WC, showed that the GRO was reported at 830 mg/kg, and that the DRO was reported at 22,900 mg/kg. The results for the overburden composite sample, TBE-CO, showed that the DRO was 4,890 mg/kg. These results also exceeded the Table 910-1 concentration levels. Per our conversation the COGCC does not



allow tank bottoms to be land farmed, so these wastes will need to be disposed at a commercial landfill facility.

## **SEPTEMBER 2014 OILY WASTE EXCAVATION SOIL SAMPLING ACTIVITIES**

### ***Additional Sidewall Confirmation Soil Sample – Oily Waste Excavation***

On September 3, 2014 Olsson personnel collected an additional soil confirmation sample, TBE-NW@6'-A, following additional excavation of the northwest corner of the waste excavation. The sample was collected to confirm that the extent of DRO impacted soil had been removed. The results for the TBE-NW@6'-A soil sample showed that DRO was not detected above the laboratory reporting limits in the sample.

### **July 2014 Ephemeral Drainage Soils Assessment Summary**

On July 23, 2014 Olsson personnel conducted an assessment of the produced water impacted soil within the drainage to the east of the north and east produced water pits. The assessment involved the installation of a hand augered piezometer to a depth of ten feet below ground surface (bgs) at an elevation of approximately three feet above the base of the main drainage downslope from the east pit, collection of a produced water sample from the east pit, and collection of a surface water sample from where the side drainage downslope of the north pit joins the main drainage.

The piezometer remained dry during the time that Olsson personnel were onsite on July 23, 2014. There was evidence of moisture seeping from both banks of the drainage following recent precipitation. The results of the surface water sample and the produced water sample showed elevated levels of chloride and TDS.

## **SEPTEMBER 2014 WATER SAMPLING ACTIVITIES**

### ***North and South Produced Water Pit Samples and Main Drainage Surface Water Sample***

Olsson personnel also collected produced water samples from the north pit and south pit to compare to the sample results for the east pit produced water sample and a surface water sample collected from the side drainage downslope from the north pit during the July 2014 site characterization activities. Olsson personnel were also able to collect a surface water sample from the main drainage down gradient from the north pit.

The produced water sample results for the north pit (Sample ID: N Pit) showed that chloride was detected at 6,050 milligrams per liter (mg/L), that total dissolved solids (TDS) were reported at 12,400 mg/L, and sulfate was reported at 76.3 mg/l. The produced water sample results for the south pit (Sample ID: S Pit) showed that chloride was detected at 5,450 mg/l, TDS was reported at 11,300 mg/l, and sulfate was reported at 70.8 mg/l.



Limited surface water flow was observed in the main drainage approximately 130 feet east of the north pit and was able to collect a sample. The results for the surface water sample (Sample ID: NPD-SW) collected on September 3, 2014 showed that chloride was detected at 1,360 mg/l, TDS was reported at 2,580 mg/l, and sulfate was reported at 20.8 mg/l.

The side drainage downslope from the north pit was dry. Olsson personnel checked the water level in temporary piezometer, PZ-1, and the piezometer was dry. The main drainage was dry at this point downslope from the southeast corner of the east pit.

## **CONCLUSIONS**

The following sections present the conclusions for the oily waste excavation and the produced water and surface water samples.

### Oily Waste Excavation

The July 2014 confirmation soil sample results for the oily waste excavation show that concentrations of BTEX and GRO were not detected above the COGCC Table 910-1 concentration levels. The July 2014 soil sample TBE-NW @6' showed that DRO was detected at a concentration of 8,080 mg/kg, which was above the 500 mg/kg Table 910-1 value for DRO.

CM Production performed additional excavation of the northwest corner and Olsson personnel collected an additional sidewall confirmation soil sample, TBE-NW @6', which was collected on September 3, 2014 and submitted for DRO analysis. The laboratory results show that DRO was not detected above the laboratory reporting limit of 7.8 mg/kg. Therefore, no further action is warranted for the oily waste excavation. Impacted soils will be disposed offsite at a landfill.

### Produced Water and Surface Water Samples

The produced water samples from the three pits showed similar chloride and TDS concentrations. The results for the July 2014 north pit drainage standing surface water sample show higher levels of chloride and TDS which may be due to evaporation, likely due to leaching out of soil, in the side drainage, impacted by historic produced water discharge previously allowed by the COGCC. The results for the September 2014 main drainage surface water sample show levels of chloride and TDS that are significantly lower than the produced water pit samples.



The side drainage downslope from the north pit, and the temporary piezometer (PZ-1), downslope from the southeast pit were dry. This suggests that the current operations of the produced water pits are not the source of the chloride and TDS detected in the drainage soils and that these impacts are related to historic produced water releases, allowed by the COGCC, by previous operators of the field. Based on the historic produced water discharge to the drainage, no further action is warranted at this time for the impacted soils within the drainage.

Sincerely,

**Olsson Associates, Inc.**



Jason Davidson  
Project Scientist



James W. Hix, PG  
Senior Geologist



---

# Tables



**Table 1**  
**ANALYTICAL SUMMARY - ORGANIC COMPOUNDS IN SOIL**

**Tank Bottoms Excavation - Oily Waste**  
**CM Production LLC - Cliff Unit / Rice Lease**  
**Section 33 Township 12 North, Range 54 West**  
**Logan County, Colorado**

