

**CM Production, LLC**  
**S.J. Warren #1 Skim Pit Excavation Report**  
**And Soil Remediation Work Plan**

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**COGCC Remediation Project #8179**  
**Hyde Field, Washington County, Colorado**

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**October 2014**

**Olsson Project #013-1681**  
**Phase 102/Task 102001**

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Appendix B – Confirmation Soil Analytical Results

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## **1.0 Introduction and Site Information**

CM Production retained Olsson Associates to perform environmental oversight during remediation of petroleum hydrocarbon-impacted soils excavated from a former skim pit at the S.J. Warren #1 crude oil production site. Olsson performed a subsurface assessment of the skim pit on March 27, 2014 which identified petroleum impacts that were above the Colorado Oil and Gas Conservation Commission (COGCC) allowable concentrations.

Excavation and removal of the impacted soils from the former skim pit was performed on August 13, 2014. The impacted soils were segregated from clean overburden soils, and the impacted materials were placed within a plastic-lined, earthen berm containment located to the north of the produced water tank and separator. Confirmation soil samples were collected from the skim pit side walls and the base of the excavation. The laboratory analytical results for the confirmation soil samples show that the soils in the side wall and bottom of the excavation meet the Table 910-1 concentration levels with the exception of pH which was above 9. The elevated pH is not expected to be an issue since these soil samples were all collected at depths greater than 3 feet below ground surface.

### **1.1 Site Location and Description**

The S.J. Warren #1 skim pit (Remediation #8179), Facility ID #234892, is located in the Northwest  $\frac{1}{4}$  of the Southwest  $\frac{1}{4}$  of Section 11, Township 2 North, Range 49 West of the 6<sup>th</sup> Principal Meridian. The S.J. Warren site is located approximately one-third of a mile north of Highway 34, on the east side of Washington County Road YY. The site is located approximately five miles west of the town of Yuma, Colorado. A site location map is provided as Figure 1. A site map showing the site layout, skim pit, and confirmation soil sample locations and results is presented as Figure 2. The proposed land treatment area is shown as Figure 3.

### **1.2 Site Conceptual Model**

The skim pit at the S.J. Warren #1 was not used for several years. The pit was formerly used to 'skim' crude oil off of the produced water before discharging the produced water into the onsite produced water pit. Delta Petroleum Corporation installed a skim tank to replace the skim pit prior to CM Production becoming the operator in May 2010. CM Production improperly closed the pit by not sampling for the presence of exploration and production (E&P) wastes and without proper notification to the COGCC prior to closing the pit.

The March 27, 2014 site investigation conducted by CM Production and Olsson indicated that the vertical extent of impacts were limited to within 20 feet of ground surface based on soil samples collected at depth. The E&P waste and impacted soils lay at depths between 4 feet and 10 feet bgs. Groundwater was not encountered in any of the trenches excavated in the three test trenches excavated down to depths of 18 feet bgs. Reported groundwater levels in area water wells are more than 200 feet bgs as shown on Figure 4.

It is expected that the petroleum hydrocarbon impacts in the soils can be successfully treated using land treating techniques to reduce the petroleum hydrocarbon concentrations. The presence of inorganic constituents, such as arsenic, may be above the Table 910-1 concentration levels, but are representative of natural background soil conditions. These inorganic parameters may not be effectively treated using the prescribed techniques in this work plan. The electrical conductance (EC), soil pH, and SAR may need to be adjusted using soil amendments if the soils are to remain at the surface, or the COGCC may allow higher levels of these parameters to remain if buried beneath at least three feet of clean fill, and surface soil sample results document that the concentration levels have been met.

### **1.3 Colorado Oil and Gas Conservation Commission Requirements**

The COGCC Northeast Region Environmental Specialist, Mr. John Noto, indicated in an email dated May 28, 2014 that all visibly stained oily soil must be removed from the skim pit at the S.J. Warren #1 site. CM Production and Olsson performed the necessary preparations for conducting the work.

Olsson personnel conducted environmental oversight and collected confirmation soil samples on August 13, 2014. Confirmation soil samples were submitted for laboratory analysis of total petroleum hydrocarbons (TPH) for gasoline range organics (GRO) and diesel range organics (DRO) by EPA modified Method 8015, polycyclic aromatic hydrocarbons (PAH) by EPA Method 8270, pH by EPA Method 150.1, electrical conductivity (EC) by EPA Method 120.1, and sodium adsorption ratio (SAR) by USDA Handbook 60 Method 20B.

Polycyclic aromatic hydrocarbons (PAH) and Benzene, toluene, ethylbenzene, or xylenes (BTEX) analysis will be required to demonstrate that these compounds are below the Table 910-1 concentration levels. The COGCC may allow soils with EC, SAR, and pH reported above the Table 910-1 concentration levels for these parameters to remain in place if the soils are buried under at least three feet of “clean” fill. At least one sample of the fill material will be collected and analyzed for the same Table 910-1 parameters as the confirmation soil samples to document what is placed back into the excavations.

The COGCC indicated that the following information would be required for land treatment of the oily waste from the skim pits:

1. A copy of the Surface Owner Agreement for the land Application (Appendix A)
2. A map/aerial photograph of the proposed treatment/spread field property (Figure 3)
3. A Waste Management Plan with land application procedures, waste tracking, sampling, and planned schedule (contained herein)
4. An evaluation of surface drainage and site-specific storm water best management practices (BMPs)

5. An evaluation of shallow groundwater based on existing data and identification of nearby wells and uses.
6. Although not required, it was stated that pre-application “background” soil analysis may be useful for “site specific” comparison of the fluids and cuttings to background conditions as well as Table 910-1 values.

This information is included in this report and work plan to land treat the impacted soils on site. The COGCC will require the preparation and submittal of semi-annual reports to provide updates on the land treatment activities and the progress in reducing the petroleum hydrocarbon levels to below the Table 910-1 values.

#### **1.4 Soil Properties**

A review of the Washington County, Colorado Soil Survey (1986) identifies Keith-Kuma complex loam to silty loam soils (Unit #33) are developed beneath the site. Water management for these soils indicates that there is some seepage with permeability ranging from 0.6 to 2.0 inches per hour, dikes and levees are prone to piping, drainage indicates that it is deep to water, and that terraces and diversions constructed in these soil types are susceptible to erosion. Soil salinity is < 2 mmohs/cm, and the pH ranges from 6.1 to 8.4 standard units for the 0 to 6-inches depth, but pH ranges from 7.9 to 9.0 from 22 to 60-inches for the Kuma soils, and 7.4 to 8.4 for the same depth in the Keith soils. This indicates alkalinity increases with depth in the soils.

The total iron concentrations in the confirmation soil samples ranged from 5,660 mg/kg to 7,790 mg/kg. A composite soil sample from the impacted soil stockpile was submitted for analysis of potassium, nitrate/nitrite, orthophosphate, and sulfate to assess which analytes might need to be enhanced to land treat these soils. The results for potassium were 2,210 mg/kg, nitrate was 9.3 mg/kg, nitrite was not detected, orthophosphate was 1 mg/kg, and sulfate was reported at 48.3 mg/kg. Therefore, a fertilizer with higher nitrate and phosphorus content would be recommended for land treatment of the impacted soils.

#### **1.5 Groundwater Assessment Based on Existing Data and Area Wells**

The water resources in the area are contained within the High Plains aquifer. Olsson reviewed information on the COGCC GIS website, including area water wells permitted by the Colorado Natural Resources - Division of Water Resources. The reported depth to groundwater in permitted water wells in the vicinity of the sites is more than 170 feet bgs based on top of screen intervals reported, and static water levels are reported at more than 200 feet bgs. The listed water use from these wells is primarily for crop irrigation; however, livestock, domestic, and commercial uses were also identified. Figure 4 shows water wells within one mile of the site.

## **2.0 Scope-of-Work Summary**

The proposed work involves treating approximately 500 cubic yards of petroleum hydrocarbon impacted soils by land treatment to meet the COGCC Table 910-1 concentration levels for petroleum hydrocarbon constituents.

It is expected that the impacted soils at the S.J. Warren can be land treated within three years to meet the Table 910-1 concentration levels per COGCC Rule 907. Management of E&P Waste. This scope-of-work was developed based on correspondence with Mr. John Teff, Business Manager, and Mr. Curtis Ditzell, Vice President and Chief Exploration Officer, of CM Production, LLC.

### **2.1 Summary of Completed Tasks**

- CM Production hired a contractor, Ridgeline Excavation, to excavate the impacted soils from the former skim pit at the S.J. Warren on August 13, 2014. Impacted materials were segregated and stockpiled separately from non-impacted soils.
- Heavily impacted soils were separated from less impacted soils, to the extent possible, as determined by visual observation of staining, olfactory inspection of the excavated soil, and headspace screening using a handheld photoionization detector (PID) to screen for the presence of volatile organic compounds in a sealable plastic bag.
- Confirmation soil samples were collected from the sidewalls and base of the excavation to demonstrate that the horizontal and vertical extent of the impact has been removed.

### **2.2 Summary of Future Tasks**

- Soils will be land treated on location in accordance with the surface owner agreement included in Attachment A.
- The land treatment will be performed in accordance with COGCC Rule 907. There is no potable water source or electricity at the S.J. Warren tank battery and produced water pit location. Therefore, it is expected that fresh water will need to be periodically hauled to the site for use in the treatment of the impacted soils.
- Storm water best management practices (BMPs) will be used in conjunction with a site specific storm water and erosion control plan to prevent impacted soil from leaving the treatment area.
- Collection of samples of the treated soil for laboratory analysis will be conducted periodically following treatment to evaluate the success of the treatment. Soils will be analyzed for total petroleum hydrocarbon ranges to assess progress.
- Semi-annual reports detailing the results of the petroleum impacted soil remediation and the closure of the former skim pit will be submitted to the COGCC.

### **2.3 Health and Safety**

Olsson personnel will prepare a site specific health and safety plan (HASP) and will prepare a job safety analysis (JSA) prior to conducting the remediation activities. Daily tailgate safety meetings will be conducted prior to initiating work or whenever there is a significant change in the operations or site conditions.

Safety data sheets for all fertilizers and treatment chemicals will be maintained onsite, unless they are deemed non-hazardous. Personnel will use appropriate personal protective equipment (PPE) when mixing or applying fertilizers and other amendments to prevent splash or exposure to these materials. Adequate rest intervals and fresh, cool drinking water will need to be provided to prevent heat stress, cold stress, and dehydration.



### **3.0 Excavation and Soil Confirmation Sample Results**

The following sections present the observations and results of the excavation of the S.J. Warren skim pit. Excavation of the skim pit was performed on August 13, 2014. Site photographs taken during the skim pit excavation are included as Appendix C.

#### **3.1 Excavation Observations**

Olsson personnel performed environmental oversight on August 13, 2014 to observe the removal of impacted soils from the former skim pit and to collect the confirmation soil samples from the side walls and the base of the excavation. The excavation was advanced to a total depth of 19 feet below ground surface (bgs) on the east side, closest to the produced water pit. Impacted soils as evidenced by staining and odor extended down to this depth at which point partly cemented and stratified sandy shale was encountered. The excavation only went to 12 feet bgs on the west side closest to the stairs for the produced water tank and the soil did not exhibit staining or odor.

A minimum of five confirmation soil samples were to be collected, including one soil sample from the bottom of the pit, and one soil sample from each side wall. Olsson personnel collected soil samples from the four side walls at depths of 9 feet bgs, and two base of excavation soil samples at 19 feet and 12 feet, from the east side and west side bottom of the excavation, respectively. The confirmation soil samples were collected from the excavator bucket and placed into laboratory-provided glass sample jars. Soil samples were also collected for analysis of total iron and one soil sample from the stockpile for nutrients.

The sample jars were labeled with the sample id, analytical parameters, time, date, and sampler's signature, and were placed into a cooler and stored on ice pending delivery to the laboratory under chain-of-custody protocol. The samples were submitted to Accutest Mountain States Laboratory in Wheat Ridge, Colorado.

#### **3.2 Confirmation Soil Analytical Results**

Six soil samples were submitted for analysis of the COGCC Table 910-1 soil parameters, except for metals analysis which the COGCC did not require based on the results reported in the laboratory analysis conducted during the March 2014 site assessment. The metals results were consistent with natural background. The SAR, EC, and pH concentrations in soils that were reported above the Table 910-1 concentrations may be left in place with COGCC approval if these soils are buried below three feet of soil cover that meets the Table 910-1 concentration levels.

The laboratory analytical results for the soil confirmation samples collected from the side walls and bottom of the excavation show that petroleum hydrocarbon concentrations were not detected above the laboratory reporting limits or were reported below the COGCC Table 910-1 concentration levels for benzene, toluene, ethylbenzene, and xylenes (BTEX), GRO, DRO, and

PAHs. The confirmation soil sample results are summarized on the attached tables, and figures, and a copy of the laboratory report is included in Appendix B.

### **3.3 Comparison with March 2014 Soil Analytical Results**

The results for the March 2014 site assessment soil samples showed that DRO was above the COGCC Table 910-1 concentration level in six of the seven soil samples collected.

Concentrations of GRO were reported slightly above the Table 910-1 concentration level in only one soil sample.

Concentrations of benzene were slightly above the Table 910-1 concentration of 0.17 mg/kg in two of the March 2014 assessment samples in soil sample CMSJW-SP @ 9E (0.221 mg/kg) collected on the east side of the former pit at 9 feet bgs, and CMSJW-SP @ 5W (0.199 mg/kg) on the west side of the pit at 5 feet bgs. Soil samples CMSJW-SP @ 10.5E and CMSJW-SP @ 8W, collected at lower depth showed that benzene was not reported above the Table 910-1 concentration level. The laboratory reported PAH compounds at concentrations above the COGCC Table 910-1 concentrations levels in three of the site assessment soil samples including CMSJW-SP @10.5E, CMSJW-SP @ 4.5N, and CMSJW-SP @ 5W.

The August 2014 confirmation soil samples showed that concentrations of BTEX, GRO, and PAH compounds were not detected above the laboratory reporting limits. Concentrations of DRO were reportedly not detected above the laboratory reporting limits in five of the six confirmation soil samples. The concentration of DRO in the bottom sample, SJW-EBC @ 19', was reported at 213 mg/kg, which is below the COGCC Table 910-1 concentration level of 500 mg/kg for DRO.

## **4.0 Remediation and Waste Management Plan**

The following sections present the remediation objectives, techniques, and identification of impacted and non-impacted soil horizons within the former pits, identification of potential treatment areas, sampling, and laboratory analytical results.

The E&P wastes and impacted soils will be managed in accordance with the COGCC 900 Series Rules, specifically Rule 907, with the objective of meeting the Table 910-1 soil parameter concentration levels as identified in the COGCC conditional approval of the Form 27 dated May 28, 2014.

Although not required, the COGCC suggests that pre-application “background” soil analysis may be useful for “site specific” comparison of the ‘fluids and cuttings’ (E&P waste) to background conditions as well as Table 910-1 values. Olsson collected three background soil samples at the time of the March 2014 site assessment activities, but it may be advantageous to collect background soil samples from the proposed treatment areas prior to land application to document the conditions prior to treatment so pre-treatment conditions can be documented once it is time to return the site to its previous conditions. The results can also be used to support those background results obtained previously and better define site specific conditions.

### **4.1 Remediation Objectives**

The remediation objectives are to treat the petroleum hydrocarbon impacted soils excavated from the skim pit at the S.J. Warren #1 (Remediation #8179) to meet the Table 910-1 concentration levels for soil parameters as requested by the COGCC.

### **4.2 Impacted Soil Remedy Application**

The impacted soils will be remediated by land treating the soils using fertilizer and soil amendments on land adjacent to the tank battery facility. CM Production has an agreement with the landowner to allow for the land treatment of the impacted soils. A copy of the signed agreement is included in Appendix A.

The soils will be thin-spread within a soil land treatment area surrounded with an earthen berm. CM Production is requesting that the total area from the surface owner will encompass approximately one acre, but it is likely that smaller treatment cells will be set up within that area and the impacted soils land treated in stages.

A tractor with tiller attachment will be used to periodically turn the soils. CM Production may need to spray the soils with water periodically to maintain moisture levels needed by microorganisms to breakdown the hydrocarbons and nutrients as needed to effectively treat the impacted soils. This will require hauling freshwater to the site. CM Production will continue to treat the impacted soil as needed until the Table 910-1 concentration levels are achieved.

### **4.3 Soil Sampling**

The following sections present the sampling techniques used during the collection of excavation confirmation soil samples from the side walls and the bottom of each excavation on August 13, 2014, land farm progress samples, and final confirmation samples that the treated soils have been remediated.

#### **4.3.1 Treatment Progress Soil Samples**

Soil samples will be collected from the treated soils to document progress of the remedy process. It is expected that a representative number of soil samples collected from a systematic random sampling grid over the thin-spread treated soils, or that a minimum of one soil sample for every 100 cubic yards of treated soil, will be collected to assess the treatment progress. The soil samples will be submitted for the TPH ranges of GRO and DRO and the results used to assess the progress of land treatment.

#### **4.3.2 Final Land Treatment Confirmation Soil Samples**

If the laboratory results show that the GRO and DRO results are less than 500 milligrams per kilogram (mg/kg) additional soil samples will be analyzed for PAH, EC, pH, and SAR to demonstrate that the soils meet the Table 910-1 concentration levels and can be used on the surface of the lease. CM Production may request that the COGCC approve soil with EC, pH, and SAR above the Table 910-1 concentration levels if the soils are buried below three (3) feet of clean fill.

### **4.4 Land Treatment of Impacted Soils Schedule**

The land treatment of the soils will begin in the fall of 2014. It is expected that the remediation of the soils to meet Table 910-1 soil parameters concentration levels can be achieved in three years; however, it is possible that it may require more time to meet the Table 910-1 concentration levels. It is expected that as long as CM Production is able to demonstrate progress in reducing the Table 910-1 soil parameter concentration levels and that CM Production communicates the results of the remedy efforts to the surface owner and COGCC on a semi-annual basis that the COGCC and surface owner will be willing to work with CM Production to extend the treatment dates as necessary to meet project goals.