Sample ID	Date	Volatile Organic Compounds and Hydrocarbons				GRO (mg/kg)	DRO (mg/kg)
		Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Total Xylenes (mg/kg)		
<b>COGCC T 910-1</b>		<b>0.17</b>	<b>85</b>	<b>100</b>	<b>175</b>	<b>500</b>	<b>500</b>
TBE-NE @ 6'	7/23/2014	< 0.066	< 0.13	< 0.13	< 0.26	< 13	< 7.7
TBE-SW @ 6'	7/23/2014	< 0.068	< 0.14	< 0.14	< 0.27	< 14	18.4
TBE-SE @ 6'	7/23/2014	< 0.068	< 0.14	< 0.14	< 0.27	< 14	< 7.9
TBE-B @ 8'	7/23/2014	< 0.062	< 0.12	< 0.12	< 0.25	< 12	< 7.5
TBE-NW @ 6'	7/23/2014	< 0.068	< 0.14	< 0.14	< 0.27	47.1	<b>8,080</b>
TBE-NW @ 6'-A	9/3/2014	NA	NA	NA	NA	NA	< 7.8
TBE - WC	7/23/2014	< 0.069	< 0.14	0.401	19.6	<b>830</b>	<b>22,900</b>
TBE - CO	7/23/2014	< 0.064	< 0.13	< 0.13	< 0.25	17.7	<b>4,890</b>

mg/kg - milligrams per kilogram

GRO: gasoline range organics

DRO: diesel range organics

TPH: Total petroleum hydrocarbons (Sum of GRO plus DRO concentrations)

**BOLD**

- Above Colorado Oil and Gas Conservation Commission (COGCC) Table 910-1 concentration levels

< - Analyte was not detected at or above the laboratory reporting limit

NA - Analyte was not analyzed

See attached map for soil sample locations:

TBE-NE @ 6': Confirmation soil sample from the northeast corner at 6 feet below ground surface (bgs)

TBE-SW @ 6': Confirmation soil sample from the southwest corner at 6 feet bgs

TBE-SE @ 6': Confirmation soil sample from the southeast corner at 6 feet bgs

TBE-B @ 8': Confirmation soil sample from the base of the buried tank bottoms excavation at 8 feet bgs

TBE-NW @ 6': Confirmation soil sample from the northwest corner at 6 feet bgs

TBE-NW @6'-A: Confirmation soil sample collected on 09/03/2014 from the northwest corner at 6 feet bgs following additional excavation.

TBE - WC: Tank Bottoms Excavation - Waste Characterization soil sample

TBE - CO: Tank Bottoms Excavation - Composite Overburden soil sample



**Table 2**  
**ANALYTICAL SUMMARY - INORGANIC COMPOUNDS IN WATER**

**Surface and Produced Pit Water Samples**  
**CM Production LLC - Cliff Unit / Rice Lease**  
**Section 33 Township 12 North, Range 54 West**  
**Logan County, Colorado**

Sample ID	Date	Chloride (mg/l)	TDS (mg/L)	Sulfate (mg/L)	Sample Collection Point
<b>COGCC T 910-1</b>		<b>250 mg/L <sup>1</sup></b>	<b>&lt; 1.25 x Background</b>	<b>250 mg/L <sup>1</sup></b>	
N PIT	9/3/2014	6050	12400	76.3	Water sample collected from the north produced water pit
S PIT	9/3/2014	5450	11300	70.8	Water sample collected from the south produced water pit
NPD-SW	9/3/2014	<b>1360</b>	<b>2580</b>	20.8	Water sample collected from the main drainage down stream from the north produced water pit (flowing from the north/drying up downstream).
NPD - SW	7/23/2014	<b>8380</b>	<b>15100</b>	< 50	Water sample from the drainage down from the north pit near the confluence with the main drainage (standing puddle). Evaporation/leaching may have increased concentrations.
SE - Pit	7/23/2014	5800	11900	38.9	Water sample from the southeast pit

Note: Background established by the Colorado Department of Public Health and Environment (CDPHE) Water Quality Control Commission (WQCC) Regulation 41

The basic standards for groundwater

<sup>1</sup> - Domestic drinking water standard

**BOLD** - Above Colorado Oil and Gas Conservation Commission (COGCC) Table 910-1 concentration levels

The sample results for the SE - Pit sample are also above the Table 910-1 concentration levels; however, this sample was collected from a permitted pit.

The COGCC records indicate that historically produced water was discharged to the ephemeral drainage east of the site. This practice was not regulated at that time.

There was evidence of moisture/seepage in both banks of the drainage adjacent to the facility and north of the facility.