CM Production will add soil amendments including fertilizer (such as diammonium phosphate) and organic material (mulch, compost, or manure) to the soils to stimulate biodegradation of petroleum hydrocarbon constituents. Product brochures and/or safety data sheets (SDS) for commercially available fertilizers and soil amendments will be provided to the surface owner and to COGCC for approval at least one week prior to use. Use of locally available soil amendments such as manure or corn stalks will be communicated to the surface owner and to the COGCC if requested. Weeds will be controlled in and around the treatment area.

In summary, the wastes will be treated onsite by land farming and periodically tilling and turning the soil and adding soil amendments to promote biodegradation. Soil samples will be collected periodically of the treated soils to assess remediation progress.

Waste tracking is not expected to be necessary unless the soils are transported offsite to a commercial landfill facility. In the event that the E&P wastes are disposed at a commercial facility, CM Production will provide copies of the bills of lading, manifests, waste characterization analytical results (if required), and the name of the receiving facility to the surface landowner and to the COGCC.

#### **4.5 Reports**

Semi-annual reports will be submitted to the COGCC to document the progress of the soil land treatment. It is expected that the treatment will be completed within three years, or that CM Production will be able to demonstrate that sufficient progress is being made in remediating the soils that an extension may be requested of the Director.

Laboratory analytical results will be summarized in a table and the soil sample locations will be shown on a figure to be included in a final report submitted to the COGCC once the Table 910-1 concentration levels have been met. CM Production will request closure for the S.J. Warren skim pit remediation from the COGCC.

## **5.0 Site Specific Storm Water Best Management Practices**

The S.J. Warren #1 tank battery and produced water facility and surrounding areas are relatively flat lying. Figure 1 shows the general site location and topography of the sites. The topography in the vicinity of the treatment area slopes to the east and southeast. There is a slight east slope near the S.J. Warren #1.

A perimeter earthen berm will be constructed of “clean” fill materials around the perimeter of the treatment cell, compacted with the excavator, and monitored during remediation activities for signs of erosion. A gravel covered entrance will be constructed on the high side of the earthen berm for the tractor to drive over the berm to treat the impacted soils. A diversion ditch may be required to divert storm water run-on from the northwest away from the treatment cell and re-direct it to the southeast through energy dissipating best management practices (BMPs) such as a gravel apron, or rock filled geotextile bag, or sediment control logs as needed at the site.

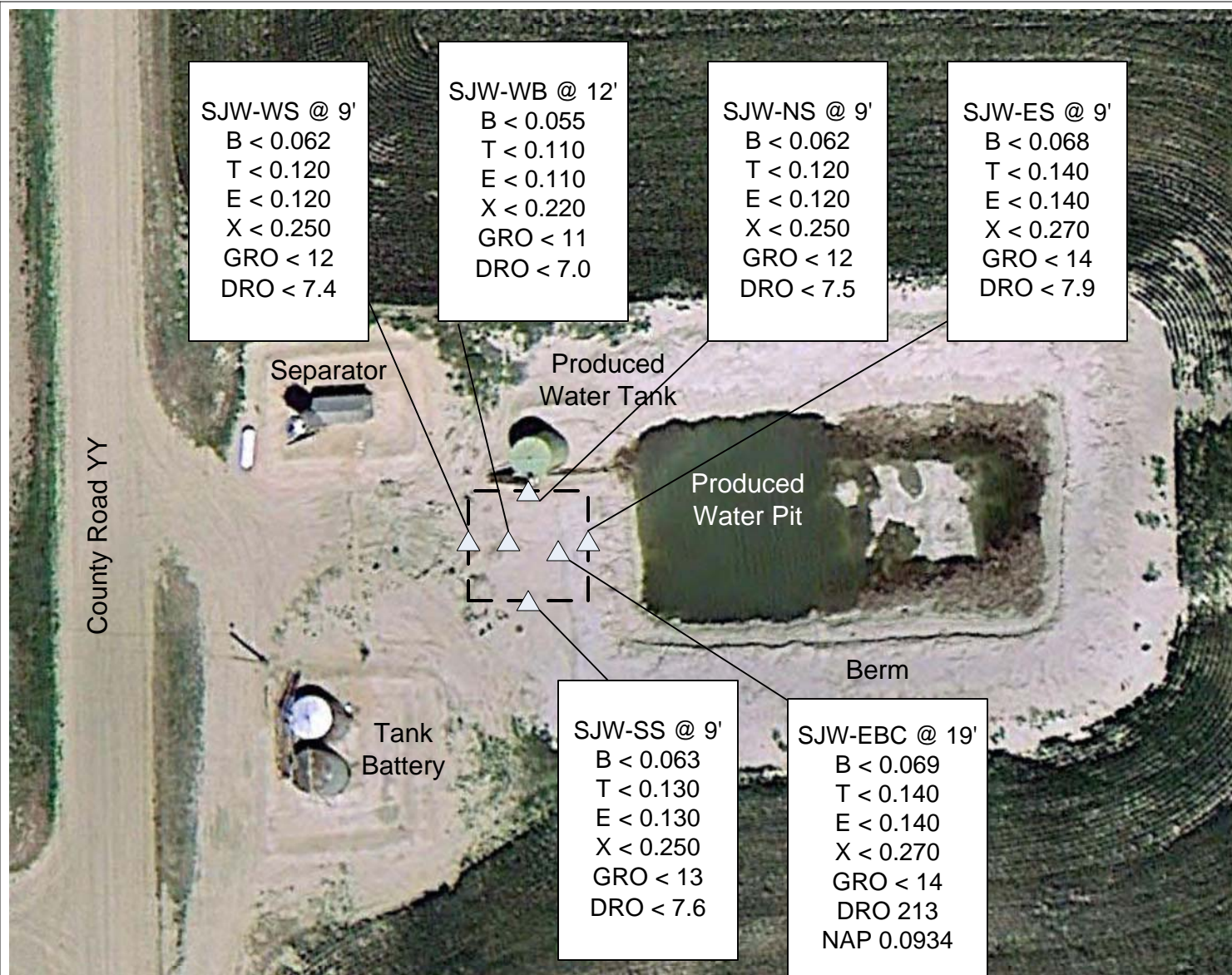
There are no surface waters in close proximity to the sites. Based on observations made during the assessment activities, a review of existing data, and identification of nearby water wells and usage, shallow groundwater does not appear to be present in the vicinity of the site. CM Personnel and contractors will observe site conditions during the routine visits to the sites to make sure erosive conditions do not exist, and that the E&P wastes do not become entrained in storm water runoff and that the wastes remain onsite. Site conditions will be documented in a field form to be completed at the time of the soil treatment. An example of the field form is included in Appendix D.

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# FIGURES







#### LEGEND:

- - - Approximate  
 | | Former Skim Pit Location  
 | | and excavation limits  
 - - -

Base Map Google™ Earth image  
Imagery Date 6/1/2013

△ SJW-SS @ 9' Confirmation Soil Sample ID and depth in feet

B – Benzene (0.17)      < - Analyte was not detected above  
 T – Toluene (85)      the laboratory reporting limit  
 E – Ethylbenzene (100)  
 X – Xylenes (175)

GRO – Gasoline Range Organics (500)

DRO – Diesel Range Organics (500)

NAP – Naphthalene (23)

(Polycyclic aromatic hydrocarbons (PAHs) were not detected in the other soil samples)

Results are in milligrams per kilogram (mg/kg)

COGCC Table 910-1 concentration level in parentheses

0 25 50

Approximate Scale  
in Feet 1" = 50'



PROJECT NO: 013-1681

DRAWN BY: JWH

DATE: 09/8/2014

**CM Production, LLC**  
**SJ Warren 1 Skim Pit Site Map &**  
**August 2014 Confirmation Samples**

**OLSSON**  
 ASSOCIATES

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FIGURE

2





#### LEGEND:

- - - - - Approximate  
 | | | | | Former Skim Pit Location  
 | | | | | and excavation limits  
 - - - - -

Base Map Google™ Earth image  
Imagery Date 6/1/2013

CM Production proposes to land treat the impacted soils excavated from the former skim pit in an area to the north of the produced water tank and separator building and berm. The treatment area will be surrounded within an earthen berm.

0 25 50

Approximate Scale  
in Feet 1" = 50'



PROJECT NO: 013-1681  
 DRAWN BY: JWH  
 DATE: 09/8/2014

**CM Production, LLC**  
**SJ Warren 1 Skim Pit Excavation**  
**and Lined Soil Stockpile Area**

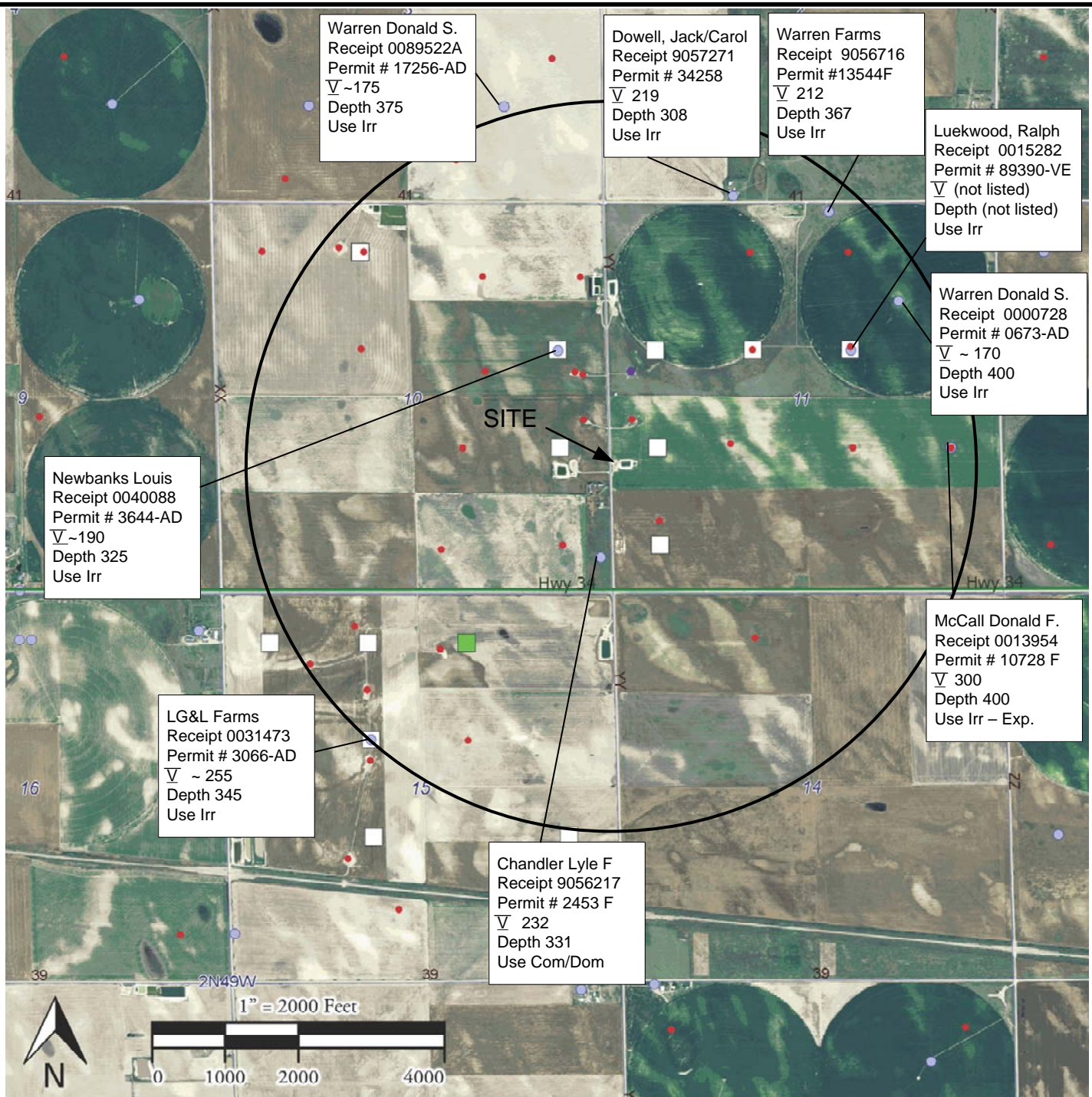
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FIGURE

3





## LEGEND:

- Oil / Gas Well Location
- Permitted Water Well Location

- Approximate 1-mile radius from location of the skim pits
- COGCC Permitted Pit Location

▽ Static Water Level – Colorado State Engineer's Office Division of Water Resources

Depth Total Depth of the Well in Feet

Receipt – Receipt Number  
Colorado State Engineer's Office, Groundwater Resources

Permit # - Colorado State Engineer's Office Groundwater Well Permit

Use  
Irr – Irrigation  
Comm – Commercial  
Dom – Domestic  
Stock - Livestock

AD – Application Denied

## FIGURE 4

### Groundwater Evaluation Map

S.J. Warren #1 Tank Battery – Former Skim Pits  
NW ¼ SW ¼ Section 11 T2N R49W 6 P.M.  
Washington County, Colorado

Revision Date:	
Revision Number	
Revised by:	
Approved by:	
Project Number:	
Scale:	

**OLSSON**  
ASSOCIATES

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# TABLES

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

Skim Pit Excavation - E&P Waste Removal  
CM Production LLC - SJ Warren #1  
NW 1/4 SW 1/4 Section 11 Township 2 North, Range 49 West  
Washington County, Colorado

Volatile Organic Compounds and Hydrocarbons							
Sample ID	Date	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Total Xylenes (mg/kg)	GRO (mg/kg)	DRO (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>
SJW-EBC @ 19'	8/13/2014	< 0.069	< 0.140	< 0.140	< 0.270	< 14	213
SJW-ES @ 9'	8/13/2014	< 0.068	< 0.140	< 0.140	< 0.270	< 14	< 7.9
SJW-SS @ 9'	8/13/2014	< 0.063	< 0.130	< 0.130	< 0.250	< 13	< 7.6
SJW-NS @ 9'	8/13/2014	< 0.062	< 0.120	< 0.120	< 0.250	< 12	< 7.5
SJW-WS @ 9'	8/13/2014	< 0.062	< 0.120	< 0.120	< 0.250	< 12	< 7.4
SJW-WSP	8/13/2014	NA	NA	NA	NA	NA	NA
SJW-WB @ 12'	8/13/2014	< 0.055	< 0.110	< 0.110	< 0.220	< 11	< 7.0

Polycyclic Aromatic Hydrocarbons														
Sample ID	Date	Acenaphthene (mg/kg)	Anthracene (mg/kg)	Benzo(a) anthracene (mg/kg)	Benzo(b) fluoranthene (mg/kg)	Benzo(k) fluoranthene (mg/kg)	Benzo(a) pyrene (mg/kg)	Chrysene (mg/kg)	Dibenzo(a,h) anthracene (mg/kg)	Fluoranthene (mg/kg)	Fluorene (mg/kg)	Indeno (1,2,3-cd) pyrene (mg/kg)	Naphthalene (mg/kg)	Pyrene (mg/kg)
<b>COGCC T 910-1</b>		<b>1000</b>	<b>0.22</b>	<b>0.22</b>	<b>2.2</b>	<b>0.022</b>	<b>0.022</b>	<b>22</b>	<b>0.022</b>	<b>1000</b>	<b>1000</b>	<b>0.22</b>	<b>23</b>	<b>1000</b>
SJW-EBC @ 19'	8/13/2014	< 0.079	< 0.079	< 0.079	< 0.079	< 0.079	< 0.079	< 0.079	< 0.079	< 0.079	< 0.079	< 0.079	0.0934	< 0.079
SJW-ES @ 9'	8/13/2014	< 0.079	< 0.079	< 0.079	< 0.079	< 0.079	< 0.079	< 0.079	< 0.079	< 0.079	< 0.079	< 0.079	< 0.079	< 0.079
SJW-SS @ 9'	8/13/2014	< 0.075	< 0.075	< 0.075	< 0.075	< 0.075	< 0.075	< 0.075	< 0.075	< 0.075	< 0.075	< 0.075	< 0.075	< 0.075
SJW-NS @ 9'	8/13/2014	< 0.075	< 0.075	< 0.075	< 0.075	< 0.075	< 0.075	< 0.075	< 0.075	< 0.075	< 0.075	< 0.075	< 0.075	< 0.075
SJW-WS @ 9'	8/13/2014	< 0.074	< 0.074	< 0.074	< 0.074	< 0.074	< 0.074	< 0.074	< 0.074	< 0.074	< 0.074	< 0.074	< 0.074	< 0.074
SJW-WSP	8/13/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SJW-WB @ 12'	8/13/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

mg/kg - milligrams per kilogram

GRO: gasoline range organics

DRO: diesel range organics

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

- Laboratory reporting limit is above the COGCC Table 910-1 concentration level even though compound was not detected. The method detection limit (MDL) is 0.020 for these compounds

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

NA - Analyte was not analyzed

See attached map for soil sample locations:

SJW-EBC @ 19': Confirmation soil sample from the east side bottom at 19 feet - Skim pit excavation

SJW-ES @ 9': Confirmation soil sample from the east side wall at 9 feet - Skim pit excavation

SJW-SS @ 9': Confirmation soil sample from the south side wall at 9 feet - Skim pit excavation

SJW-NS @ 9': Confirmation soil sample from the north side wall at 9 feet - Skim pit excavation

SJW-SP: Soil stockpile sample (Not submitted for organic analysis)

SJW-WB @ 12': Confirmation soil sample from the west side bottom at 12 feet - Skim pit excavation

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

**Skim Pit Excavation - E&P Waste Removal**  
**CM Production LLC - SJ Warren #1**  
**NW 1/4 SW 1/4 Section 11 Township 2 North, Range 49 West**  
**Washington County, Colorado**

Sample ID	Date	pH (s.u.)	Specific Conductivity (mmhos/cm)	Calcium (mg/l)	Magnesium (mg/l)	Sodium (mg/l)	SAR
<b>COGCC T 910-1</b>			<b>&lt; 4 mmhos/cm or 2x background</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>&lt; 12</b>
SJW-EBC @ 19'	8/13/2014	<b>10.23</b>	2.63	13.6	2.77	586	<b>37.8</b>
SJW-ES @ 9'	8/13/2014	<b>10.26</b>	1.97	21.0	3.25	443	<b>23.7</b>
SJW-SS @ 9'	8/13/2014	<b>10.31</b>	1.83	10.9	1.99	397	<b>29.0</b>
SJW-NS @ 9'	8/13/2014	<b>10.23</b>	1.99	16.5	4.03	438	<b>25.1</b>
SJW-WS @ 9'	8/13/2014	<b>9.73</b>	1.17	31	15	177	6.55
SJW-WB @ 12'	8/13/2014	<b>10.20</b>	0.893	NA	NA	NA	NA

pH (s.u.) - standard units  
mmhos/cm - millimohs per centimeter  
mg/l - milligrams per liter  
SAR - Sodium Adsorption Ratio  
N/A - Not Applicable

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

Note: According to the Washington County, Colorado Soil Survey (Peterson, Crabb, Larsen, 1986) the soils onsite are the Keith-Kuma Complex (Unit 33), and Table 14 - Physical and Chemical Properties indicate that at a depth of 22-60 inches the Keith soils have a pH ranging from 7.4 to 8.4 and that the Kuma soils at depths ranging from 45-60 inches have a pH range of 7.9 to 9.0.

Soil salinity is reportedly less than 2 mmhos/cm

See attached map for soil sample locations:

SJW-EBC @ 19': Confirmation soil sample from the east side bottom at 19 feet - Skim pit excavation

SJW-ES @ 9': Confirmation soil sample from the east side wall at 9 feet - Skim pit excavation

SJW-SS @ 9': Confirmation soil sample from the south side wall at 9 feet - Skim pit excavation

SJW-NS @ 9': Confirmation soil sample from the north side wall at 9 feet - Skim pit excavation

SJW-SP: Soil stockpile sample (Not submitted for organic analysis)

SJW-WB @ 12': Confirmation soil sample from the west side bottom at 12 feet - Skim pit excavation

According to the COGCC frequently asked questions, question #32, *How will the COGCC apply the Table 910-1 concentration levels for pH, sodium adsorption ratio (SAR), and electrical conductivity (EC)?*

December 9, 2009: Consistent with its prior practice and Rule 1003, the COGCC will generally apply the Table 910-1 concentration levels for pH, SAR, and EC to soils that are within three (3) feet of the ground surface because elevated levels of pH, SAR, and EC in deeper soils should not adversely affect the successful reclamation of the site, which is the objective of these concentration levels. In addition, the COGCC requires that materials with elevated pH, SAR, or EC be buried under a minimum of three (3) feet of backfill cover and soil that satisfies either the Table 901-1 levels for pH, SAR, and EC or the background levels for such contaminants within three (3) feet of the ground surface at the site. In addition the soil horizons must be replaced in their original relative position and reclaimed in accordance with 1000 Series Rules, including the establishment of vegetative cover on non-cropland and successful crop growth on cropland.

**Table 3**  
**Analytical Summary - Metals and Nutrients in Soil**

**Skim Pit Excavation - E&P Waste Removal**  
**CM Production LLC - SJ Warren #1**  
**NW 1/4 SW 1/4 Section 11 Township 2 North, Range 49 West**  
**Washington County, Colorado**

Sample ID	Date	Iron (mg/kg)	Potassium (mg/kg)	Nitrate (mg/kg)	Nitrite (mg/kg)	Orthophosphate (mg/kg)	Sulfate (mg/kg)
<b>COGCC T 910-1</b>		<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>
SJW-ES @ 9'	8/13/2014	7540	NA	NA	NA	NA	NA
SJW-SS @ 9'	8/13/2014	6210	NA	NA	NA	NA	NA
SJW-NS @ 9'	8/13/2014	5660	NA	NA	NA	NA	NA
SJW-WS @ 9'	8/13/2014	7400	NA	NA	NA	NA	NA
SJW-SP	8/13/2014	7790	2210	9.3	< 0.69	1	48.3
SJW-WB @ 12'	8/13/2014	NA	NA	NA	NA	NA	NA

mg/kg - milligrams per kilogram

N/A - Not Applicable

NA - Not Analyzed

< - Analyte was not detected above the laboratory reporting limit

See attached map for soil sample locations:

SJW-EBC @ 19': Confirmation soil sample from the east side bottom at 19 feet - Skim pit excavation

SJW-ES @ 9': Confirmation soil sample from the east side wall at 9 feet - Skim pit excavation

SJW-SS @ 9': Confirmation soil sample from the south side wall at 9 feet - Skim pit excavation

SJW-NS @ 9': Confirmation soil sample from the north side wall at 9 feet - Skim pit excavation

SJW-SP: Soil stockpile sample (Not submitted for organic analysis)

SJW-WB @ 12': Confirmation soil sample from the west side bottom at 12 feet - Skim pit excavation

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# **APPENDIX A**

## **SURFACE OWNER AGREEMENT**



July 15, 2014

Judith W. Kennedy  
37 Indian Hill Road  
Pound Ridge, NY 10576

**RE: Surface Owner Approval to Land Treat Exploration and Production Waste  
NW ¼ SW ¼ Section 11, Township 2 North, Range 49 West, 6<sup>th</sup> Principal Meridian  
County Road YY, Washington County, Colorado**

Dear Mrs. Kennedy,

CM Production, LLC (CM Production) acquired the SJ Warren #1 crude oil well and associated production facilities in 2010. One former skim pit, used to skim crude oil off of the produced water, was present to the west of the produced water pond. Delta Petroleum Corporation, the previous operator, installed a skim tank to replace the unlined skim pit and the skim pit was closed.

CM recently discovered that the skim pit contains soil with total petroleum hydrocarbon concentrations above Colorado Oil and Gas Conservation Commission (COGCC) regulations as stated in Table 910-1 (attached). Under the supervision of the COGCC, CM Production seeks permission from you to land treat these wastes on location. A general site location map, proposed treatment area map and approval signature page are attached.

**Background**

CM Production retained Olsson Associates (Olsson) to conduct a subsurface investigation of former skim pit at the SJ Warren #1 on March 27, 2014. Oily soils were encountered in the pits and laboratory analytical results show that the concentrations of total petroleum hydrocarbons are above the Table 910-1 soil parameter concentration level of 500 milligrams per kilogram, and that petroleum hydrocarbon compounds were above their respective concentration levels. Details of the investigation and testing are discussed in a Skim Pit Assessment Report filed with the COGCC under Remediation #8179. CM Production will gladly provide you a copy of the report if you desire one.

**Proposed Land Treatment of Exploration and Production Wastes**

CM Production proposes to excavate and land treat the E&P wastes and impacted soils on location in order to meet the Table 910-1 concentrations. The land treatment will consist of using a hydrogen peroxide solution used to oxidize and break down petroleum hydrocarbons in the impacted soil pile. This process may be repeated a few times to reduce the petroleum hydrocarbon concentrations, or alternatively CM Production may add nutrients, fertilizer, soil amendments such as straw and manure, and microbes to bio-remediate the E&P waste and impacted soil to meet the Table 910-1 requirements.

To accomplish the remediation, CM Production expects approximately one acre of land surface area to the north of the SJ Warren #1 produced water containment pond and tank battery will be required to thinly-spread the soils and treat them to reduce the petroleum hydrocarbon concentrations. CM Production will ensure that the impacted soils will be properly managed to prevent adverse environmental impacts to air, water, soil or biological resources.

Secondary containment, consisting of a compacted earthen berm, will be placed around the perimeter of the treatment area to prevent impacted storm water from transporting the wastes offsite. Best management practices will be in place to divert storm water away from the treatment area.

Soil samples will be collected from the treated soils and submitted for laboratory analysis throughout the remediation progress. Once analytical results show that the petroleum hydrocarbon contaminants meet COGCC Regulations, the soil may be reused onsite.

### Treatment Schedule

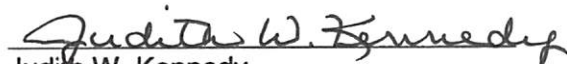
CM Production would like to begin the remediation of the impacted soils as soon as possible in July 2014.

### Agreement Time Period

CM Production believes soil treatment could take as little as a few months to several years and requests the time period of this letter agreement is for a period of three years from the execution date of this letter.


### Surface Owner Approval to Land Treat E&P Wastes and Impacted Soils

By signing below, I signify that I am the surface owner, or an authorized representative of the surface land owner for the parcel upon which the SJ Warren #1 produced water containment pond and tank battery are located. I authorize CM Production to land treat these soils on approximately one acre of land adjacent to the produced water containment pond and tank battery.

  
Judith W. Kennedy

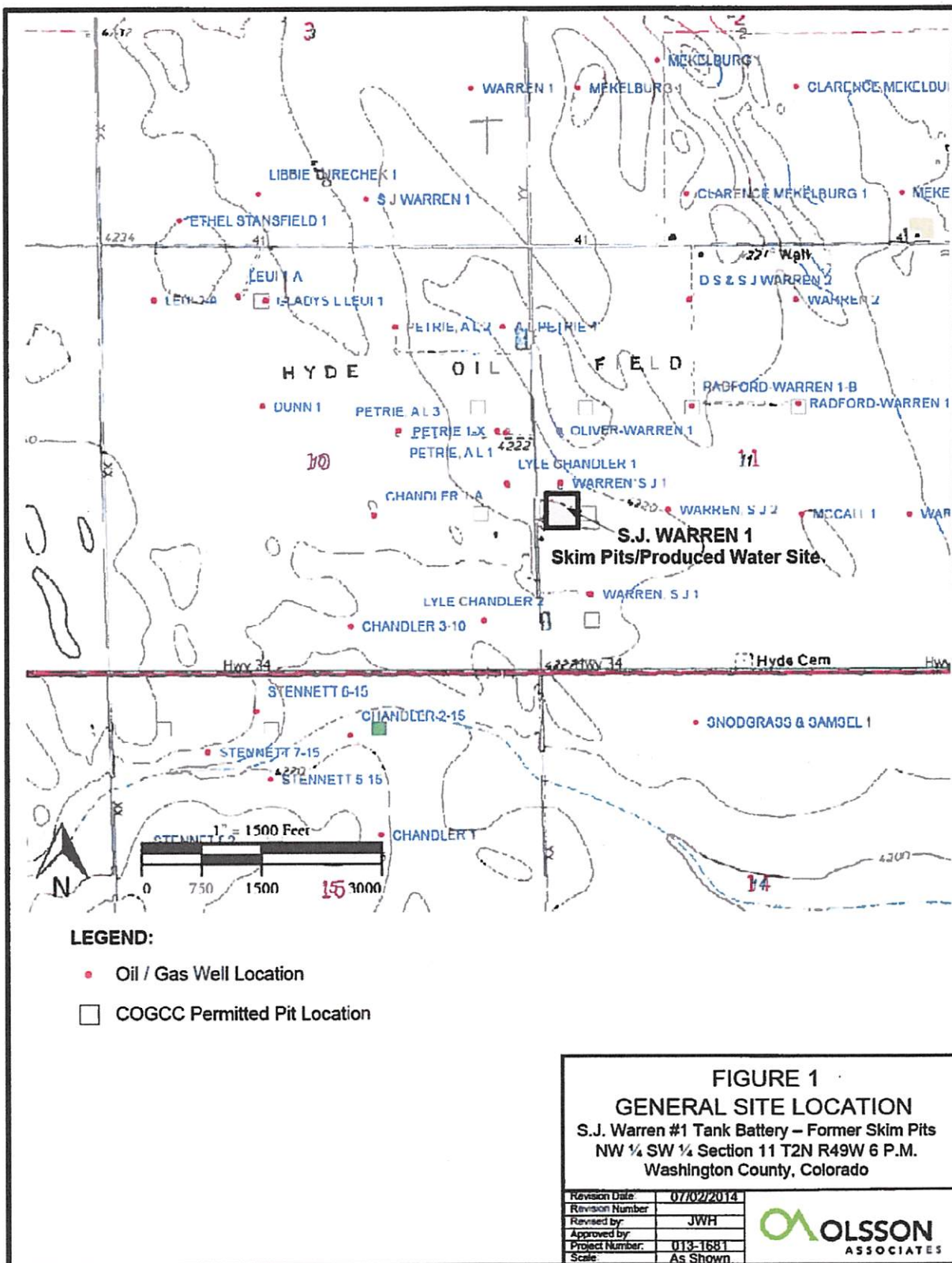
Title: Surface Owner

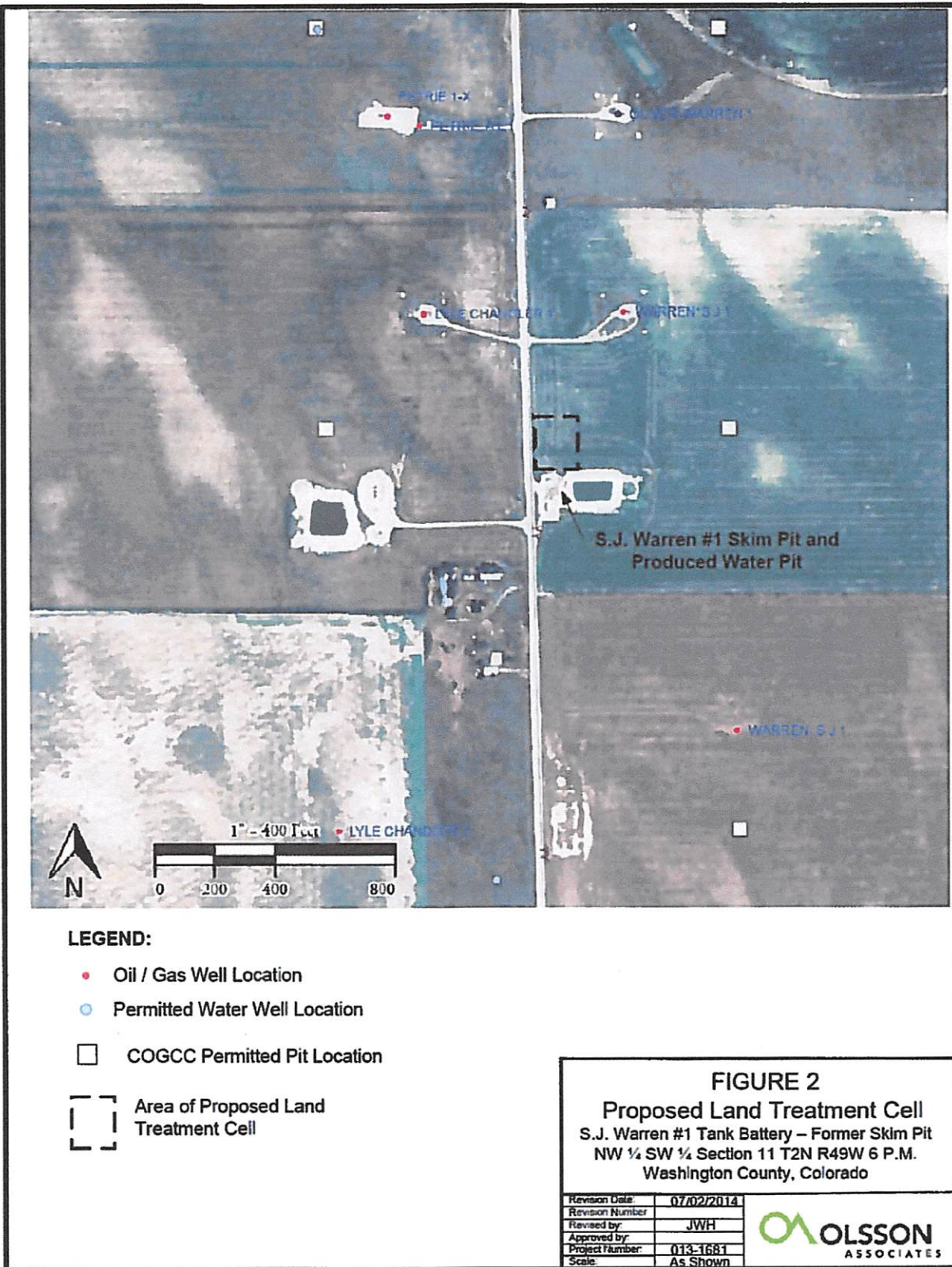
Date: 7/25/2014

  
John Teff  
Business Manager - CM Production, LLC  
Date: 7/15/14



# FIGURES







# ATTACHMENTS

Table 910-1  
Concentration Levels

Contaminant of Concern	Concentrations
<b>Organic Compounds in Soil</b>	
TPH (total petroleum hydrocarbons) GRO or DRO	500 mg/kg
Benzene	0.17 mg/kg
Toluene	85 mg/kg
Ethylbenzene	100 mg/kg
Xylenes	175 mg/kg
Acenaphthene	1000 mg/kg
Anthracene	1000 mg/kg
Benzo(A)anthracene	0.22 mg/kg
Benzo(B)fluoranthene	0.22 mg/kg
Benzo(K)fluoranthene	2.2 mg/kg
Benzo(A)pyrene	0.022 mg/kg
Chrysene	22 mg/kg
Dibenzo(A,H)anthracene	0.022 mg/kg
Fluoranthene	1000 mg/kg
Fluorene	1000 mg/kg
Indeno(1,2,3,C,D)pyrene	0.22 mg/kg
Naphthalene	23 mg/kg
Pyrene	1000 mg/kg
<b>Inorganic Compounds in Soil</b>	
Electrical Conductivity (EC)	< 4 mmhos/cm or 2x background
Sodium Adsorption Ratio (SAR)	< 12
pH	6 to 9 standard units
<b>Metals in Soil</b>	
Arsenic	0.39 mg/kg
Barium	15,000 mg/kg
Cadmium	70 mg/kg
Chromium (III)	120,000 mg/kg
Chromium (VI)	23 mg/kg
Copper	3,100 mg/kg
Lead (inorganic)	400 mg/kg
Mercury	23 mg/kg
Nickel (soluble salts)	1,600 mg/kg
Selenium	390 mg/kg
Silver	390 mg/kg
Zinc	23,000 mg/kg

---

**APPENDIX B**  
**CONFIRMATION SOIL SAMPLE**  
**ANALYTICAL RESULTS**



08/25/14

## Technical Report for

**Olsson Associates - Denver**

**CM Production-S.J. Warren #1**

**013-1681**

**Accutest Job Number: D60931**

**Sampling Date: 08/13/14**

### 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: 92**



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.