---

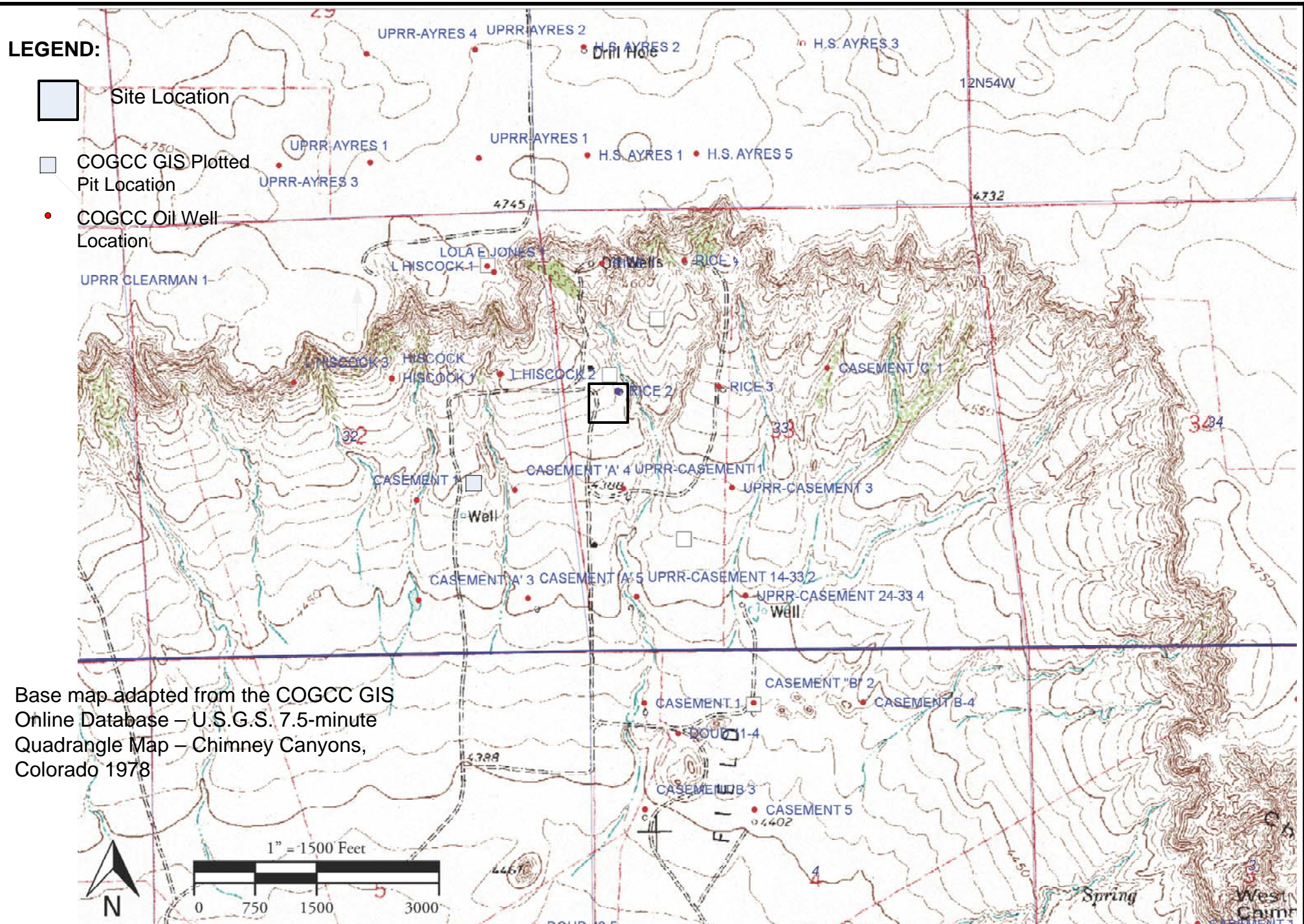
# Figures



Site Location

 COGCC GIS Plotted  
Pit Location

- COGCC Oil Well Location



Base map adapted from the COGCC GIS Online Database – U.S.G.S. 7.5-minute Quadrangle Map – Chimney Canyons, Colorado 1978

DRAWN BY: JWH

DATE: 10/06/14

General Site Location Map  
CM Production, LLC  
Cliff Field, Rice Lease, Logan County, Colorado