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## Sample Summary

Olsson Associates - Denver

Job No: D60931

CM Production-S.J. Warren #1

Project No: 013-1681

Sample Number	Collected			Received	Matrix		Client Sample ID
	Date	Time	By		Code	Type	
D60931-1	08/13/14	11:44	JH	08/14/14	SO	Soil	SJW-EBC@19'
D60931-1A	08/13/14	11:44	JH	08/14/14	SO	Soil	SJW-EBC@19'
D60931-2	08/13/14	11:49	JH	08/14/14	SO	Soil	SJW-ES@9'
D60931-2A	08/13/14	11:49	JH	08/14/14	SO	Soil	SJW-ES@9'
D60931-3	08/13/14	12:51	JH	08/14/14	SO	Soil	SJW-SS@9'
D60931-3A	08/13/14	12:51	JH	08/14/14	SO	Soil	SJW-SS@9'
D60931-4	08/13/14	13:14	JH	08/14/14	SO	Soil	SJW-NS@9'
D60931-4A	08/13/14	13:14	JH	08/14/14	SO	Soil	SJW-NS@9'
D60931-5	08/13/14	15:36	JH	08/14/14	SO	Soil	SJW-WS@9'
D60931-5A	08/13/14	15:36	JH	08/14/14	SO	Soil	SJW-WS@9'
D60931-6	08/13/14	15:49	JH	08/14/14	SO	Soil	SJW-SP
D60931-7	08/13/14	16:00	JH	08/14/14	SO	Soil	SJW-WB@12'

---

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

## CASE NARRATIVE / CONFORMANCE SUMMARY

**Client:** Olsson Associates - Denver

**Job No** D60931

**Site:** CM Production-S.J. Warren #1

**Report Date** 8/25/2014 8:32:27 PM

On 08/14/2014, 7 sample(s), 0 Trip Blank(s), and 0 Field Blank(s) were received at Accutest Mountain States (AMS) at a temperature of 5.8 °C. The samples were intact and properly preserved, unless noted below. An AMS Job Number of D60931 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.

### Volatiles by GCMS By Method SW846 8260B

**Matrix:** SO

**Batch ID:** V3V1869

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D60931-1MS, D60931-2DUP were used as the QC samples indicated.

### Extractables by GCMS By Method SW846 8270C

**Matrix:** SO

**Batch ID:** OP10430

- All samples were extracted and analyzed within the recommended method holding time.
- Sample(s) D60931-1MS, D60931-1MSD were used as the QC samples indicated.
- All method blanks for this batch meet method specific criteria.

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

**Matrix:** SO

**Batch ID:** OP10452

- All samples were extracted and analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D60931-5MS, D60931-5MSD were used as the QC samples indicated.

**Matrix:** SO

**Batch ID:** OP10460

- All samples were extracted and analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D61056-2MS, D61056-2MSD were used as the QC samples indicated.

## Metals By Method SW846 6010C

**Matrix:** AQ

**Batch ID:** MP13744

- All samples were digested and analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D60931-5AMS, D60931-5AMSD, D60931-5ASDL were used as the QC samples for the metals analysis.

**Matrix:** SO

**Batch ID:** MP13714

- All samples were digested and analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D60728-1MSD, D60728-1SDL, D60728-1MS were used as the QC samples for the metals analysis.
- The matrix spike (MS) recovery(s) of Potassium are outside control limits. Spike recovery indicates possible matrix interference.
- The matrix spike (MS) recovery(s) of Iron are outside control limits. Spike amount low relative to the sample amount. Refer to lab control or spike blank for recovery information.
- MP13714-SD1 for Iron: Serial dilution indicates possible matrix interference.

## Wet Chemistry By Method EPA 300.0/SW846 9056

**Matrix:** SO

**Batch ID:** GP13294

- All samples were prepared and analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D60736-1MS, D60736-1MSD were used as the QC samples for the Nitrogen, Nitrate, Nitrogen, Nitrite, Phosphate, Ortho, Sulfate analysis.

## Wet Chemistry By Method SM2540G-2011 M

**Matrix:** SO

**Batch ID:** GN26014

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

## Wet Chemistry By Method USDA HANDBOOK 60

**Matrix:** SO

**Batch ID:** MP13744

- D60931-1A, -2A, -3A, -4A, -5A for Sodium Adsorption Ratio: Calculated as:  $(\text{Na meq/L}) / \sqrt{[(\text{Ca meq/L}) + (\text{Mg meq/L})/2]}$

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

**Job Number:** D60931  
**Account:** Olsson Associates - Denver  
**Project:** CM Production-S.J. Warren #1  
**Collected:** 08/13/14



Lab Sample ID Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
<b>D60931-1 SJW-EBC@19'</b>						
1-Methylnaphthalene		269	79	20	ug/kg	SW846 8270C
2-Methylnaphthalene		373	79	40	ug/kg	SW846 8270C
Naphthalene		93.4	79	20	ug/kg	SW846 8270C
Phenanthrene		225	79	20	ug/kg	SW846 8270C
TPH-DRO (C10-C28)		213	7.9	5.9	mg/kg	SW846-8015B
Specific Conductivity		2630	1.0		umhos/cm	SM 2510B-2011 MOD
pH		10.23			su	SW846 9045D
<b>D60931-1A SJW-EBC@19'</b>						
Calcium		13.6	2.0		mg/l	SW846 6010C
Magnesium		2.77	1.0		mg/l	SW846 6010C
Sodium		586	2.0		mg/l	SW846 6010C
Sodium Adsorption Ratio <sup>a</sup>		37.8			ratio	USDA HANDBOOK 60
<b>D60931-2 SJW-ES@9'</b>						
Iron		7540	7.9		mg/kg	SW846 6010C
Specific Conductivity		1970	1.0		umhos/cm	SM 2510B-2011 MOD
pH		10.26			su	SW846 9045D
<b>D60931-2A SJW-ES@9'</b>						
Calcium		21.0	2.0		mg/l	SW846 6010C
Magnesium		3.25	1.0		mg/l	SW846 6010C
Sodium		443	2.0		mg/l	SW846 6010C
Sodium Adsorption Ratio <sup>a</sup>		23.7			ratio	USDA HANDBOOK 60
<b>D60931-3 SJW-SS@9'</b>						
Iron		6210	8.0		mg/kg	SW846 6010C
Specific Conductivity		1830	1.0		umhos/cm	SM 2510B-2011 MOD
pH		10.31			su	SW846 9045D
<b>D60931-3A SJW-SS@9'</b>						
Calcium		10.9	2.0		mg/l	SW846 6010C
Magnesium		1.99	1.0		mg/l	SW846 6010C
Sodium		397	2.0		mg/l	SW846 6010C
Sodium Adsorption Ratio <sup>a</sup>		29.0			ratio	USDA HANDBOOK 60

## Summary of Hits

**Job Number:** D60931  
**Account:** Olsson Associates - Denver  
**Project:** CM Production-S.J. Warren #1  
**Collected:** 08/13/14

Lab Sample ID	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
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### D60931-4 SJW-NS@9'

Iron	5660	7.8		mg/kg	SW846 6010C
Specific Conductivity	1990	1.0		umhos/cm	SM 2510B-2011 MOD
pH	10.23			su	SW846 9045D

### D60931-4A SJW-NS@9'

Calcium	16.5	2.0		mg/l	SW846 6010C
Magnesium	4.03	1.0		mg/l	SW846 6010C
Sodium	438	2.0		mg/l	SW846 6010C
Sodium Adsorption Ratio <sup>a</sup>	25.1			ratio	USDA HANDBOOK 60

### D60931-5 SJW-WS@9'

Iron	7400	7.7		mg/kg	SW846 6010C
Specific Conductivity	1170	1.0		umhos/cm	SM 2510B-2011 MOD
pH	9.73			su	SW846 9045D

### D60931-5A SJW-WS@9'

Calcium	31.3	2.0		mg/l	SW846 6010C
Magnesium	14.6	1.0		mg/l	SW846 6010C
Sodium	177	2.0		mg/l	SW846 6010C
Sodium Adsorption Ratio <sup>a</sup>	6.55			ratio	USDA HANDBOOK 60

### D60931-6 SJW-SP

Iron	7790	7.4		mg/kg	SW846 6010C
Potassium	2210	210		mg/kg	SW846 6010C
Nitrogen, Nitrate	9.3	2.5		mg/kg	EPA 300.0/SW846 9056
Phosphate, Ortho	1.0	0.56		mg/kg	EPA 300.0/SW846 9056
Sulfate	48.3	28		mg/kg	EPA 300.0/SW846 9056

### D60931-7 SJW-WB@12'

Specific Conductivity	893	1.0		umhos/cm	SM 2510B-2011 MOD
pH	10.20			su	SW846 9045D

(a) Calculated as:  $(\text{Na meq/L}) / \sqrt{[(\text{Ca meq/L}) + (\text{Mg meq/L})/2]}$

Sample Results

Report of Analysis

## Report of Analysis

<b>Client Sample ID:</b>	SJW-EBC@19'	<b>Date Sampled:</b>	08/13/14
<b>Lab Sample ID:</b>	D60931-1	<b>Date Received:</b>	08/14/14
<b>Matrix:</b>	SO - Soil	<b>Percent Solids:</b>	84.0
<b>Method:</b>	SW846 8260B		
<b>Project:</b>	CM Production-S.J. Warren #1		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	3V32032.D	1	08/18/14	JL	n/a	n/a	V3V1869
Run #2							

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.03 g	5.0 ml	100 ul
Run #2			

## Purgeable Aromatics+ GRO

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	69	26	ug/kg	
108-88-3	Toluene	ND	140	69	ug/kg	
100-41-4	Ethylbenzene	ND	140	26	ug/kg	
1330-20-7	Xylene (total)	ND	270	69	ug/kg	
	TPH-GRO (C6-C10)	ND	14000	6900	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
2037-26-5	Toluene-D8	92%		64-130%
460-00-4	4-Bromofluorobenzene	100%		62-131%
17060-07-0	1,2-Dichloroethane-D4	94%		70-130%

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

## Report of Analysis

<b>Client Sample ID:</b>	SJW-EBC@19'	<b>Date Sampled:</b>	08/13/14
<b>Lab Sample ID:</b>	D60931-1	<b>Date Received:</b>	08/14/14
<b>Matrix:</b>	SO - Soil	<b>Percent Solids:</b>	84.0
<b>Method:</b>	SW846 8270C SW846 3546		
<b>Project:</b>	CM Production-S.J. Warren #1		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	1G120983.D	1	08/18/14	DC	08/15/14	OP10430	E1G1396
Run #2							

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

## BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	79	20	ug/kg	
208-96-8	Acenaphthylene	ND	79	20	ug/kg	
120-12-7	Anthracene	ND	79	20	ug/kg	
56-55-3	Benzo(a)anthracene	ND	79	20	ug/kg	
205-99-2	Benzo(b)fluoranthene	ND	79	20	ug/kg	
207-08-9	Benzo(k)fluoranthene	ND	79	20	ug/kg	
191-24-2	Benzo(g,h,i)perylene	ND	79	20	ug/kg	
50-32-8	Benzo(a)pyrene	ND	79	20	ug/kg	
218-01-9	Chrysene	ND	79	20	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	79	20	ug/kg	
206-44-0	Fluoranthene	ND	79	20	ug/kg	
86-73-7	Fluorene	ND	79	20	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	79	20	ug/kg	
90-12-0	1-Methylnaphthalene	269	79	20	ug/kg	
91-57-6	2-Methylnaphthalene	373	79	40	ug/kg	
91-20-3	Naphthalene	93.4	79	20	ug/kg	
85-01-8	Phenanthrene	225	79	20	ug/kg	
129-00-0	Pyrene	ND	79	20	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
321-60-8	2-Fluorobiphenyl	92%		30-130%
4165-60-0	Nitrobenzene-d5	74%		19-130%
1718-51-0	Terphenyl-d14	98%		40-130%

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



## Report of Analysis

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<b>Client Sample ID:</b>	SJW-EBC@19'	<b>Date Sampled:</b>	08/13/14
<b>Lab Sample ID:</b>	D60931-1	<b>Date Received:</b>	08/14/14
<b>Matrix:</b>	SO - Soil	<b>Percent Solids:</b>	84.0
<b>Method:</b>	SW846-8015B SW846 3546		
<b>Project:</b>	CM Production-S.J. Warren #1		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	FI15830.D	1	08/21/14	JJ	08/20/14	OP10452	GF1921
Run #2							

	Initial Weight	Final Volume
Run #1	30.1 g	1.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	213	7.9	5.9	mg/kg	
CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits		
84-15-1	o-Terphenyl	86%		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

## Report of Analysis

**Client Sample ID:** SJW-EBC@19'**Lab Sample ID:** D60931-1**Matrix:** SO - Soil**Project:** CM Production-S.J. Warren #1**Date Sampled:** 08/13/14**Date Received:** 08/14/14**Percent Solids:** 84.0**General Chemistry**

Analyte	Result	RL	Units	DF	Analyzed	By	Method
<b>%solids</b>							
Solids, Percent	84		%	1	08/14/14	SWT	SM2540G-2011 M
<b>prep: DEPT.OF AG, BOOK N9</b>							
Specific Conductivity	2630	1.0	umhos/cm	1	08/19/14	JD	SM 2510B-2011 MOD
pH	10.23		su	1	08/14/14 13:30	AK	SW846 9045D

RL = Reporting Limit

Report of Analysis

<b>Client Sample ID:</b>	SJW-EBC@19'	<b>Date Sampled:</b>	08/13/14
<b>Lab Sample ID:</b>	D60931-1A	<b>Date Received:</b>	08/14/14
<b>Matrix:</b>	SO - Soil	<b>Percent Solids:</b>	84.0
<b>Project:</b>	CM Production-S.J. Warren #1		

SAR Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Calcium	13.6	2.0	mg/l	1	08/18/14	08/19/14 JB	SW846 6010C <sup>1</sup>	SW846 3010A <sup>2</sup>
Magnesium	2.77	1.0	mg/l	1	08/18/14	08/19/14 JB	SW846 6010C <sup>1</sup>	SW846 3010A <sup>2</sup>
Sodium	586	2.0	mg/l	1	08/18/14	08/19/14 JB	SW846 6010C <sup>1</sup>	SW846 3010A <sup>2</sup>

(1) Instrument QC Batch: MA5125  
(2) Prep QC Batch: MP13744

RL = Reporting Limit

Report of Analysis

<b>Client Sample ID:</b>	SJW-EBC@19'	<b>Date Sampled:</b>	08/13/14
<b>Lab Sample ID:</b>	D60931-1A	<b>Date Received:</b>	08/14/14
<b>Matrix:</b>	SO - Soil	<b>Percent Solids:</b>	84.0
<b>Project:</b>	CM Production-S.J. Warren #1		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio <sup>a</sup>	37.8		ratio	1	08/19/14 10:38	JB	USDA HANDBOOK 60

(a) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

RL = Reporting Limit

## Report of Analysis

<b>Client Sample ID:</b>	SJW-ES@9'	<b>Date Sampled:</b>	08/13/14
<b>Lab Sample ID:</b>	D60931-2	<b>Date Received:</b>	08/14/14
<b>Matrix:</b>	SO - Soil	<b>Percent Solids:</b>	84.0
<b>Method:</b>	SW846 8260B		
<b>Project:</b>	CM Production-S.J. Warren #1		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	3V32033.D	1	08/18/14	JL	n/a	n/a	V3V1869
Run #2							

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.08 g	5.0 ml	100 ul
Run #2			

## Purgeable Aromatics+ GRO

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	68	26	ug/kg	
108-88-3	Toluene	ND	140	68	ug/kg	
100-41-4	Ethylbenzene	ND	140	26	ug/kg	
1330-20-7	Xylene (total)	ND	270	68	ug/kg	
	TPH-GRO (C6-C10)	ND	14000	6800	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
2037-26-5	Toluene-D8	92%		64-130%
460-00-4	4-Bromofluorobenzene	98%		62-131%
17060-07-0	1,2-Dichloroethane-D4	100%		70-130%

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

## Report of Analysis

<b>Client Sample ID:</b>	SJW-ES@9'	<b>Date Sampled:</b>	08/13/14
<b>Lab Sample ID:</b>	D60931-2	<b>Date Received:</b>	08/14/14
<b>Matrix:</b>	SO - Soil	<b>Percent Solids:</b>	84.0
<b>Method:</b>	SW846 8270C SW846 3546		
<b>Project:</b>	CM Production-S.J. Warren #1		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	1G120986.D	1	08/18/14	DC	08/15/14	OP10430	E1G1396
Run #2							

	Initial Weight	Final Volume
Run #1	30.1 g	1.0 ml
Run #2		

## BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	79	20	ug/kg	
208-96-8	Acenaphthylene	ND	79	20	ug/kg	
120-12-7	Anthracene	ND	79	20	ug/kg	
56-55-3	Benzo(a)anthracene	ND	79	20	ug/kg	
205-99-2	Benzo(b)fluoranthene	ND	79	20	ug/kg	
207-08-9	Benzo(k)fluoranthene	ND	79	20	ug/kg	
191-24-2	Benzo(g,h,i)perylene	ND	79	20	ug/kg	
50-32-8	Benzo(a)pyrene	ND	79	20	ug/kg	
218-01-9	Chrysene	ND	79	20	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	79	20	ug/kg	
206-44-0	Fluoranthene	ND	79	20	ug/kg	
86-73-7	Fluorene	ND	79	20	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	79	20	ug/kg	
90-12-0	1-Methylnaphthalene	ND	79	20	ug/kg	
91-57-6	2-Methylnaphthalene	ND	79	40	ug/kg	
91-20-3	Naphthalene	ND	79	20	ug/kg	
85-01-8	Phenanthrene	ND	79	20	ug/kg	
129-00-0	Pyrene	ND	79	20	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
321-60-8	2-Fluorobiphenyl	85%		30-130%
4165-60-0	Nitrobenzene-d5	62%		19-130%
1718-51-0	Terphenyl-d14	105%		40-130%

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



## Report of Analysis

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<b>Client Sample ID:</b>	SJW-ES@9'	<b>Date Sampled:</b>	08/13/14
<b>Lab Sample ID:</b>	D60931-2	<b>Date Received:</b>	08/14/14
<b>Matrix:</b>	SO - Soil	<b>Percent Solids:</b>	84.0
<b>Method:</b>	SW846-8015B SW846 3546		
<b>Project:</b>	CM Production-S.J. Warren #1		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	FI15828.D	1	08/21/14	JJ	08/20/14	OP10452	GF1921
Run #2							

	Initial Weight	Final Volume
Run #1	30.1 g	1.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	ND	7.9	5.9	mg/kg	
CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits		
84-15-1	o-Terphenyl	83%		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

Report of Analysis

<b>Client Sample ID:</b>	SJW-ES@9'	<b>Date Sampled:</b>	08/13/14
<b>Lab Sample ID:</b>	D60931-2	<b>Date Received:</b>	08/14/14
<b>Matrix:</b>	SO - Soil	<b>Percent Solids:</b>	84.0
<b>Project:</b>	CM Production-S.J. Warren #1		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Iron	7540	7.9	mg/kg	1	08/14/14	08/14/14 KV	SW846 6010C <sup>1</sup>	SW846 3050B <sup>2</sup>

(1) Instrument QC Batch: MA5104  
(2) Prep QC Batch: MP13714

RL = Reporting Limit

## Report of Analysis

**Client Sample ID:** SJW-ES@9'**Lab Sample ID:** D60931-2**Matrix:** SO - Soil**Project:** CM Production-S.J. Warren #1**Date Sampled:** 08/13/14**Date Received:** 08/14/14**Percent Solids:** 84.0

## General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
%solids							
Solids, Percent	84		%	1	08/14/14	SWT	SM2540G-2011 M
prep: DEPT.OF AG, BOOK N9							
Specific Conductivity	1970	1.0	umhos/cm	1	08/19/14	JD	SM 2510B-2011 MOD
pH	10.26		su	1	08/14/14 13:30	AK	SW846 9045D

RL = Reporting Limit

Report of Analysis

<b>Client Sample ID:</b>	SJW-ES@9'	<b>Date Sampled:</b>	08/13/14
<b>Lab Sample ID:</b>	D60931-2A	<b>Date Received:</b>	08/14/14
<b>Matrix:</b>	SO - Soil	<b>Percent Solids:</b>	84.0
<b>Project:</b>	CM Production-S.J. Warren #1		

SAR Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Calcium	21.0	2.0	mg/l	1	08/18/14	08/19/14 JB	SW846 6010C <sup>1</sup>	SW846 3010A <sup>2</sup>
Magnesium	3.25	1.0	mg/l	1	08/18/14	08/19/14 JB	SW846 6010C <sup>1</sup>	SW846 3010A <sup>2</sup>
Sodium	443	2.0	mg/l	1	08/18/14	08/19/14 JB	SW846 6010C <sup>1</sup>	SW846 3010A <sup>2</sup>

(1) Instrument QC Batch: MA5125  
(2) Prep QC Batch: MP13744

RL = Reporting Limit

Report of Analysis

<b>Client Sample ID:</b>	SJW-ES@9'	<b>Date Sampled:</b>	08/13/14
<b>Lab Sample ID:</b>	D60931-2A	<b>Date Received:</b>	08/14/14
<b>Matrix:</b>	SO - Soil	<b>Percent Solids:</b>	84.0
<b>Project:</b>	CM Production-S.J. Warren #1		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio <sup>a</sup>	23.7		ratio	1	08/19/14 10:45	JB	USDA HANDBOOK 60

(a) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

RL = Reporting Limit

## Report of Analysis

<b>Client Sample ID:</b>	SJW-SS@9'	<b>Date Sampled:</b>	08/13/14
<b>Lab Sample ID:</b>	D60931-3	<b>Date Received:</b>	08/14/14
<b>Matrix:</b>	SO - Soil	<b>Percent Solids:</b>	88.0
<b>Method:</b>	SW846 8260B		
<b>Project:</b>	CM Production-S.J. Warren #1		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	3V32035.D	1	08/18/14	JL	n/a	n/a	V3V1869
Run #2							

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.09 g	5.0 ml	100 ul
Run #2			

## Purgeable Aromatics+ GRO

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	63	24	ug/kg	
108-88-3	Toluene	ND	130	63	ug/kg	
100-41-4	Ethylbenzene	ND	130	24	ug/kg	
1330-20-7	Xylene (total)	ND	250	63	ug/kg	
	TPH-GRO (C6-C10)	ND	13000	6300	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
2037-26-5	Toluene-D8	91%		64-130%
460-00-4	4-Bromofluorobenzene	97%		62-131%
17060-07-0	1,2-Dichloroethane-D4	96%		70-130%

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



## Report of Analysis

**Client Sample ID:** SJW-SS@9'  
**Lab Sample ID:** D60931-3  
**Matrix:** SO - Soil  
**Method:** SW846 8270C SW846 3546  
**Project:** CM Production-S.J. Warren #1

**Date Sampled:** 08/13/14  
**Date Received:** 08/14/14  
**Percent Solids:** 88.0

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	1G120987.D	1	08/18/14	DC	08/15/14	OP10430	E1G1396
Run #2							

	Initial Weight	Final Volume
Run #1	30.2 g	1.0 ml
Run #2		

## BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	75	19	ug/kg	
208-96-8	Acenaphthylene	ND	75	19	ug/kg	
120-12-7	Anthracene	ND	75	19	ug/kg	
56-55-3	Benzo(a)anthracene	ND	75	19	ug/kg	
205-99-2	Benzo(b)fluoranthene	ND	75	19	ug/kg	
207-08-9	Benzo(k)fluoranthene	ND	75	19	ug/kg	
191-24-2	Benzo(g,h,i)perylene	ND	75	19	ug/kg	
50-32-8	Benzo(a)pyrene	ND	75	19	ug/kg	
218-01-9	Chrysene	ND	75	19	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	75	19	ug/kg	
206-44-0	Fluoranthene	ND	75	19	ug/kg	
86-73-7	Fluorene	ND	75	19	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	75	19	ug/kg	
90-12-0	1-Methylnaphthalene	ND	75	19	ug/kg	
91-57-6	2-Methylnaphthalene	ND	75	38	ug/kg	
91-20-3	Naphthalene	ND	75	19	ug/kg	
85-01-8	Phenanthrene	ND	75	19	ug/kg	
129-00-0	Pyrene	ND	75	19	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
321-60-8	2-Fluorobiphenyl	91%		30-130%
4165-60-0	Nitrobenzene-d5	72%		19-130%
1718-51-0	Terphenyl-d14	108%		40-130%

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

## Report of Analysis

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<b>Client Sample ID:</b>	SJW-SS@9'	<b>Date Sampled:</b>	08/13/14
<b>Lab Sample ID:</b>	D60931-3	<b>Date Received:</b>	08/14/14
<b>Matrix:</b>	SO - Soil	<b>Percent Solids:</b>	88.0
<b>Method:</b>	SW846-8015B SW846 3546		
<b>Project:</b>	CM Production-S.J. Warren #1		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	FI15824.D	1	08/21/14	JJ	08/20/14	OP10452	GF1921
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	7.6	5.7	mg/kg	
CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits		
84-15-1	o-Terphenyl	79%		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

Report of Analysis

<b>Client Sample ID:</b>	SJW-SS@9'	<b>Date Sampled:</b>	08/13/14
<b>Lab Sample ID:</b>	D60931-3	<b>Date Received:</b>	08/14/14
<b>Matrix:</b>	SO - Soil	<b>Percent Solids:</b>	88.0
<b>Project:</b>	CM Production-S.J. Warren #1		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Iron	6210	8.0	mg/kg	1	08/14/14	08/14/14 KV	SW846 6010C <sup>1</sup>	SW846 3050B <sup>2</sup>

- (1) Instrument QC Batch: MA5104  
(2) Prep QC Batch: MP13714

RL = Reporting Limit

## Report of Analysis

**Client Sample ID:** SJW-SS@9'**Lab Sample ID:** D60931-3**Matrix:** SO - Soil**Project:** CM Production-S.J. Warren #1**Date Sampled:** 08/13/14**Date Received:** 08/14/14**Percent Solids:** 88.0**General Chemistry**

Analyte	Result	RL	Units	DF	Analyzed	By	Method
<b>%solids</b>							
Solids, Percent	88		%	1	08/14/14	SWT	SM2540G-2011 M
<b>prep: DEPT.OF AG, BOOK N9</b>							
Specific Conductivity	1830	1.0	umhos/cm	1	08/19/14	JD	SM 2510B-2011 MOD
pH	10.31		su	1	08/14/14 13:30	AK	SW846 9045D

RL = Reporting Limit

Report of Analysis

<b>Client Sample ID:</b>	SJW-SS@9'	<b>Date Sampled:</b>	08/13/14
<b>Lab Sample ID:</b>	D60931-3A	<b>Date Received:</b>	08/14/14
<b>Matrix:</b>	SO - Soil	<b>Percent Solids:</b>	88.0
<b>Project:</b>	CM Production-S.J. Warren #1		

SAR Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Calcium	10.9	2.0	mg/l	1	08/18/14	08/19/14 JB	SW846 6010C <sup>1</sup>	SW846 3010A <sup>2</sup>
Magnesium	1.99	1.0	mg/l	1	08/18/14	08/19/14 JB	SW846 6010C <sup>1</sup>	SW846 3010A <sup>2</sup>
Sodium	397	2.0	mg/l	1	08/18/14	08/19/14 JB	SW846 6010C <sup>1</sup>	SW846 3010A <sup>2</sup>

(1) Instrument QC Batch: MA5125  
(2) Prep QC Batch: MP13744

RL = Reporting Limit

Report of Analysis

<b>Client Sample ID:</b>	SJW-SS@9'	<b>Date Sampled:</b>	08/13/14
<b>Lab Sample ID:</b>	D60931-3A	<b>Date Received:</b>	08/14/14
<b>Matrix:</b>	SO - Soil	<b>Percent Solids:</b>	88.0
<b>Project:</b>	CM Production-S.J. Warren #1		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio <sup>a</sup>	29.0		ratio	1	08/19/14 10:52	JB	USDA HANDBOOK 60

(a) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

RL = Reporting Limit



## Report of Analysis

<b>Client Sample ID:</b>	SJW-NS@9'	<b>Date Sampled:</b>	08/13/14
<b>Lab Sample ID:</b>	D60931-4	<b>Date Received:</b>	08/14/14
<b>Matrix:</b>	SO - Soil	<b>Percent Solids:</b>	88.7
<b>Method:</b>	SW846 8260B		
<b>Project:</b>	CM Production-S.J. Warren #1		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	3V32036.D	1	08/18/14	JL	n/a	n/a	V3V1869
Run #2							

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.04 g	5.0 ml	100 ul
Run #2			

## Purgeable Aromatics+ GRO

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	62	24	ug/kg	
108-88-3	Toluene	ND	120	62	ug/kg	
100-41-4	Ethylbenzene	ND	120	24	ug/kg	
1330-20-7	Xylene (total)	ND	250	62	ug/kg	
	TPH-GRO (C6-C10)	ND	12000	6200	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
2037-26-5	Toluene-D8	90%		64-130%
460-00-4	4-Bromofluorobenzene	98%		62-131%
17060-07-0	1,2-Dichloroethane-D4	100%		70-130%

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

## Report of Analysis

<b>Client Sample ID:</b>	SJW-NS@9'	<b>Date Sampled:</b>	08/13/14
<b>Lab Sample ID:</b>	D60931-4	<b>Date Received:</b>	08/14/14
<b>Matrix:</b>	SO - Soil	<b>Percent Solids:</b>	88.7
<b>Method:</b>	SW846 8270C SW846 3546		
<b>Project:</b>	CM Production-S.J. Warren #1		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	1G120988.D	1	08/18/14	DC	08/15/14	OP10430	E1G1396
Run #2							

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

## BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	75	19	ug/kg	
208-96-8	Acenaphthylene	ND	75	19	ug/kg	
120-12-7	Anthracene	ND	75	19	ug/kg	
56-55-3	Benzo(a)anthracene	ND	75	19	ug/kg	
205-99-2	Benzo(b)fluoranthene	ND	75	19	ug/kg	
207-08-9	Benzo(k)fluoranthene	ND	75	19	ug/kg	
191-24-2	Benzo(g,h,i)perylene	ND	75	19	ug/kg	
50-32-8	Benzo(a)pyrene	ND	75	19	ug/kg	
218-01-9	Chrysene	ND	75	19	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	75	19	ug/kg	
206-44-0	Fluoranthene	ND	75	19	ug/kg	
86-73-7	Fluorene	ND	75	19	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	75	19	ug/kg	
90-12-0	1-Methylnaphthalene	ND	75	19	ug/kg	
91-57-6	2-Methylnaphthalene	ND	75	38	ug/kg	
91-20-3	Naphthalene	ND	75	19	ug/kg	
85-01-8	Phenanthrene	ND	75	19	ug/kg	
129-00-0	Pyrene	ND	75	19	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
321-60-8	2-Fluorobiphenyl	90%		30-130%
4165-60-0	Nitrobenzene-d5	68%		19-130%
1718-51-0	Terphenyl-d14	96%		40-130%

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

## Report of Analysis

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<b>Client Sample ID:</b>	SJW-NS@9'	<b>Date Sampled:</b>	08/13/14
<b>Lab Sample ID:</b>	D60931-4	<b>Date Received:</b>	08/14/14
<b>Matrix:</b>	SO - Soil	<b>Percent Solids:</b>	88.7
<b>Method:</b>	SW846-8015B SW846 3546		
<b>Project:</b>	CM Production-S.J. Warren #1		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	FI15826.D	1	08/21/14	JJ	08/20/14	OP10452	GF1921
Run #2							

	Initial Weight	Final Volume
Run #1	30.1 g	1.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	ND	7.5	5.6	mg/kg	
CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits		
84-15-1	o-Terphenyl	81%		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

Report of Analysis

<b>Client Sample ID:</b>	SJW-NS@9'	<b>Date Sampled:</b>	08/13/14
<b>Lab Sample ID:</b>	D60931-4	<b>Date Received:</b>	08/14/14
<b>Matrix:</b>	SO - Soil	<b>Percent Solids:</b>	88.7
<b>Project:</b>	CM Production-S.J. Warren #1		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Iron	5660	7.8	mg/kg	1	08/14/14	08/14/14 KV	SW846 6010C <sup>1</sup>	SW846 3050B <sup>2</sup>

(1) Instrument QC Batch: MA5104  
(2) Prep QC Batch: MP13714

RL = Reporting Limit

Report of Analysis

<b>Client Sample ID:</b>	SJW-NS@9'	<b>Date Sampled:</b>	08/13/14
<b>Lab Sample ID:</b>	D60931-4	<b>Date Received:</b>	08/14/14
<b>Matrix:</b>	SO - Soil	<b>Percent Solids:</b>	88.7
<b>Project:</b>	CM Production-S.J. Warren #1		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
%solids							
Solids, Percent	88.7		%	1	08/14/14	SWT	SM2540G-2011 M
prep: DEPT.OF AG, BOOK N9							
Specific Conductivity	1990	1.0	umhos/cm	1	08/19/14	JD	SM 2510B-2011 MOD
pH	10.23		su	1	08/14/14 13:30	AK	SW846 9045D

RL = Reporting Limit

Report of Analysis

<b>Client Sample ID:</b>	SJW-NS@9'	<b>Date Sampled:</b>	08/13/14
<b>Lab Sample ID:</b>	D60931-4A	<b>Date Received:</b>	08/14/14
<b>Matrix:</b>	SO - Soil	<b>Percent Solids:</b>	88.7
<b>Project:</b>	CM Production-S.J. Warren #1		

SAR Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Calcium	16.5	2.0	mg/l	1	08/18/14	08/19/14 JB	SW846 6010C <sup>1</sup>	SW846 3010A <sup>2</sup>
Magnesium	4.03	1.0	mg/l	1	08/18/14	08/19/14 JB	SW846 6010C <sup>1</sup>	SW846 3010A <sup>2</sup>
Sodium	438	2.0	mg/l	1	08/18/14	08/19/14 JB	SW846 6010C <sup>1</sup>	SW846 3010A <sup>2</sup>

(1) Instrument QC Batch: MA5125  
(2) Prep QC Batch: MP13744

RL = Reporting Limit

Report of Analysis

<b>Client Sample ID:</b>	SJW-NS@9'	<b>Date Sampled:</b>	08/13/14
<b>Lab Sample ID:</b>	D60931-4A	<b>Date Received:</b>	08/14/14
<b>Matrix:</b>	SO - Soil	<b>Percent Solids:</b>	88.7
<b>Project:</b>	CM Production-S.J. Warren #1		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio <sup>a</sup>	25.1		ratio	1	08/19/14 10:59	JB	USDA HANDBOOK 60

(a) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

RL = Reporting Limit

## Report of Analysis

<b>Client Sample ID:</b>	SJW-WS@9'	<b>Date Sampled:</b>	08/13/14
<b>Lab Sample ID:</b>	D60931-5	<b>Date Received:</b>	08/14/14
<b>Matrix:</b>	SO - Soil	<b>Percent Solids:</b>	89.5
<b>Method:</b>	SW846 8260B		
<b>Project:</b>	CM Production-S.J. Warren #1		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	3V32037.D	1	08/18/14	JL	n/a	n/a	V3V1869
Run #2							

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.01 g	5.0 ml	100 ul
Run #2			

## Purgeable Aromatics+ GRO

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	62	23	ug/kg	
108-88-3	Toluene	ND	120	62	ug/kg	
100-41-4	Ethylbenzene	ND	120	23	ug/kg	
1330-20-7	Xylene (total)	ND	250	62	ug/kg	
	TPH-GRO (C6-C10)	ND	12000	6200	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
2037-26-5	Toluene-D8	91%		64-130%
460-00-4	4-Bromofluorobenzene	98%		62-131%
17060-07-0	1,2-Dichloroethane-D4	101%		70-130%