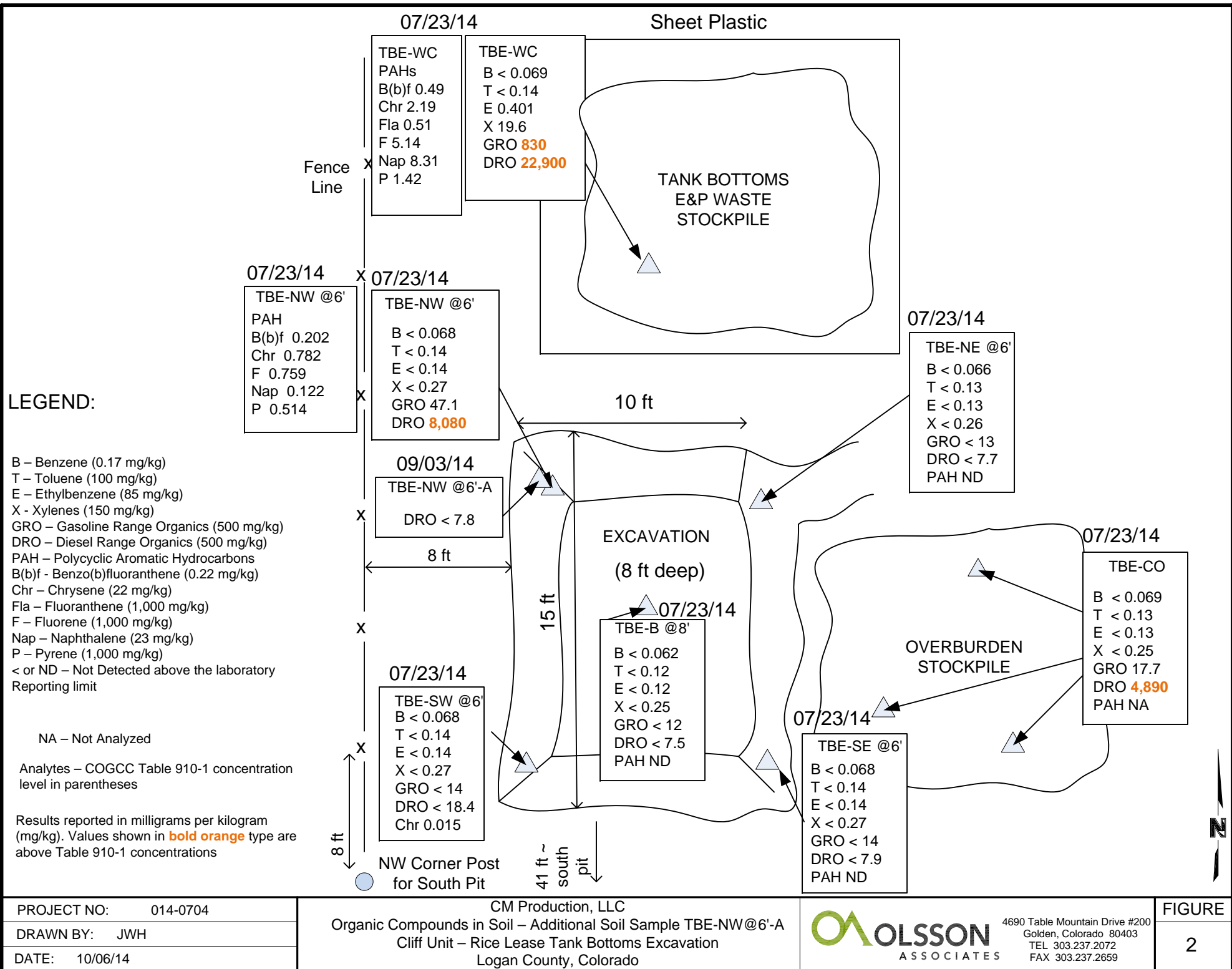


4690 Table Mountain Drive #200  
Golden, Colorado 80403  
TEL 303.237.2072  
FAX 303.237.2659

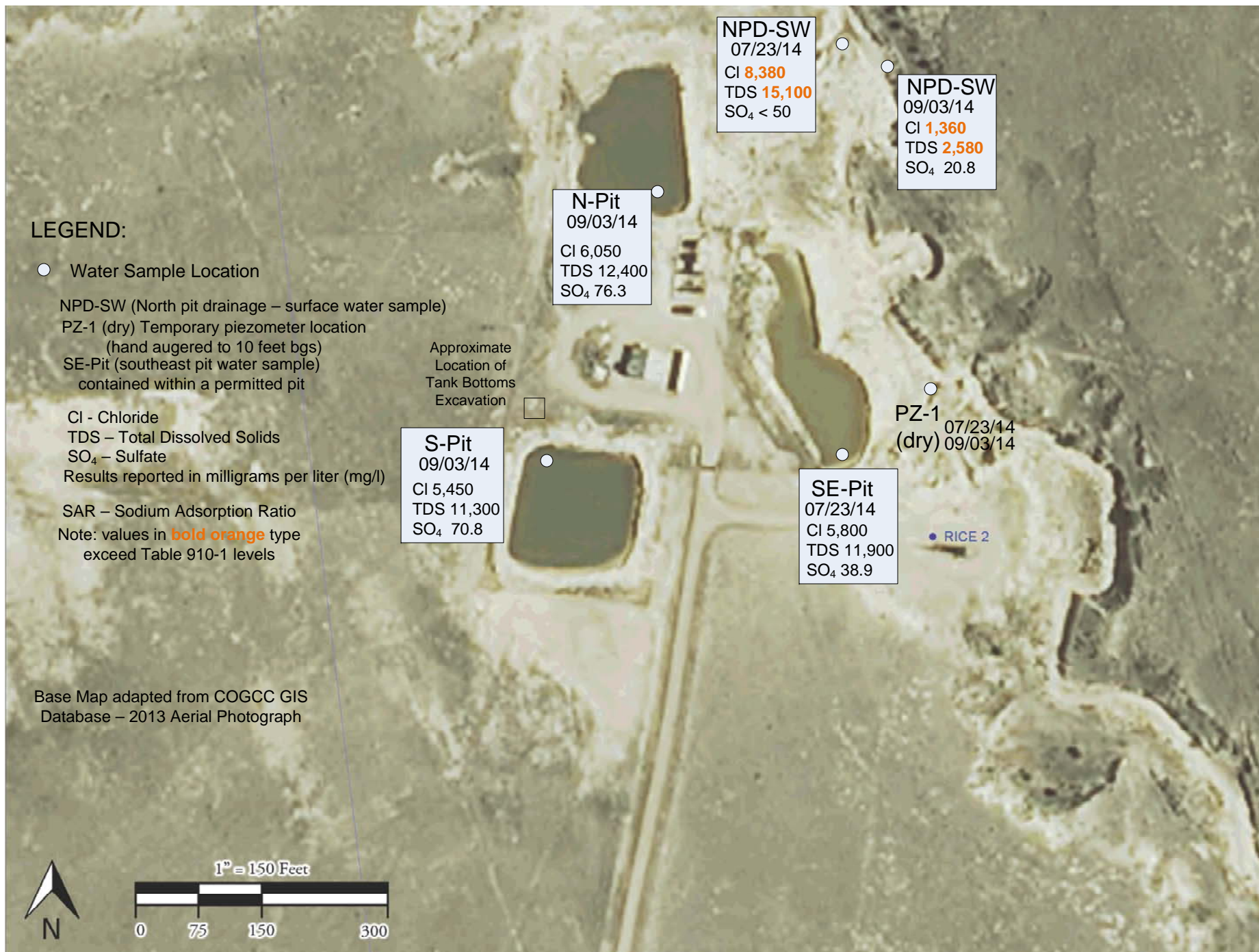
FIGURE

1









PROJECT NO: 014-0704

DRAWN BY: JWH

DATE: 10/03/2014

CM Production, LLC - Cliff Unit Rice Lease  
Produced Water Pit and Surface Water Sample Results  
Logan County, Colorado

**OLSSON**  
ASSOCIATES

4690 Table Mountain Drive #200  
Golden, Colorado 80403  
TEL 303.237.2072  
FAX 303.237.2659

FIGURE

3



---

**Appendix A**  
**Form 27 – Site Investigation and**  
**Remediation Work Plan**



**State of Colorado**  
**Oil and Gas Conservation Commission**

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

**CAUSE OF CONDITION BEING INVESTIGATED AND REMEDIATED**

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

OGCC Employee:

☐ Spill ☐ Complaint  
☐ Inspection ☐ NOAV

Tracking No:

OGCC Operator Number: 10352

Name of Operator: CM Production, LLC

Address: 390 Union Boulevard, Suite 620

City: Lakewood State: CO Zip: 80228

Contact Name and Telephone:

Mr. John Teff

No: (303) 534-0199 x 207 / (720) 299-1101

Fax: (303) 479-1318

API Number: \_\_\_\_\_

County: Logan

Facility Name: Rice - 6 12N54W 33 SENW

Facility Number: 219791, 312243, Rem #8517

Well Name: \_\_\_\_\_

Well Number: \_\_\_\_\_

Location: (QtrQtr, Sec, Twp, Rng, Meridian): SW NW Sec 33, T12N, R54W, 6 PM Latitude: 40.97341 Longitude: -103.42021