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



## Report of Analysis

<b>Client Sample ID:</b>	SJW-WS@9'	<b>Date Sampled:</b>	08/13/14
<b>Lab Sample ID:</b>	D60931-5	<b>Date Received:</b>	08/14/14
<b>Matrix:</b>	SO - Soil	<b>Percent Solids:</b>	89.5
<b>Method:</b>	SW846 8270C SW846 3546		
<b>Project:</b>	CM Production-S.J. Warren #1		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	1G120989.D	1	08/18/14	DC	08/15/14	OP10430	E1G1396
Run #2							

	Initial Weight	Final Volume
Run #1	30.2 g	1.0 ml
Run #2		

## BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	74	19	ug/kg	
208-96-8	Acenaphthylene	ND	74	19	ug/kg	
120-12-7	Anthracene	ND	74	19	ug/kg	
56-55-3	Benzo(a)anthracene	ND	74	19	ug/kg	
205-99-2	Benzo(b)fluoranthene	ND	74	19	ug/kg	
207-08-9	Benzo(k)fluoranthene	ND	74	19	ug/kg	
191-24-2	Benzo(g,h,i)perylene	ND	74	19	ug/kg	
50-32-8	Benzo(a)pyrene	ND	74	19	ug/kg	
218-01-9	Chrysene	ND	74	19	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	74	19	ug/kg	
206-44-0	Fluoranthene	ND	74	19	ug/kg	
86-73-7	Fluorene	ND	74	19	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	74	19	ug/kg	
90-12-0	1-Methylnaphthalene	ND	74	19	ug/kg	
91-57-6	2-Methylnaphthalene	ND	74	37	ug/kg	
91-20-3	Naphthalene	ND	74	19	ug/kg	
85-01-8	Phenanthrene	ND	74	19	ug/kg	
129-00-0	Pyrene	ND	74	19	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
321-60-8	2-Fluorobiphenyl	68%		30-130%
4165-60-0	Nitrobenzene-d5	55%		19-130%
1718-51-0	Terphenyl-d14	88%		40-130%

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

## Report of Analysis

<b>Client Sample ID:</b>	SJW-WS@9'	<b>Date Sampled:</b>	08/13/14
<b>Lab Sample ID:</b>	D60931-5	<b>Date Received:</b>	08/14/14
<b>Matrix:</b>	SO - Soil	<b>Percent Solids:</b>	89.5
<b>Method:</b>	SW846-8015B SW846 3546		
<b>Project:</b>	CM Production-S.J. Warren #1		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	FH024773.D	1	08/21/14	JS	08/20/14	OP10452	GFH1117
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	7.4	5.6	mg/kg	
CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits		
84-15-1	o-Terphenyl	75%		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

Report of Analysis

<b>Client Sample ID:</b>	SJW-WS@9'	<b>Date Sampled:</b>	08/13/14
<b>Lab Sample ID:</b>	D60931-5	<b>Date Received:</b>	08/14/14
<b>Matrix:</b>	SO - Soil	<b>Percent Solids:</b>	89.5
<b>Project:</b>	CM Production-S.J. Warren #1		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Iron	7400	7.7	mg/kg	1	08/14/14	08/14/14 KV	SW846 6010C <sup>1</sup>	SW846 3050B <sup>2</sup>

(1) Instrument QC Batch: MA5104  
(2) Prep QC Batch: MP13714

RL = Reporting Limit

## Report of Analysis

**Client Sample ID:** SJW-WS@9'**Lab Sample ID:** D60931-5**Matrix:** SO - Soil**Project:** CM Production-S.J. Warren #1**Date Sampled:** 08/13/14**Date Received:** 08/14/14**Percent Solids:** 89.5**General Chemistry**

Analyte	Result	RL	Units	DF	Analyzed	By	Method
<b>%solids</b>							
Solids, Percent	89.5		%	1	08/14/14	SWT	SM2540G-2011 M
<b>prep: DEPT.OF AG, BOOK N9</b>							
Specific Conductivity	1170	1.0	umhos/cm	1	08/19/14	JD	SM 2510B-2011 MOD
pH	9.73		su	1	08/14/14 13:30	AK	SW846 9045D

RL = Reporting Limit

Report of Analysis

<b>Client Sample ID:</b>	SJW-WS@9'	<b>Date Sampled:</b>	08/13/14
<b>Lab Sample ID:</b>	D60931-5A	<b>Date Received:</b>	08/14/14
<b>Matrix:</b>	SO - Soil	<b>Percent Solids:</b>	89.5
<b>Project:</b>	CM Production-S.J. Warren #1		

SAR Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Calcium	31.3	2.0	mg/l	1	08/18/14	08/19/14 JB	SW846 6010C <sup>1</sup>	SW846 3010A <sup>2</sup>
Magnesium	14.6	1.0	mg/l	1	08/18/14	08/19/14 JB	SW846 6010C <sup>1</sup>	SW846 3010A <sup>2</sup>
Sodium	177	2.0	mg/l	1	08/18/14	08/19/14 JB	SW846 6010C <sup>1</sup>	SW846 3010A <sup>2</sup>

(1) Instrument QC Batch: MA5125  
(2) Prep QC Batch: MP13744

RL = Reporting Limit

Report of Analysis

<b>Client Sample ID:</b>	SJW-WS@9'	<b>Date Sampled:</b>	08/13/14
<b>Lab Sample ID:</b>	D60931-5A	<b>Date Received:</b>	08/14/14
<b>Matrix:</b>	SO - Soil	<b>Percent Solids:</b>	89.5
<b>Project:</b>	CM Production-S.J. Warren #1		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio <sup>a</sup>	6.55		ratio	1	08/19/14 09:48	JB	USDA HANDBOOK 60

(a) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

RL = Reporting Limit

Report of Analysis

<b>Client Sample ID:</b>	SJW-SP	<b>Date Sampled:</b>	08/13/14
<b>Lab Sample ID:</b>	D60931-6	<b>Date Received:</b>	08/14/14
<b>Matrix:</b>	SO - Soil	<b>Percent Solids:</b>	88.3
<b>Project:</b>	CM Production-S.J. Warren #1		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Iron	7790	7.4	mg/kg	1	08/14/14	08/14/14 KV	SW846 6010C <sup>1</sup>	SW846 3050B <sup>2</sup>
Potassium	2210	210	mg/kg	1	08/14/14	08/14/14 KV	SW846 6010C <sup>1</sup>	SW846 3050B <sup>2</sup>

(1) Instrument QC Batch: MA5104  
(2) Prep QC Batch: MP13714

RL = Reporting Limit

## Report of Analysis

<b>Client Sample ID:</b> SJW-SP	<b>Date Sampled:</b> 08/13/14
<b>Lab Sample ID:</b> D60931-6	<b>Date Received:</b> 08/14/14
<b>Matrix:</b> SO - Soil	<b>Percent Solids:</b> 88.3
<b>Project:</b> CM Production-S.J. Warren #1	

## General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
<b>%solids</b>							
Solids, Percent	88.3		%	1	08/14/14	SWT	SM2540G-2011 M
Nitrogen, Nitrate	9.3	2.5	mg/kg	5	08/15/14 17:30	SK	EPA 300.0/SW846 9056
Nitrogen, Nitrite	< 0.69	0.69	mg/kg	1	08/15/14 13:30	SK	EPA 300.0/SW846 9056
Phosphate, Ortho	1.0	0.56	mg/kg	1	08/15/14 13:30	SK	EPA 300.0/SW846 9056
Sulfate	48.3	28	mg/kg	5	08/15/14 17:30	SK	EPA 300.0/SW846 9056

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 RL = Reporting Limit



## Report of Analysis

<b>Client Sample ID:</b>	SJW-WB@12'	<b>Date Sampled:</b>	08/13/14
<b>Lab Sample ID:</b>	D60931-7	<b>Date Received:</b>	08/14/14
<b>Matrix:</b>	SO - Soil	<b>Percent Solids:</b>	95.2
<b>Method:</b>	SW846 8260B		
<b>Project:</b>	CM Production-S.J. Warren #1		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	3V32038.D	1	08/18/14	JL	n/a	n/a	V3V1869
Run #2							

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.03 g	5.0 ml	100 ul
Run #2			

## Purgeable Aromatics+ GRO

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	55	21	ug/kg	
108-88-3	Toluene	ND	110	55	ug/kg	
100-41-4	Ethylbenzene	ND	110	21	ug/kg	
1330-20-7	Xylene (total)	ND	220	55	ug/kg	
	TPH-GRO (C6-C10)	ND	11000	5500	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
2037-26-5	Toluene-D8	92%		64-130%
460-00-4	4-Bromofluorobenzene	99%		62-131%
17060-07-0	1,2-Dichloroethane-D4	97%		70-130%

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

## Report of Analysis

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<b>Client Sample ID:</b>	SJW-WB@12'	<b>Date Sampled:</b>	08/13/14
<b>Lab Sample ID:</b>	D60931-7	<b>Date Received:</b>	08/14/14
<b>Matrix:</b>	SO - Soil	<b>Percent Solids:</b>	95.2
<b>Method:</b>	SW846-8015B SW846 3546		
<b>Project:</b>	CM Production-S.J. Warren #1		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	FH024841.D	1	08/22/14	JJ	08/21/14	OP10460	GFH1119
Run #2							

	Initial Weight	Final Volume
Run #1	30.1 g	1.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	ND	7.0	5.2	mg/kg	
CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits		
84-15-1	o-Terphenyl	92%		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

## Report of Analysis

**Client Sample ID:** SJW-WB@12'**Lab Sample ID:** D60931-7**Matrix:** SO - Soil**Project:** CM Production-S.J. Warren #1**Date Sampled:** 08/13/14**Date Received:** 08/14/14**Percent Solids:** 95.2**General Chemistry**

Analyte	Result	RL	Units	DF	Analyzed	By	Method
<b>%solids</b>							
Solids, Percent	95.2		%	1	08/14/14	SWT	SM2540G-2011 M
<b>prep: DEPT.OF AG, BOOK N9</b>							
Specific Conductivity	893	1.0	umhos/cm	1	08/19/14	JD	SM 2510B-2011 MOD
pH	10.20		su	1	08/14/14 13:30	AK	SW846 9045D

RL = Reporting Limit

## Misc. Forms

5

### Custody Documents and Other Forms

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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]

## 5.1

## D60931: Chain of Custody

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## GC/MS Volatiles

### QC Data Summaries

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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:** D60931  
**Account:** COCSCOG Olsson Associates - Denver  
**Project:** CM Production-S.J. Warren #1

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V3V1869-MB	3V32023.D	1	08/18/14	JL	n/a	n/a	V3V1869

The QC reported here applies to the following samples:

Method: SW846 8260B

D60931-1, D60931-2, D60931-3, D60931-4, D60931-5, D60931-7

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	50	19	ug/kg	
100-41-4	Ethylbenzene	ND	100	19	ug/kg	
108-88-3	Toluene	ND	100	50	ug/kg	
1330-20-7	Xylene (total)	ND	200	50	ug/kg	
	TPH-GRO (C6-C10)	ND	10000	5000	ug/kg	

CAS No.	Surrogate Recoveries	Limits
2037-26-5	Toluene-D8	102% 64-130%
460-00-4	4-Bromofluorobenzene	95% 62-131%
17060-07-0	1,2-Dichloroethane-D4	98% 70-130%

Blank Spike Summary

Job Number: D60931  
Account: COCSCOG Olsson Associates - Denver  
Project: CM Production-S.J. Warren #1

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V3V1869-BS	3V32024.D	1	08/18/14	JL	n/a	n/a	V3V1869

The QC reported here applies to the following samples: Method: SW846 8260B

D60931-1, D60931-2, D60931-3, D60931-4, D60931-5, D60931-7

CAS No.	Compound	Spike ug/kg	BSP ug/kg	BSP %	Limits
71-43-2	Benzene	2500	2530	101	70-130
100-41-4	Ethylbenzene	2500	2660	106	70-130
108-88-3	Toluene	2500	2520	101	70-130
1330-20-7	Xylene (total)	7500	7910	105	70-130

CAS No.	Surrogate Recoveries	BSP	Limits
2037-26-5	Toluene-D8	101%	64-130%
460-00-4	4-Bromofluorobenzene	95%	62-131%
17060-07-0	1,2-Dichloroethane-D4	95%	70-130%

\* = Outside of Control Limits.



## Blank Spike Summary

Page 1 of 1

**Job Number:** D60931  
**Account:** COCSCOG Olsson Associates - Denver  
**Project:** CM Production-S.J. Warren #1

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V3V1869-BS	3V32025.D	1	08/18/14	JL	n/a	n/a	V3V1869

The QC reported here applies to the following samples:

Method: SW846 8260B

D60931-1, D60931-2, D60931-3, D60931-4, D60931-5, D60931-7

CAS No.	Compound	Spike ug/kg	BSP ug/kg	BSP %	Limits
	TPH-GRO (C6-C10)	110000	90400	82	58-130

CAS No.	Surrogate Recoveries	BSP	Limits
2037-26-5	Toluene-D8	102%	64-130%
460-00-4	4-Bromofluorobenzene	93%	62-131%
17060-07-0	1,2-Dichloroethane-D4	99%	70-130%

\* = Outside of Control Limits.

## Matrix Spike Summary

Page 1 of 1

**Job Number:** D60931  
**Account:** COCSCOG Olsson Associates - Denver  
**Project:** CM Production-S.J. Warren #1

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
D60931-1MS	3V32030.D	1	08/18/14	JL	n/a	n/a	V3V1869
D60931-1	3V32032.D	1	08/18/14	JL	n/a	n/a	V3V1869

The QC reported here applies to the following samples:

Method: SW846 8260B

D60931-1, D60931-2, D60931-3, D60931-4, D60931-5, D60931-7

CAS No.	Compound	D60931-1 ug/kg	Spike Q	MS ug/kg	MS %	Limits
71-43-2	Benzene	ND		3440	2940	86 64-139
100-41-4	Ethylbenzene	ND		3440	3020	88 68-136
108-88-3	Toluene	ND		3440	2810	82 60-130
1330-20-7	Xylene (total)	ND		10300	9190	89 58-142

CAS No.	Surrogate Recoveries	MS	D60931-1	Limits
2037-26-5	Toluene-D8	93%	92%	64-130%
460-00-4	4-Bromofluorobenzene	99%	100%	62-131%
17060-07-0	1,2-Dichloroethane-D4	96%	94%	70-130%

\* = Outside of Control Limits.

# Matrix Spike Summary

Page 1 of 1

**Job Number:** D60931  
**Account:** COCSCOG Olsson Associates - Denver  
**Project:** CM Production-S.J. Warren #1

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
D60931-1MS	3V32031.D	1	08/18/14	JL	n/a	n/a	V3V1869
D60931-1	3V32032.D	1	08/18/14	JL	n/a	n/a	V3V1869

The QC reported here applies to the following samples:

Method: SW846 8260B

D60931-1, D60931-2, D60931-3, D60931-4, D60931-5, D60931-7

CAS No.	Compound	D60931-1 ug/kg	Spike Q	MS ug/kg	MS %	Limits
	TPH-GRO (C6-C10)	ND		151000	127000	84 14-174

CAS No.	Surrogate Recoveries	MS	D60931-1	Limits
2037-26-5	Toluene-D8	93%	92%	64-130%
460-00-4	4-Bromofluorobenzene	97%	100%	62-131%
17060-07-0	1,2-Dichloroethane-D4	94%	94%	70-130%

\* = Outside of Control Limits.

## Duplicate Summary

Page 1 of 1

**Job Number:** D60931  
**Account:** COCSCOG Olsson Associates - Denver  
**Project:** CM Production-S.J. Warren #1

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
D60931-2DUP	3V32034.D	1	08/18/14	JL	n/a	n/a	V3V1869
D60931-2	3V32033.D	1	08/18/14	JL	n/a	n/a	V3V1869

The QC reported here applies to the following samples:

Method: SW846 8260B

D60931-1, D60931-2, D60931-3, D60931-4, D60931-5, D60931-7

CAS No.	Compound	D60931-2 ug/kg	DUP Q	Q	RPD	Limits
71-43-2	Benzene	ND	ND		nc	30
100-41-4	Ethylbenzene	ND	ND		nc	30
108-88-3	Toluene	ND	ND		nc	30
1330-20-7	Xylene (total)	ND	ND		nc	30
	TPH-GRO (C6-C10)	ND	ND		nc	30

CAS No.	Surrogate Recoveries	DUP	D60931-2	Limits
2037-26-5	Toluene-D8	90%	92%	64-130%
460-00-4	4-Bromofluorobenzene	97%	98%	62-131%
17060-07-0	1,2-Dichloroethane-D4	102%	100%	70-130%

\* = Outside of Control Limits.