**TECHNICAL CONDITIONS**

Type of Waste Causing Impact (crude oil, condensate, produced water, etc): oily waste - tank bottoms

**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.): Rangeland - Cattle grazing

Soil type, if not previously identified on Form 2A or Federal Surface Use Plan: Mitchell-Keota Loams (Unit#70)/Badland (Unit#13)

Potential receptors (water wells within 1/4 mi, surface waters, etc.): Unnamed ephemeral drainage- Approximately 450 feet East

**Description of Impact** (if previously provided, refer to that form or document):

Impacted Media (check):

- ☒ Soils  
☐ Vegetation  
☐ Groundwater  
☐ Surface Water

Extent of Impact:

10 feet by 15 feet by 8 feet deep

How Determined:

Excavation & confirmation soil samples

**REMEDIALTION WORKPLAN**

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

On July 22, 2014 CM Production personnel excavated the area where oily wastes were identified in the Inspection on 01/14/2014 (Doc #670600199). The work was performed in accordance with an approved work plan the COGCC received on 06/30/2014, and approved on 07/01/2014 (#8517).

**Describe how source is to be removed:**

On July 22, 2014 CM Production excavated the oily waste using a mini-excavator (John Deere 35D) and placed it on plastic to the north of the excavation within a lined and bermed containment. Overburden soil was placed on the east side of the excavation.

**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.:**

Impacted soils are to be taken to a commercial disposal facility. The excavation will be filled with clean soil and the area restored to grade.





**REMEDIATION WORKPLAN (Cont.)**

Tracking Number: \_\_\_\_\_  
Name of Operator: \_\_\_\_\_  
OGCC Operator No: \_\_\_\_\_  
Received Date: \_\_\_\_\_  
Well Name & No: \_\_\_\_\_  
Facility Name & No: \_\_\_\_\_

OGCC Employee: \_\_\_\_\_

**If groundwater has been impacted, describe proposed monitoring plan** (# of wells or sample points, sampling schedule, analytical methods, etc.):  
Groundwater was not encountered in the excavation. Groundwater is expected to lie more than 100 feet below ground surface, and is not expected to be impacted. Confirmation soil samples were collected from the sidewalls and base of the excavation. The analytical results for the confirmation soil samples show that the Table 910-1 concentration levels for soil parameters were met.

**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.  
The excavation will be filled with clean soil from the location or from an area approved by the surface landowner. The area will be restored to grade and seeded with a native grass mixture.

**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 the Rice Lease Environmental Assessment Report (Document #2141753) Prepared by Olsson Associates and received by the COGCC on 09/09/2014 for Remediation #8444, 8461, and 8517, and the attached supplemental data from field work conducted on 09/03/2014 involving the collection of confirmation soil sample TBE-NW@6-A. Produced water samples were collected from the north and south pits (Sample Id#s N Pit and S Pit), and a surface water sample was collected from the main drainage down slope from the north pit. No further action is required.

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

The impacted soils will be taken to the Waste Management Buffalo Ridge landfill near Keenesburg, or the North Weld Landfill near Ault, Colorado.

**IMPLEMENTATION SCHEDULE**

Date Site Investigation Began: 01/14/2014	Date Site Investigation Completed: Est 08/2014	Date Remediation Plan Submitted: 06/30/2014
Remediation Start Date: 07/22/2014	Anticipated Completion Date: 07/23/2014	Actual Completion Date: 09/03/2014

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

Print Name: James W. Hix - as agent for CM Production, LLC

Signed: James W. Hix as agent for  
CM Production, LLC

Title: Senior Geologist

Date: 10/06/2014

OGCC Approved: \_\_\_\_\_ Title: \_\_\_\_\_ Date: \_\_\_\_\_



---

## **Appendix B**

# **Laboratory Analytical Report**





09/10/14

## Technical Report for

**Olsson Associates - Denver**

**CM Production LLC, Rice Lease Logan County Co**

**014-0704**

**Accutest Job Number: D61775**

**Sampling Date: 09/03/14**

### Report to:

**Olsson Associates  
4690 Table Mountain Drive #200 Suite 200  
Golden, CO 80403  
jhix@olssonassociates.com**

**ATTN: James Hix**

**Total number of pages in report: 22**



Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Program and/or state specific certification programs as applicable.

A handwritten signature in black ink, appearing to read 'Scott Heideman'.

**Scott Heideman  
Laboratory Director**

**Client Service contact: Renea Jackson 303-425-6021**

Certifications: CO (CO00049), ID, NE (CO00049), ND (R-027), NJ (CO 0007), OK (D9942), UT (NELAP CO00049), TX (T104704511)

This report shall not be reproduced, except in its entirety, without the written approval of Accutest Laboratories.  
Test results relate only to samples analyzed.



# Table of Contents

-1-

<b>Section 1: Sample Summary .....</b>	<b>3</b>
<b>Section 2: Case Narrative/Conformance Summary .....</b>	<b>4</b>
<b>Section 3: Summary of Hits .....</b>	<b>6</b>
<b>Section 4: Sample Results .....</b>	<b>7</b>
<b>4.1: D61775-1: N PIT .....</b>	<b>8</b>
<b>4.2: D61775-2: S PIT .....</b>	<b>9</b>
<b>4.3: D61775-3: NPD-SW .....</b>	<b>10</b>
<b>4.4: D61775-4: TBE-NW@6'-A .....</b>	<b>11</b>
<b>Section 5: Misc. Forms .....</b>	<b>12</b>
<b>5.1: Chain of Custody .....</b>	<b>13</b>
<b>Section 6: GC Semi-volatiles - QC Data Summaries .....</b>	<b>14</b>
<b>6.1: Method Blank Summary .....</b>	<b>15</b>
<b>6.2: Blank Spike Summary .....</b>	<b>16</b>
<b>6.3: Matrix Spike/Matrix Spike Duplicate Summary .....</b>	<b>17</b>
<b>Section 7: General Chemistry - QC Data Summaries .....</b>	<b>18</b>
<b>7.1: Method Blank and Spike Results Summary .....</b>	<b>19</b>
<b>7.2: Duplicate Results Summary .....</b>	<b>20</b>
<b>7.3: Matrix Spike Results Summary .....</b>	<b>21</b>
<b>7.4: Matrix Spike Duplicate Results Summary .....</b>	<b>22</b>





Sample Summary

Olsson Associates - Denver

Job No: D61775

CM Production LLC, Rice Lease Logan County Co  
Project No: 014-0704

Sample Number	Collected		Received	Matrix		Client Sample ID
	Date	Time By		Code	Type	
D61775-1	09/03/14	08:11 JED	09/03/14	AQ	Water	N PIT
D61775-2	09/03/14	08:02 JED	09/03/14	AQ	Water	S PIT
D61775-3	09/03/14	08:30 JED	09/03/14	AQ	Water	NPD-SW
D61775-4	09/03/14	07:45 JED	09/03/14	SO	Soil	TBE-NW@6'-A

Soil samples reported on a dry weight basis unless otherwise indicated on result page.



## CASE NARRATIVE / CONFORMANCE SUMMARY

**Client:** Olsson Associates - Denver

**Job No** D61775

**Site:** CM Production LLC, Rice Lease Logan County Co

**Report Date** 9/10/2014 2:02:43 PM

On 09/03/2014, 4 sample(s), 0 Trip Blank(s), and 0 Field Blank(s) were received at Accutest Mountain States (AMS) at a temperature of 20.2 °C. The samples were intact and properly preserved, unless noted below. An AMS Job Number of D61775 was assigned to the project. The lab sample ID, client sample ID, and date of sample collection are detailed in the report's Results Summary.

Specified quality control criteria were achieved for this job except as noted below. For more information, please refer to the analytical results and QC summary pages.

### Extractables by GC By Method SW846-8015B

**Matrix:** SO

**Batch ID:** OP10556

- All samples were extracted and analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D61777-1MS, D61777-1MSD were used as the QC samples indicated.

### Wet Chemistry By Method EPA 300.0/SW846 9056

**Matrix:** AQ

**Batch ID:** GP13465

- All samples were prepared and analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D61867-1MS, D61867-1MSD were used as the QC samples for the Chloride, Sulfate analysis.

**Matrix:** AQ

**Batch ID:** GP13468

- All samples were prepared and analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D61844-3MS, D61844-3MSD were used as the QC samples for the Sulfate analysis.

### Wet Chemistry By Method SM 2540C-2011

**Matrix:** AQ

**Batch ID:** GN26364

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D61775-3DUP were used as the QC samples for the Solids, Total Dissolved analysis.

### Wet Chemistry By Method SM2540G-2011 M

**Matrix:** SO

**Batch ID:** GN26286

- The data for SM2540G-2011 M meets quality control requirements.



AMS certifies that data reported for samples received, listed on the associated custody chain or analytical task order, were produced to specifications meeting AMS's Quality System precision, accuracy and completeness objectives except as noted.

Estimated non-standard method measurement uncertainty data is available on request, based on quality control bias and implicit for standard methods. Acceptable uncertainty requires tested parameter quality control data to meet method criteria.

AMS is not responsible for data quality assumptions if partial reports are used and recommends that this report be used in its entirety. This report is authorized by AMS indicated via signature on the report cover.



## Summary of Hits

Page 1 of 1

**Job Number:** D61775  
**Account:** Olsson Associates - Denver  
**Project:** CM Production LLC, Rice Lease Logan County Co  
**Collected:** 09/03/14



Lab Sample ID	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
---------------	------------------	-----------------	----	-----	-------	--------

### D61775-1 N PIT

Chloride	6050	250		mg/l	EPA 300.0/SW846 9056
Solids, Total Dissolved	12400	10		mg/l	SM 2540C-2011
Sulfate	76.3	50		mg/l	EPA 300.0/SW846 9056

### D61775-2 S PIT

Chloride	5450	250		mg/l	EPA 300.0/SW846 9056
Solids, Total Dissolved	11300	10		mg/l	SM 2540C-2011
Sulfate	70.8	50		mg/l	EPA 300.0/SW846 9056

### D61775-3 NPD-SW

Chloride	1360	50		mg/l	EPA 300.0/SW846 9056
Solids, Total Dissolved	2580	10		mg/l	SM 2540C-2011
Sulfate	20.8	5.0		mg/l	EPA 300.0/SW846 9056

### D61775-4 TBE-NW@6'-A

No hits reported in this sample.



Sample Results

Report of Analysis



Report of Analysis

<b>Client Sample ID:</b>	N PIT	<b>Date Sampled:</b>	09/03/14
<b>Lab Sample ID:</b>	D61775-1	<b>Date Received:</b>	09/03/14
<b>Matrix:</b>	AQ - Water	<b>Percent Solids:</b>	n/a
<b>Project:</b>	CM Production LLC, Rice Lease Logan County Co		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Chloride	6050	250	mg/l	500	09/05/14 16:16	JB	EPA 300.0/SW846 9056
Solids, Total Dissolved	12400	10	mg/l	1	09/09/14	JD	SM 2540C-2011
Sulfate	76.3	50	mg/l	100	09/05/14 19:48	JB	EPA 300.0/SW846 9056

RL = Reporting Limit



Report of Analysis

<b>Client Sample ID:</b>	S PIT	<b>Date Sampled:</b>	09/03/14
<b>Lab Sample ID:</b>	D61775-2	<b>Date Received:</b>	09/03/14
<b>Matrix:</b>	AQ - Water	<b>Percent Solids:</b>	n/a
<b>Project:</b>	CM Production LLC, Rice Lease Logan County Co		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Chloride	5450	250	mg/l	500	09/05/14 16:59	JB	EPA 300.0/SW846 9056
Solids, Total Dissolved	11300	10	mg/l	1	09/09/14	JD	SM 2540C-2011
Sulfate	70.8	50	mg/l	100	09/05/14 20:02	JB	EPA 300.0/SW846 9056