## GC/MS Semi-volatiles

### QC Data Summaries

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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:** D60931  
**Account:** COCSCOG Olsson Associates - Denver  
**Project:** CM Production-S.J. Warren #1

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP10430-MB	1G120981.D	1	08/18/14	DC	08/15/14	OP10430	E1G1396

The QC reported here applies to the following samples:

Method: SW846 8270C

D60931-1, D60931-2, D60931-3, D60931-4, D60931-5

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	67	17	ug/kg	
208-96-8	Acenaphthylene	ND	67	17	ug/kg	
120-12-7	Anthracene	ND	67	17	ug/kg	
56-55-3	Benzo(a)anthracene	ND	67	17	ug/kg	
205-99-2	Benzo(b)fluoranthene	ND	67	17	ug/kg	
207-08-9	Benzo(k)fluoranthene	ND	67	17	ug/kg	
191-24-2	Benzo(g,h,i)perylene	ND	67	17	ug/kg	
50-32-8	Benzo(a)pyrene	ND	67	17	ug/kg	
218-01-9	Chrysene	ND	67	17	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	67	17	ug/kg	
206-44-0	Fluoranthene	ND	67	17	ug/kg	
86-73-7	Fluorene	ND	67	17	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	67	17	ug/kg	
90-12-0	1-Methylnaphthalene	ND	67	17	ug/kg	
91-57-6	2-Methylnaphthalene	ND	67	33	ug/kg	
91-20-3	Naphthalene	ND	67	17	ug/kg	
85-01-8	Phenanthrene	ND	67	17	ug/kg	
129-00-0	Pyrene	ND	67	17	ug/kg	

CAS No.	Surrogate Recoveries	Limits
321-60-8	2-Fluorobiphenyl	109% 30-130%
4165-60-0	Nitrobenzene-d5	84% 19-130%
1718-51-0	Terphenyl-d14	107% 40-130%

## Blank Spike Summary

Page 1 of 1

**Job Number:** D60931  
**Account:** COCSCOG Olsson Associates - Denver  
**Project:** CM Production-S.J. Warren #1

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP10430-BS	1G120982.D	1	08/18/14	DC	08/15/14	OP10430	E1G1396

The QC reported here applies to the following samples:

Method: SW846 8270C

D60931-1, D60931-2, D60931-3, D60931-4, D60931-5

CAS No.	Compound	Spike ug/kg	BSP ug/kg	BSP %	Limits
83-32-9	Acenaphthene	1670	1640	98	58-130
208-96-8	Acenaphthylene	1670	1640	98	58-130
120-12-7	Anthracene	1670	1790	107	67-130
56-55-3	Benzo(a)anthracene	1670	1840	110	63-130
205-99-2	Benzo(b)fluoranthene	1670	1890	113	42-157
207-08-9	Benzo(k)fluoranthene	1670	1790	107	38-175
191-24-2	Benzo(g,h,i)perylene	1670	1800	108	49-152
50-32-8	Benzo(a)pyrene	1670	1840	110	47-155
218-01-9	Chrysene	1670	1890	113	68-130
53-70-3	Dibenzo(a,h)anthracene	1670	1900	114	48-152
206-44-0	Fluoranthene	1670	1880	113	64-130
86-73-7	Fluorene	1670	1700	102	58-130
193-39-5	Indeno(1,2,3-cd)pyrene	1670	1840	110	45-153
90-12-0	1-Methylnaphthalene	1670	1550	93	55-130
91-57-6	2-Methylnaphthalene	1670	1610	97	54-130
91-20-3	Naphthalene	1670	1570	94	53-130
85-01-8	Phenanthrene	1670	1790	107	66-130
129-00-0	Pyrene	1670	1880	113	68-130

CAS No.	Surrogate Recoveries	BSP	Limits
321-60-8	2-Fluorobiphenyl	111%	30-130%
4165-60-0	Nitrobenzene-d5	98%	19-130%
1718-51-0	Terphenyl-d14	115%	40-130%

\* = Outside of Control Limits.

# Matrix Spike/Matrix Spike Duplicate Summary

Page 1 of 1

**Job Number:** D60931  
**Account:** COCSCOG Olsson Associates - Denver  
**Project:** CM Production-S.J. Warren #1

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP10430-MS	1G120984.D	1	08/18/14	DC	08/15/14	OP10430	E1G1396
OP10430-MSD	1G120985.D	1	08/18/14	DC	08/15/14	OP10430	E1G1396
D60931-1	1G120983.D	1	08/18/14	DC	08/15/14	OP10430	E1G1396

The QC reported here applies to the following samples:

Method: SW846 8270C

D60931-1, D60931-2, D60931-3, D60931-4, D60931-5

CAS No.	Compound	D60931-1 ug/kg	Spike Q	ug/kg	MS ug/kg	MS %	Spike ug/kg	MSD ug/kg	MSD %	RPD	Limits Rec/RPD
83-32-9	Acenaphthene	ND		1980	1800	91	1980	1900	96	5	36-130/30
208-96-8	Acenaphthylene	ND		1980	1790	90	1980	1930	97	8	10-150/30
120-12-7	Anthracene	ND		1980	2000	101	1980	1960	99	2	50-130/30
56-55-3	Benzo(a)anthracene	ND		1980	2140	108	1980	1920	97	11	41-130/30
205-99-2	Benzo(b)fluoranthene	ND		1980	2040	103	1980	2070	104	1	29-152/30
207-08-9	Benzo(k)fluoranthene	ND		1980	2190	111	1980	1800	91	20	14-175/30
191-24-2	Benzo(g,h,i)perylene	ND		1980	2000	101	1980	1780	90	12	15-164/30
50-32-8	Benzo(a)pyrene	ND		1980	2100	106	1980	1910	96	9	27-151/30
218-01-9	Chrysene	ND		1980	2140	108	1980	2010	101	6	46-130/30
53-70-3	Dibenzo(a,h)anthracene	ND		1980	2070	105	1980	1870	94	10	31-152/30
206-44-0	Fluoranthene	ND		1980	2120	107	1980	2010	101	5	53-130/30
86-73-7	Fluorene	ND		1980	1960	99	1980	1990	100	2	24-134/30
193-39-5	Indeno(1,2,3-cd)pyrene	ND		1980	2040	103	1980	1810	91	12	26-153/30
90-12-0	1-Methylnaphthalene	269		1980	1790	77	1980	2040	89	13	21-130/30
91-57-6	2-Methylnaphthalene	373		1980	1920	78	1980	2240	94	15	10-148/30
91-20-3	Naphthalene	93.4		1980	1580	75	1980	1920	92	19	27-130/30
85-01-8	Phenanthrene	225		1980	2210	100	1980	2170	98	2	38-130/30
129-00-0	Pyrene	ND		1980	2130	108	1980	1990	100	7	53-130/30

CAS No.	Surrogate Recoveries	MS	MSD	D60931-1	Limits
321-60-8	2-Fluorobiphenyl	95%	104%	92%	30-130%
4165-60-0	Nitrobenzene-d5	75%	88%	74%	19-130%
1718-51-0	Terphenyl-d14	105%	91%	98%	40-130%

\* = Outside of Control Limits.



## GC Semi-volatiles

### QC Data Summaries

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Includes the following where applicable:

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

Method Blank Summary

Job Number: D60931  
Account: COCSCOG Olsson Associates - Denver  
Project: CM Production-S.J. Warren #1

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP10452-MB	FH024706.D	1	08/20/14	JS	08/20/14	OP10452	GFH1116

The QC reported here applies to the following samples: Method: SW846-8015B  
D60931-1, D60931-2, D60931-3, D60931-4, D60931-5

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	84% 20-130%

## Method Blank Summary

Page 1 of 1

**Job Number:** D60931  
**Account:** COCSCOG Olsson Associates - Denver  
**Project:** CM Production-S.J. Warren #1

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP10460-MB	FH024779.D	1	08/21/14	JS	08/21/14	OP10460	GFH1117

The QC reported here applies to the following samples:

Method: SW846-8015B

D60931-7

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	95% 20-130%

8.1.2

8

## Blank Spike Summary

Page 1 of 1

**Job Number:** D60931  
**Account:** COCSCOG Olsson Associates - Denver  
**Project:** CM Production-S.J. Warren #1

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP10452-BS	FH024708.D	1	08/20/14	JS	08/20/14	OP10452	GFH1116

The QC reported here applies to the following samples:

Method: SW846-8015B

D60931-1, D60931-2, D60931-3, D60931-4, D60931-5

CAS No.	Compound	Spike mg/kg	BSP mg/kg	BSP %	Limits
	TPH-DRO (C10-C28)	167	117	70	42-130

CAS No.	Surrogate Recoveries	BSP	Limits
84-15-1	o-Terphenyl	95%	20-130%

\* = Outside of Control Limits.

## Blank Spike Summary

Page 1 of 1

**Job Number:** D60931  
**Account:** COCSCOG Olsson Associates - Denver  
**Project:** CM Production-S.J. Warren #1

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP10460-BS	FH024781.D	1	08/21/14	JS	08/21/14	OP10460	GFH1117

The QC reported here applies to the following samples:

Method: SW846-8015B

D60931-7

CAS No.	Compound	Spike mg/kg	BSP mg/kg	BSP %	Limits
	TPH-DRO (C10-C28)	167	91.1	55	42-130

CAS No.	Surrogate Recoveries	BSP	Limits
84-15-1	o-Terphenyl	81%	20-130%

\* = Outside of Control Limits.

# Matrix Spike/Matrix Spike Duplicate Summary

Page 1 of 1

**Job Number:** D60931  
**Account:** COCSCOG Olsson Associates - Denver  
**Project:** CM Production-S.J. Warren #1

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP10452-MS	FH024710.D	1	08/20/14	JS	08/20/14	OP10452	GFH1116
OP10452-MSD	FH024712.D	1	08/20/14	JS	08/20/14	OP10452	GFH1116
D60931-5	FH024773.D	1	08/21/14	JS	08/20/14	OP10452	GFH1117

The QC reported here applies to the following samples:

Method: SW846-8015B

D60931-1, D60931-2, D60931-3, D60931-4, D60931-5

CAS No.	Compound	D60931-5 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		186	108	58	186	97.7	52	10	20-150/30

CAS No.	Surrogate Recoveries	MS	MSD	D60931-5	Limits
84-15-1	o-Terphenyl	83%	81%	75%	20-130%

\* = Outside of Control Limits.

# Matrix Spike/Matrix Spike Duplicate Summary

Page 1 of 1

**Job Number:** D60931  
**Account:** COCSCOG Olsson Associates - Denver  
**Project:** CM Production-S.J. Warren #1

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP10460-MS	FH024783.D	1	08/21/14	JS	08/21/14	OP10460	GFH1117
OP10460-MSD	FH024785.D	1	08/21/14	JS	08/21/14	OP10460	GFH1117
D61056-2	FH024809.D	1	08/22/14	JJ	08/21/14	OP10460	GFH1119

The QC reported here applies to the following samples:

Method: SW846-8015B

D60931-7

CAS No.	Compound	D61056-2 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		190	114	60	190	108	57	5	20-150/30

CAS No.	Surrogate Recoveries	MS	MSD	D61056-2	Limits
84-15-1	o-Terphenyl	81%	78%	70%	20-130%

\* = Outside of Control Limits.

## Metals Analysis

### QC Data Summaries

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Includes the following where applicable:

- Method Blank Summaries
- Matrix Spike and Duplicate Summaries
- Blank Spike and Lab Control Sample Summaries
- Serial Dilution Summaries



BLANK RESULTS SUMMARY  
Part 2 - Method Blanks

Login Number: D60931  
Account: COCSCOG - Olsson Associates - Denver  
Project: CM Production-S.J. Warren #1

QC Batch ID: MP13714  
Matrix Type: SOLID

Methods: SW846 6010C  
Units: mg/kg

Prep Date: 08/14/14

Metal	RL	IDL	MDL	MB raw	final
Aluminum	10	.86	1.8		
Antimony	3.0	.21	.5		
Arsenic	2.5	.38	.63		
Barium	1.0	.02	.36		
Beryllium	1.0	.08	.06		
Boron	5.0	.08	.16		
Cadmium	1.0	.02	.28		
Calcium	40	.22	6.8		
Chromium	1.0	.03	.03		
Cobalt	0.50	.04	.039		
Copper	1.0	.08	.13		
Iron	7.0	.15	1.8	2.2	<7.0
Lead	5.0	.21	.25		
Lithium	0.50	.04	.13		
Magnesium	20	.68	1.8		
Manganese	0.50	.001	.038		
Molybdenum	1.0	.04	.13		
Nickel	3.0	.05	.07		
Phosphorus	10	1.5	1.2		
Potassium	200	9.9	12	7.5	<200
Selenium	5.0	.71	1.1		
Silicon	5.0	.47	1.1		
Silver	3.0	.03	.05		
Sodium	40	.49	3.7		
Strontium	5.0	.001	.022		
Thallium	1.0	.18	.46		
Tin	5.0	1.2	2.3		
Titanium	1.0	.01	.46		
Uranium	5.0	.29	.31		
Vanadium	1.0	.04	.043		
Zinc	3.0	.04	.16		

Associated samples MP13714: D60931-2, D60931-3, D60931-4, D60931-5, D60931-6

Results < IDL are shown as zero for calculation purposes  
(\*) Outside of QC limits

BLANK RESULTS SUMMARY  
Part 2 - Method Blanks

Login Number: D60931  
Account: COCSCOG - Olsson Associates - Denver  
Project: CM Production-S.J. Warren #1

QC Batch ID: MP13714  
Matrix Type: SOLID

Methods: SW846 6010C  
Units: mg/kg

Prep Date: 08/14/14

Metal	RL	IDL	MDL	MB raw	final
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(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D60931  
 Account: COCSCOG - Olsson Associates - Denver  
 Project: CM Production-S.J. Warren #1

QC Batch ID: MP13714  
 Matrix Type: SOLID

Methods: SW846 6010C  
 Units: mg/kg

Prep Date: 08/14/14

Metal	D60728-1 Original MS	Spikelot ICPAL2	% Rec	QC Limits
Aluminum				
Antimony				
Arsenic	anr			
Barium	anr			
Beryllium				
Boron				
Cadmium	anr			
Calcium				
Chromium	anr			
Cobalt				
Copper				
Iron	27100	27400	1430	21.0 (a) 75-125
Lead	anr			
Lithium				
Magnesium				
Manganese				
Molybdenum				
Nickel				
Phosphorus	anr			
Potassium	3920	9260	7150	74.7N(b) 75-125
Selenium	anr			
Silicon				
Silver	anr			
Sodium				
Strontium				
Thallium				
Tin				
Titanium				
Uranium	anr			
Vanadium				
Zinc				

Associated samples MP13714: D60931-2, D60931-3, D60931-4, D60931-5, D60931-6

Results < IDL are shown as zero for calculation purposes  
 (\*) Outside of QC limits

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D60931  
 Account: COCSCOG - Olsson Associates - Denver  
 Project: CM Production-S.J. Warren #1

QC Batch ID: MP13714  
 Matrix Type: SOLID

Methods: SW846 6010C  
 Units: mg/kg

Prep Date: 08/14/14

Metal	D60728-1 Original MS	Spikelot ICPALL2	% Rec	QC Limits
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(N) Matrix Spike Rec. outside of QC limits

(anr) Analyte not requested

(a) Spike amount low relative to the sample amount. Refer to lab control or spike blank for recovery information.

(b) Spike recovery indicates possible matrix interference.

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D60931  
 Account: COCSCOG - Olsson Associates - Denver  
 Project: CM Production-S.J. Warren #1

QC Batch ID: MP13714  
 Matrix Type: SOLID

Methods: SW846 6010C  
 Units: mg/kg

Prep Date: 08/14/14

Metal	D60728-1 Original	MSD	Spikelot ICPALL2	% Rec	MSD RPD	QC Limit
Aluminum						
Antimony						
Arsenic	anr					
Barium	anr					
Beryllium						
Boron						
Cadmium	anr					
Calcium						
Chromium	anr					
Cobalt						
Copper						
Iron	27100	25500	1490	-107.6(a	7.2	20
Lead	anr					
Lithium						
Magnesium						
Manganese						
Molybdenum						
Nickel						
Phosphorus	anr					
Potassium	3920	9550	7430	75.7	3.1	20
Selenium	anr					
Silicon						
Silver	anr					
Sodium						
Strontium						
Thallium						
Tin						
Titanium						
Uranium	anr					
Vanadium						
Zinc						

Associated samples MP13714: D60931-2, D60931-3, D60931-4, D60931-5, D60931-6

Results < IDL are shown as zero for calculation purposes  
 (\*) Outside of QC limits

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D60931  
 Account: COCSCOG - Olsson Associates - Denver  
 Project: CM Production-S.J. Warren #1

QC Batch ID: MP13714  
 Matrix Type: SOLID

Methods: SW846 6010C  
 Units: mg/kg

Prep Date: 08/14/14

Metal	D60728-1 Original MSD	Spikelot ICPALL2	% Rec	MSD RPD	QC Limit
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(N) Matrix Spike Rec. outside of QC limits

(anr) Analyte not requested

(a) Spike amount low relative to the sample amount. Refer to lab control or spike blank for recovery information.

## SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D60931

Account: COCSCOG - Olsson Associates - Denver

Project: CM Production-S.J. Warren #1

QC Batch ID: MP13714

Methods: SW846 6010C

Matrix Type: SOLID

Units: mg/kg

Prep Date:

08/14/14

Metal	BSP Result	Spikelot ICPALL2	% Rec	QC Limits
Aluminum				
Antimony				
Arsenic	anr			
Barium	anr			
Beryllium				
Boron				
Cadmium	anr			
Calcium				
Chromium	anr			
Cobalt				
Copper				
Iron	469	500	93.8	80-120
Lead	anr			
Lithium				
Magnesium				
Manganese				
Molybdenum				
Nickel				
Phosphorus	anr			
Potassium	2320	2500	92.8	80-120
Selenium	anr			
Silicon				
Silver	anr			
Sodium				
Strontium				
Thallium				
Tin				
Titanium				
Uranium	anr			
Vanadium				
Zinc				

Associated samples MP13714: D60931-2, D60931-3, D60931-4, D60931-5, D60931-6

Results &lt; IDL are shown as zero for calculation purposes

(\*) Outside of QC limits

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D60931  
Account: COCSCOG - Olsson Associates - Denver  
Project: CM Production-S.J. Warren #1

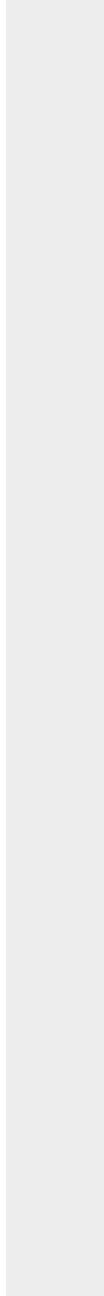
QC Batch ID: MP13714  
Matrix Type: SOLID

Methods: SW846 6010C  
Units: mg/kg

Prep Date: 08/14/14

Metal	BSP Result	Spikelot ICPALL2	% Rec	QC Limits
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(anr) Analyte not requested





# SERIAL DILUTION RESULTS SUMMARY

Login Number: D60931  
 Account: COCSCOG - Olsson Associates - Denver  
 Project: CM Production-S.J. Warren #1

QC Batch ID: MP13714  
 Matrix Type: SOLID

Methods: SW846 6010C  
 Units: ug/l

Prep Date: 08/14/14

Metal	D60728-1 Original	SDL 1:5	%DIF	QC Limits
Aluminum				
Antimony				
Arsenic	anr			
Barium	anr			
Beryllium				
Boron				
Cadmium	anr			
Calcium				
Chromium	anr			
Cobalt				
Copper				
Iron	92900	105000	12.8*(a)	0-10
Lead	anr			
Lithium				
Magnesium				
Manganese				
Molybdenum				
Nickel				
Phosphorus	anr			
Potassium	13400	14500	8.1	0-10
Selenium	anr			
Silicon				
Silver	anr			
Sodium				
Strontium				
Thallium				
Tin				
Titanium				
Uranium	anr			
Vanadium				
Zinc				

Associated samples MP13714: D60931-2, D60931-3, D60931-4, D60931-5, D60931-6

Results < IDL are shown as zero for calculation purposes  
 (\*) Outside of QC limits

SERIAL DILUTION RESULTS SUMMARY

Login Number: D60931  
 Account: COCSCOG - Olsson Associates - Denver  
 Project: CM Production-S.J. Warren #1

QC Batch ID: MP13714  
 Matrix Type: SOLID

Methods: SW846 6010C  
 Units: ug/l

Prep Date: 08/14/14

Metal	D60728-1	QC
	Original SDL 1:5 %DIF	Limits

(anr) Analyte not requested  
 (a) Serial dilution indicates possible matrix interference.