RL = Reporting Limit



Report of Analysis

<b>Client Sample ID:</b>	NPD-SW	<b>Date Sampled:</b>	09/03/14
<b>Lab Sample ID:</b>	D61775-3	<b>Date Received:</b>	09/03/14
<b>Matrix:</b>	AQ - Water	<b>Percent Solids:</b>	n/a
<b>Project:</b>	CM Production LLC, Rice Lease Logan County Co		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Chloride	1360	50	mg/l	100	09/05/14 17:13	JB	EPA 300.0/SW846 9056
Solids, Total Dissolved	2580	10	mg/l	1	09/09/14	JD	SM 2540C-2011
Sulfate	20.8	5.0	mg/l	10	09/06/14 10:48	JB	EPA 300.0/SW846 9056

RL = Reporting Limit



## Report of Analysis

<b>Client Sample ID:</b>	TBE-NW@6'-A	<b>Date Sampled:</b>	09/03/14
<b>Lab Sample ID:</b>	D61775-4	<b>Date Received:</b>	09/03/14
<b>Matrix:</b>	SO - Soil	<b>Percent Solids:</b>	85.5
<b>Method:</b>	SW846-8015B SW846 3546		
<b>Project:</b>	CM Production LLC, Rice Lease Logan County Co		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	FH025407.D	1	09/05/14	JS	09/04/14	OP10556	GFH1137
Run #2							

	Initial Weight	Final Volume
Run #1	30.0 g	1.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	ND	7.8	5.8	mg/kg	
CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits		
84-15-1	o-Terphenyl	55%		20-130%		

ND = Not detected      MDL = Method Detection Limit  
 RL = Reporting Limit  
 E = Indicates value exceeds calibration range

J = Indicates an estimated value  
 B = Indicates analyte found in associated method blank  
 N = Indicates presumptive evidence of a compound



## Misc. Forms

5

### Custody Documents and Other Forms

---

Includes the following where applicable:

- Chain of Custody



4036 Youngfield Street, Wheat Ridge, Colorado 80033  
TEL: 303-425-6021; 877-737-4521 FAX: 303-425-6854  
[www.acctest.com](http://www.acctest.com)

[illegible]

435.0

## D61775: Chain of Custody

Page 1 of 1



## GC Semi-volatiles

### QC Data Summaries

---

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries



## Method Blank Summary

Page 1 of 1

**Job Number:** D61775

**Account:** COCSCOG Olsson Associates - Denver

**Project:** CM Production LLC, Rice Lease Logan County Co

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP10556-MB	FH025434.D	1	09/05/14	JS	09/04/14	OP10556	GFH1140

The QC reported here applies to the following samples:

Method: SW846-8015B

D61775-4

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	ND	6.7	5.0	mg/kg	

CAS No.	Surrogate Recoveries	Limits
84-15-1	o-Terphenyl	76% 20-130%



## Blank Spike Summary

Page 1 of 1

**Job Number:** D61775

**Account:** COCSCOG Olsson Associates - Denver

**Project:** CM Production LLC, Rice Lease Logan County Co

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP10556-BS	FH025436.D	1	09/05/14	JS	09/04/14	OP10556	GFH1140

The QC reported here applies to the following samples:

Method: SW846-8015B

D61775-4

CAS No.	Compound	Spike mg/kg	BSP mg/kg	BSP %	Limits
	TPH-DRO (C10-C28)	167	92.2	55	42-130

CAS No.	Surrogate Recoveries	BSP	Limits
84-15-1	o-Terphenyl	77%	20-130%

\* = Outside of Control Limits.



# Matrix Spike/Matrix Spike Duplicate Summary

Page 1 of 1

**Job Number:** D61775

**Account:** COCSCOG Olsson Associates - Denver

**Project:** CM Production LLC, Rice Lease Logan County Co

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP10556-MS	FH025438.D	1	09/05/14	JS	09/04/14	OP10556	GFH1140
OP10556-MSD	FH025440.D	1	09/05/14	JS	09/04/14	OP10556	GFH1140
D61777-1	FH025452.D	1	09/05/14	JS	09/04/14	OP10556	GFH1140

The QC reported here applies to the following samples:

Method: SW846-8015B

D61775-4

CAS No.	Compound	D61777-1 mg/kg	Q	Spike mg/kg	MS mg/kg	MS %	Spike mg/kg	MSD mg/kg	MSD %	RPD	Limits Rec/RPD
	TPH-DRO (C10-C28)	ND		187	93.1	50	186	102	55	9	20-150/30

CAS No.	Surrogate Recoveries	MS	MSD	D61777-1	Limits
84-15-1	o-Terphenyl	66%	74%	58%	20-130%

\* = Outside of Control Limits.



## General Chemistry

### QC Data Summaries

---

Includes the following where applicable:

- Method Blank and Blank Spike Summaries
- Duplicate Summaries
- Matrix Spike Summaries



METHOD BLANK AND SPIKE RESULTS SUMMARY  
GENERAL CHEMISTRY

Login Number: D61775  
Account: COCSCOG - Olsson Associates - Denver  
Project: CM Production LLC, Rice Lease Logan County Co

Analyte	Batch ID	RL	MB Result	Units	Spike Amount	BSP Result	BSP %Recov	QC Limits
Bromide	GP13465/GN26327	0.050	0.0	mg/l	0.5	0.524	104.8	90-110%
Bromide	GP13468/GN26329	0.050	0.0	mg/l	0.5	0.519	103.8	90-110%
Chloride	GP13465/GN26327	0.50	0.0	mg/l	5	4.91	98.2	90-110%
Chloride	GP13468/GN26329	0.50	0.0	mg/l	5	5.05	101.0	90-110%
Fluoride	GP13465/GN26327	0.10	0.0	mg/l	1	0.978	97.8	90-110%
Fluoride	GP13468/GN26329	0.10	0.0	mg/l	1	1.01	101.0	90-110%
Nitrogen, Nitrate	GP13465/GN26327	0.010	0.0	mg/l	0.1	0.104	104.0	90-110%
Nitrogen, Nitrate	GP13468/GN26329	0.010	0.0	mg/l	0.1	0.108	108.0	90-110%
Nitrogen, Nitrite	GP13465/GN26327	0.0040	0.0	mg/l	0.05	0.0491	98.2	90-110%
Nitrogen, Nitrite	GP13468/GN26329	0.0040	0.0	mg/l	0.05	0.0481	96.2	90-110%
Solids, Total Dissolved	GN26364	10	0.0	mg/l	400	399	99.8	90-110%
Sulfate	GP13465/GN26327	0.50	0.0	mg/l	5	5.04	100.8	90-110%
Sulfate	GP13468/GN26329	0.50	0.0	mg/l	5	5.07	101.4	90-110%

Associated Samples:

Batch GN26364: D61775-1, D61775-2, D61775-3

Batch GP13465: D61775-1, D61775-2, D61775-3

Batch GP13468: D61775-3

(\*) Outside of QC limits



DUPLICATE RESULTS SUMMARY  
GENERAL CHEMISTRY

Login Number: D61775  
Account: COCSCOG - Olsson Associates - Denver  
Project: CM Production LLC, Rice Lease Logan County Co

Analyte	Batch ID	QC Sample	Units	Original Result	DUP Result	RPD	QC Limits
Solids, Total Dissolved	GN26364	D61775-3	mg/l	2580	2610	1.2	0-20%

Associated Samples:

Batch GN26364: D61775-1, D61775-2, D61775-3

(\*) Outside of QC limits



MATRIX SPIKE RESULTS SUMMARY  
GENERAL CHEMISTRY

Login Number: D61775  
Account: COCSCOG - Olsson Associates - Denver  
Project: CM Production LLC, Rice Lease Logan County Co

Analyte	Batch ID	QC Sample	Units	Original Result	Spike Amount	MS Result	%Rec	QC Limits
Bromide	GP13465/GN26327	D61867-1	mg/l	1.3 U	25	26.5	106.0	80-120%
Bromide	GP13468/GN26329	D61844-3	mg/l	0.0	5	5.3	106.0	80-120%
Chloride	GP13465/GN26327	D61867-1	mg/l	110	250	362	100.8	80-120%
Chloride	GP13468/GN26329	D61844-3	mg/l	18.6	50	66.7	96.2	80-120%
Fluoride	GP13465/GN26327	D61867-1	mg/l	2.5 U	50	58.5	117.0	80-120%
Fluoride	GP13468/GN26329	D61844-3	mg/l	0.84	10	10.7	98.6	80-120%
Nitrogen, Nitrate	GP13465/GN26327	D61867-1	mg/l	10.1	5	15.7	112.0	80-120%
Nitrogen, Nitrate	GP13468/GN26329	D61844-3	mg/l	0.78	1	1.8	102.0	80-120%
Nitrogen, Nitrite	GP13465/GN26327	D61867-1	mg/l	1.2	2.5	3.9	108.0	80-120%
Nitrogen, Nitrite	GP13468/GN26329	D61844-3	mg/l	0.0	0.5	0.51	102.0	80-120%
Sulfate	GP13465/GN26327	D61867-1	mg/l	95.0	250	353	103.2	80-120%
Sulfate	GP13468/GN26329	D61844-3	mg/l	150	50	206	112.0	80-120%

Associated Samples:

Batch GP13465: D61775-1, D61775-2, D61775-3

Batch GP13468: D61775-3

(\*) Outside of QC limits

(N) Matrix Spike Rec. outside of QC limits

7.3  
7



MATRIX SPIKE DUPLICATE RESULTS SUMMARY  
GENERAL CHEMISTRY

Login Number: D61775  
Account: COCSCOG - Olsson Associates - Denver  
Project: CM Production LLC, Rice Lease Logan County Co

Analyte	Batch ID	QC Sample	Units	Original Result	Spike Amount	MSD Result	RPD	QC Limit
Bromide	GP13465/GN26327	D61867-1	mg/l	1.3 U	25	26.7	0.8	20%
Bromide	GP13468/GN26329	D61844-3	mg/l	0.0	5	5.2	1.9	20%
Chloride	GP13465/GN26327	D61867-1	mg/l	110	250	358	1.1	20%
Chloride	GP13468/GN26329	D61844-3	mg/l	18.6	50	67.5	1.2	20%
Fluoride	GP13465/GN26327	D61867-1	mg/l	2.5 U	50	52.7	10.4	20%
Fluoride	GP13468/GN26329	D61844-3	mg/l	0.84	10	10.7	0.0	20%
Nitrogen, Nitrate	GP13465/GN26327	D61867-1	mg/l	10.1	5	15.4	1.9	20%
Nitrogen, Nitrate	GP13468/GN26329	D61844-3	mg/l	0.78	1	1.9	5.4	20%
Nitrogen, Nitrite	GP13465/GN26327	D61867-1	mg/l	1.2	2.5	3.8	2.6	20%
Nitrogen, Nitrite	GP13468/GN26329	D61844-3	mg/l	0.0	0.5	0.54	5.7	20%
Sulfate	GP13465/GN26327	D61867-1	mg/l	95.0	250	348	1.4	20%
Sulfate	GP13468/GN26329	D61844-3	mg/l	150	50	206	0.0	20%

Associated Samples:

Batch GP13465: D61775-1, D61775-2, D61775-3

Batch GP13468: D61775-3

(\*) Outside of QC limits

(N) Matrix Spike Rec. outside of QC limits

7.4  
7