9.1.4

9

BLANK RESULTS SUMMARY  
Part 2 - Method Blanks

Login Number: D60931  
Account: COCSCOG - Olsson Associates - Denver  
Project: CM Production-S.J. Warren #1

QC Batch ID: MP13744  
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60  
Units: ug/l

Prep Date: 08/18/14

Metal	RL	IDL	MDL	MB raw	final
Aluminum	500	55	210		
Antimony	150	11	95		
Arsenic	130	19	28		
Barium	50	1	7		
Beryllium	50	4.5	6		
Boron	250	4	33		
Cadmium	50	1	1.8		
Calcium	2000	12	210	28.5	<2000
Chromium	50	1.5	2		
Cobalt	25	2.5	2.9		
Copper	50	4	9.5		
Iron	350	7.5	48		
Lead	250	11	110		
Lithium	25	2	14		
Magnesium	1000	34	95	19.0	<1000
Manganese	25	2.5	2.3		
Molybdenum	50	2	4.2		
Nickel	150	2.5	4.4		
Phosphorus	500	75	100		
Potassium	5000	500	1400		
Selenium	250	36	55		
Silicon	250	24	26		
Silver	150	1.5	3		
Sodium	2000	37	850	-270	<2000
Strontium	25	.05	.6		
Thallium	50	9	20		
Tin	250	60	80		
Titanium	50	.5	11		
Uranium	250	15	28		
Vanadium	50	2	2		
Zinc	150	2	16		

Associated samples MP13744: D60931-1A, D60931-2A, D60931-3A, D60931-4A, D60931-5A

Results < IDL are shown as zero for calculation purposes  
(\*) Outside of QC limits

BLANK RESULTS SUMMARY  
Part 2 - Method Blanks

Login Number: D60931  
Account: COCSCOG - Olsson Associates - Denver  
Project: CM Production-S.J. Warren #1

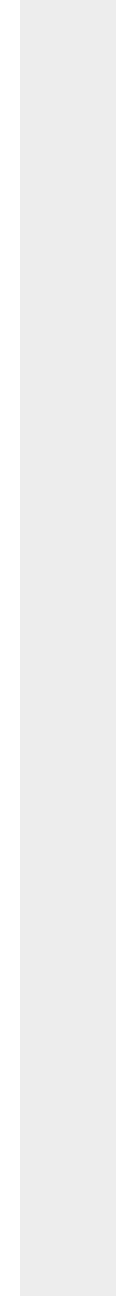
QC Batch ID: MP13744  
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60  
Units: ug/l

Prep Date: 08/18/14

Metal	RL	IDL	MDL	MB raw	final
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(anr) Analyte not requested



MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D60931  
 Account: COCSCOG - Olsson Associates - Denver  
 Project: CM Production-S.J. Warren #1

QC Batch ID: MP13744  
 Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60  
 Units: ug/l

Prep Date: 08/18/14

Metal	D60931-5A Original MS		Spikelot ICPALL2	% Rec	QC Limits
Aluminum					
Antimony					
Arsenic					
Barium					
Beryllium					
Boron					
Cadmium					
Calcium	31300	170000	125000	111.0	75-125
Chromium					
Cobalt					
Copper					
Iron					
Lead					
Lithium					
Magnesium	14600	149000	125000	107.5	75-125
Manganese					
Molybdenum					
Nickel					
Phosphorus					
Potassium					
Selenium					
Silicon					
Silver					
Sodium	177000	317000	125000	112.0	75-125
Strontium					
Thallium					
Tin					
Titanium					
Uranium					
Vanadium					
Zinc					

Associated samples MP13744: D60931-1A, D60931-2A, D60931-3A, D60931-4A, D60931-5A

Results < IDL are shown as zero for calculation purposes  
 (\*) Outside of QC limits

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D60931  
 Account: COCSCOG - Olsson Associates - Denver  
 Project: CM Production-S.J. Warren #1

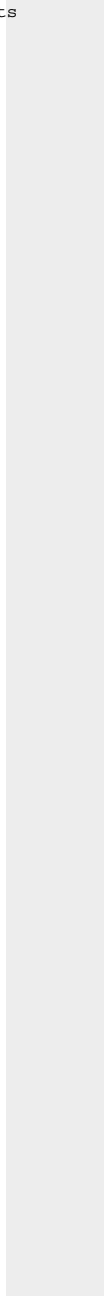
QC Batch ID: MP13744  
 Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60  
 Units: ug/l

Prep Date: 08/18/14

Metal	D60931-5A Original MS	Spikelot ICPALL2 % Rec	QC Limits
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(N) Matrix Spike Rec. outside of QC limits  
 (anr) Analyte not requested



MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D60931  
 Account: COCSCOG - Olsson Associates - Denver  
 Project: CM Production-S.J. Warren #1

QC Batch ID: MP13744  
 Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60  
 Units: ug/l

Prep Date: 08/18/14

Metal	D60931-5A Original	MSD	Spikelot ICPALL2	% Rec	MSD RPD	QC Limit
Aluminum						
Antimony						
Arsenic						
Barium						
Beryllium						
Boron						
Cadmium						
Calcium	31300	166000	125000	107.8	2.4	20
Chromium						
Cobalt						
Copper						
Iron						
Lead						
Lithium						
Magnesium	14600	147000	125000	105.9	1.4	20
Manganese						
Molybdenum						
Nickel						
Phosphorus						
Potassium						
Selenium						
Silicon						
Silver						
Sodium	177000	308000	125000	104.8	2.9	20
Strontium						
Thallium						
Tin						
Titanium						
Uranium						
Vanadium						
Zinc						

Associated samples MP13744: D60931-1A, D60931-2A, D60931-3A, D60931-4A, D60931-5A

Results < IDL are shown as zero for calculation purposes  
 (\*) Outside of QC limits

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D60931  
 Account: COCSCOG - Olsson Associates - Denver  
 Project: CM Production-S.J. Warren #1

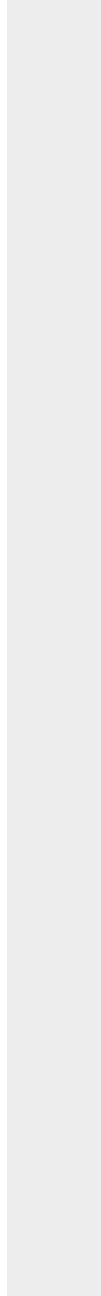
QC Batch ID: MP13744  
 Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60  
 Units: ug/l

Prep Date: 08/18/14

Metal	D60931-5A Original MSD	Spikelet ICPALL2 % Rec	MSD RPD	QC Limit
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(N) Matrix Spike Rec. outside of QC limits  
 (anr) Analyte not requested





## SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D60931

Account: COCSCOG - Olsson Associates - Denver

Project: CM Production-S.J. Warren #1

QC Batch ID: MP13744

Methods: SW846 6010C, USDA HANDBOOK 60

Matrix Type: AQUEOUS

Units: ug/l

Prep Date:

08/18/14

Metal	BSP Result	Spikelot ICPALL2	% Rec	QC Limits
Aluminum				
Antimony				
Arsenic				
Barium				
Beryllium				
Boron				
Cadmium				
Calcium	135000	125000	108.0	80-120
Chromium				
Cobalt				
Copper				
Iron				
Lead				
Lithium				
Magnesium	134000	125000	107.2	80-120
Manganese				
Molybdenum				
Nickel				
Phosphorus				
Potassium				
Selenium				
Silicon				
Silver				
Sodium	135000	125000	108.0	80-120
Strontium				
Thallium				
Tin				
Titanium				
Uranium				
Vanadium				
Zinc				

Associated samples MP13744: D60931-1A, D60931-2A, D60931-3A, D60931-4A, D60931-5A

Results &lt; IDL are shown as zero for calculation purposes

(\*) Outside of QC limits

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D60931  
Account: COCSCOG - Olsson Associates - Denver  
Project: CM Production-S.J. Warren #1

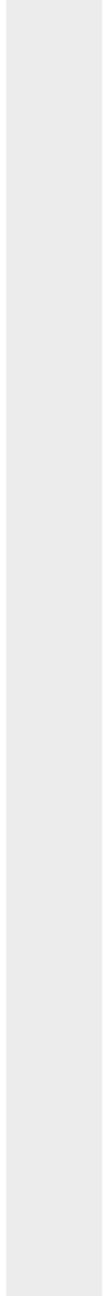
QC Batch ID: MP13744  
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60  
Units: ug/l

Prep Date: 08/18/14

Metal	BSP Result	Spikelot ICPALL2	% Rec	QC Limits
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(anr) Analyte not requested



# SERIAL DILUTION RESULTS SUMMARY

Login Number: D60931  
 Account: COCSCOG - Olsson Associates - Denver  
 Project: CM Production-S.J. Warren #1

QC Batch ID: MP13744  
 Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60  
 Units: ug/l

Prep Date: 08/18/14

Metal	D60931-5A		QC	
	Original	SDL 1:5	%DIF	Limits
Aluminum				
Antimony				
Arsenic				
Barium				
Beryllium				
Boron				
Cadmium				
Calcium	6260	6150	1.8	0-10
Chromium				
Cobalt				
Copper				
Iron				
Lead				
Lithium				
Magnesium	2930	3080	5.2	0-10
Manganese				
Molybdenum				
Nickel				
Phosphorus				
Potassium				
Selenium				
Silicon				
Silver				
Sodium	35400	36300	2.6	0-10
Strontium				
Thallium				
Tin				
Titanium				
Uranium				
Vanadium				
Zinc				

Associated samples MP13744: D60931-1A, D60931-2A, D60931-3A, D60931-4A, D60931-5A

Results < IDL are shown as zero for calculation purposes  
 (\*) Outside of QC limits

SERIAL DILUTION RESULTS SUMMARY

Login Number: D60931  
Account: COCSCOG - Olsson Associates - Denver  
Project: CM Production-S.J. Warren #1

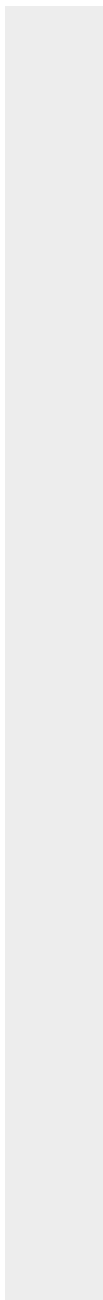
QC Batch ID: MP13744  
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60  
Units: ug/l

Prep Date: 08/18/14

D60931-5A				QC
Metal	Original	SDL 1:5	%DIF	Limits

(anr) Analyte not requested



## General Chemistry

### QC Data Summaries

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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: D60931  
Account: COCSCOG - Olsson Associates - Denver  
Project: CM Production-S.J. Warren #1

Analyte	Batch ID	RL	MB Result	Units	Spike Amount	BSP Result	BSP %Recov	QC Limits
Chloride	GP13294/GN26035	5.0	0.0	mg/kg	50	49.0	98.0	90-110%
Nitrogen, Nitrate	GP13294/GN26035	0.45	0.0	mg/kg	1	1.05	105.0	90-110%
Nitrogen, Nitrite	GP13294/GN26035	0.61	0.0	mg/kg	0.5	0.512	102.4	90-110%
Specific Conductivity	GP13314/GN26083			umhos/cm	10000	9920	99.2	90-110%
Sulfate	GP13294/GN26035	5.0	0.0	mg/kg	50	50.4	100.8	90-110%
pH	GN26016			su	8.00	7.96	99.5	99.1-100.9%
pH	GN26016			su	8.00	8.02	100.2	99.1-100.9%

Associated Samples:

Batch GN26016: D60931-1, D60931-2, D60931-3, D60931-4, D60931-5, D60931-7

Batch GP13294: D60931-6

Batch GP13314: D60931-1, D60931-2, D60931-3, D60931-4, D60931-5, D60931-7

(\*) Outside of QC limits

MATRIX SPIKE RESULTS SUMMARY  
GENERAL CHEMISTRY

Login Number: D60931  
Account: COCSCOG - Olsson Associates - Denver  
Project: CM Production-S.J. Warren #1

Analyte	Batch ID	QC Sample	Units	Original Result	Spike Amount	MS Result	%Rec	QC Limits
Chloride	GP13294/GN26035	D60736-1	mg/kg	1030	309	1340	100.4	80-120%
Nitrogen, Nitrate	GP13294/GN26035	D60736-1	mg/kg	0.0	6.17	7.3	118.3	80-120%
Nitrogen, Nitrite	GP13294/GN26035	D60736-1	mg/kg	0.0	3.09	3.3	106.9	80-120%
Phosphate, Ortho	GP13294/GN26035	D60736-1	mg/kg	0.0	30.9	37.0	119.9	80-120%
Sulfate	GP13294/GN26035	D60736-1	mg/kg	1250	309	1540	94.0	80-120%

Associated Samples:

Batch GP13294: D60931-6

(\*) Outside of QC limits

(N) Matrix Spike Rec. outside of QC limits

MATRIX SPIKE DUPLICATE RESULTS SUMMARY  
GENERAL CHEMISTRY

Login Number: D60931  
Account: COCSCOG - Olsson Associates - Denver  
Project: CM Production-S.J. Warren #1

Analyte	Batch ID	QC Sample	Units	Original Result	Spike Amount	MSD Result	RPD	QC Limit
Chloride	GP13294/GN26035	D60736-1	mg/kg	1030	309	1340	0.0	20%
Nitrogen, Nitrate	GP13294/GN26035	D60736-1	mg/kg	0.0	6.17	7.1	2.8	20%
Nitrogen, Nitrite	GP13294/GN26035	D60736-1	mg/kg	0.0	3.09	3.4	3.0	20%
Phosphate, Ortho	GP13294/GN26035	D60736-1	mg/kg	0.0	30.9	36.9	0.3	20%
Sulfate	GP13294/GN26035	D60736-1	mg/kg	1250	309	1540	0.0	20%

Associated Samples:

Batch GP13294: D60931-6

(\*) Outside of QC limits

(N) Matrix Spike Rec. outside of QC limits



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# **APPENDIX C**

## **EXCAVATION PHOTOGRAPHS**



**Subject:** S.J. Warren Sign at the tank battery and soil excavation stockpile of un-impacted over burden.

**Date:** 08/13/2014

**View:** Northeast



**Subject:** A plastic lined containment cell was constructed for the impacted soils excavated from the former skim pit.

**Date:** 08/13/2014

**View:** South



**Subject:** The plastic lined containment for the impacted soils was located on the north side of the vertical treater berm at the S.J. Warren tank battery location.

**Date:** 08/13/2014

**View:** North - Northeast





**Subject:** An Ingersoll Rand trackhoe excavator was used to excavate the impacted soil from the former skim pit at the S.J. Warren site.

**Date:** 08/13/2014

**View:** North-Northeast



**Subject:** The former skim pit was located on the south side of the former skim tank and on the west side of the produced water pit.

**Date:** 08/13/2014

**View:** North



**Subject:** Gray stained soils were observed within the former skim pit.

**Date:** 08/13/2014

**View:** North





**Subject:** The excavation of the former skim pit was advanced to a maximum depth of 19 feet on the east side closest to the active produced water pit. Olive gray staining was observed in the soils in the sidewalls and base of the excavation.

**Date:** 08/13/2014

**View:** Northwest



**Subject:** Olive gray staining was noted in some of the soils in the excavation. Impacted materials were excavated from the former S.J. Warren skim pit and were placed in the lined secondary containment cell pending treatment.

**Date:** 08/13/2014

**View:** Northwest



**Subject:** Stratified, sandy shale was encountered in the bottom east side of the excavation at approximately 19 feet below ground surface. Odor and staining diminished at this depth.

**Date:** 08/13/2014

**View:** N/A





**Subject:** Photograph shows the north and west sidewalls of the excavation.

**Date:** 08/13/2014

**View:** West



**Subject:** Photograph shows the impacted soil stockpile.

**Date:** 08/13/2014

**View:** West

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# **APPENDIX D**

## **FIELD FORM**

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# SITE FIELD FORM

Site Name: \_\_\_\_\_ Date: \_\_\_\_\_

Weather Conditions: \_\_\_\_\_

Temperature at time of Inspection: \_\_\_\_\_

Evidence of recent precipitation? ☐ Yes ☐ No (If Yes – Indicate amount in inches if known) \_\_\_\_\_

1. Storm Water Best Management Practices (BMPs) installed and functioning properly?

☐ Yes ☐ No (If No, please describe BMP installation needed or corrective action below)

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2. Is there evidence of exploration and production (E&P) waste or impacted soils leaving the surface impoundment in stormwater runoff?

☐ Yes ☐ No (If Yes, please indicate the location of the spill/release)

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3. When was the last time the impacted soil/E&P wastes were treated and tilled or turned?

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4. Were any soil samples collected and submitted for laboratory analysis of the Colorado Oil and Gas Conservation Commission (COGCC) Table 910-1 soil parameters?

☐ Yes ☐ No (If Yes, please include laboratory results)

5. If a spill or release occurred were any agencies/individuals required to be notified?

☐ Yes ☐ No (If Yes, please indicate which agencies were notified below)

☐ COGCC ☐ Local Emergency Planning Committee ☐ County Sheriff

☐ CDPHE ☐ Emergency Services ☐ Surface Owner ☐ Property Owners