

**CM Production, LLC
S.J. Warren #1 Skim Pit Assessment
COGCC Remediation Project #8179**

**Hyde Field, Washington County,
Colorado**

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1.0 Introduction

CM Production, LLC (CM Production), Operator # 10352, retained Olsson Associates, Inc. (Olsson) to perform a limited subsurface investigation of a former skim pit located at the S.J. Warren #1 tank battery (Site), Facility ID #234892, located in the Northwest ¼ of the Southwest ¼ of Section 11, Township 2 North, Range 49 West of the 6th Principal Meridian. The site is located approximately one-third of a mile north of Highway 34, on Washington County Road YY, and is approximately two miles west of the town of Yuma, Colorado. A site location map is provided as Figure 1.

1.1 S.J. Warren #1 Skim Pit Background

According to the Colorado Oil and Gas Conservation Commission (COGCC) online documents, the S.J. Warren #1 oil well was drilled and completed in March 1955. The COGCC records indicate that there are three pits associated with the S.J. Warren #1 site that were permitted by EMV Company, a former operator of the site. The Facility ID numbers associated with these pits are listed as 102615, 102621, and 102622. The status date is listed as September 23, 1999, and the coordinates listed for all three pits are given as 40.153156 N Latitude and -102.829809 W Longitude. These coordinates plot out in the farmed field to the northeast of the tank battery and existing produced water pit.

CM Production purchased the S.J. Warren #1 site from Delta Petroleum Corporation in 2010. According to the COGCC Change of Operator form, the transaction was effective on May 1, 2010, and filed a Form 10 Change of Operator form that was signed by John Teff, with CM Production on October 7, 2010, James Berger with Hyndrex Resources, a contract pumper on February 21, 2011, and COGCC Director David Neslin on April 13, 2011.

The COGCC reviewed a 2009 aerial photograph of the Site (Figure 2), located on the COGCC database website, indicated a pit ("skim pit") was present on the west side of the produced water pit, and south of the produced water tank. Documentation located in the COGCC database records indicates CM Production acquired the Site in October 2010 and therefore did not construct skim pit. CM Production has indicated they did not operate the aforementioned skim pit.

1.2 Complaint

A complaint (document # 200390828) was filed by Mr. Ted Parks, a former CM Production employee, on December 2, 2013. Mr. John Noto, COGCC Northeast Region Environmental Protection Specialist, conducted a telephone conversation with Mr. Parks on 11/11/2013. The complaint alleged that John Teff, Business Manager of CM Production directed Mr. Parks to pump water and leave oil and mud in the skim pit and bury a skim pit at the production facility. The former employee indicated that no

samples were collected, that oily exploration and production (E&P) waste was in the pit, and a Form 27 (Remediation Workplan) was not filled out prior to closure of the pit.

1.3 Approved Workplan

On January 29, 2014 Olsson submitted a Form 27 workplan for the assessment and remediation of the skim pit at the S.J. Warren #1 site. The workplan was conditionally approved by Mr. Noto of the COGCC and assigned document #2147593. The COGCC assigned the remediation number (REM) 8179 for the Site.

The COGCC conditions included signing the Form 27 and re-submitting to the COGCC, notifying Mr. John Noto at least 24 hours prior to conducting the excavation work. Soil sample results were to be submitted to the COGCC prior to backfilling the excavation and items submitted to document the remediation were to include an analytical summary sheet/table comparing the soil analytical results with the COGCC Table 910-1 concentration levels. Also to be submitted was a sample location diagram with the final excavation dimensions, the full laboratory analytical report, the volume of soil excavated for disposal or treatment, and waste transportation documentation per Rule 907 (if applicable). If land treatment was the planned remedy for treating the soils to meet the Table 910-1 concentration levels, a Form 27 workplan was requested for prior approval per Rule 907 e. (2) (if applicable). This report is submitted by Olsson on behalf of C.M. Production to satisfy some of these requirements in part, or in whole.

1.4 Assessment Preparations

Prior to conducting the assessment of the former skim pit at the S.J. Warren #1, Olsson called for buried utility locates by contacting the Utility Notification Center of Colorado. The utility locates were requested under locate ticket # A407800370 and were completed on Friday, March 21, 2014. Olsson sent an email to John Noto and to Kym Schure on March 22, 2014 to notify the COGCC that the assessment work at the S.J. Warren skim pit would be conducted on March 27, 2014.

Work was to begin at the Oliver Warren #1 location (also owned by C.M. Production) and utility locates were requested under ticket #A407800359. Olsson received an automated confirmation email that indicated that Century Link, Petron Development, Tallgrass Interstate Gas, and Y-W Electric were clear and that there were no conflicts at either location.

Olsson prepared a site health and safety plan for the assessment work to be conducted in the reported skim pit areas at the Oliver Warren #1 and the S.J. Warren. A tailgate safety meeting was held onsite prior to initiating the excavation work. An assessment report for the Oliver Warren #1 skim pits has been prepared and submitted to the COGCC under a separate cover.

2.0 S.J. Warren Skim Pit Assessment

Olsson personnel met with CM Production's excavation contractor, Mr. Justin Crow, onsite on Thursday, March 27, 2014 to conduct the subsurface investigation of the former skim pit. Mr. Sam Spears, CM Production's contract pumper, stopped by the Oliver Warren site on March 27, 2014 to inform Olsson and Justin Crow, of the location of produced water lines from the vertical separator to the skim tank and produced water pit. Mr. Spears said that the produced water flow line from the vertical separator to 300-barrel capacity produced water AST was to the north and that there should not be any conflicts with the excavation of the former skim pit location indicated to the south of the 300-barrel tank.

A review of aerial photographs by Mr. Noto, COGCC Northeast Environmental Protection Specialist, revealed a skim pit was present in 2009 but not present in 2011. According to the complaint made by Mr. Parks, the pit was reportedly buried in 2011. Mr. Noto conducted an inspection of the Site on November 20, 2013. No skim pit was observed onsite and no documents for pit closure were found in the COGCC database. Mr. Noto was present for the assessment of the former skim pits at the Oliver Warren #1 conducted on the morning of March 27, 2014 by Olsson and left to conduct inspections of other well sites in the area. Mr. Noto returned to the Site to observe the conclusion of Olsson's assessment activities, document the collection and locations of the soil samples, and information that indicated the presence of E&P wastes buried in the former pit.

2.1 Field Screening

Olsson personnel headspace screened soils in the field using a Thermo Environmental Instruments photoionization detector (PID). Prior to screening the PID was zeroed to ambient air, and calibrated using 100 part per million (ppm) concentration isobutylene span gas in air. The PID calibrated to 100 ppm and recorded in the bound field logbook. The PID was used to assess for the presence of elevated volatile organic compounds in the breathing zone; however, these readings were consistent with background levels which were also recorded in the field logbook. The PID was used to headspace screen soils in sealable plastic bags to assess for desorbed volatile organic compounds. The PID readings are shown in Table 1.

2.2 Soil Sampling

Mr. Justin Crow used a John Deere 310 SJ extendable backhoe to conduct the assessment of the former pit. Olsson directed Mr. Crow to excavate trenches to define the vertical and lateral extent of the impacted soils in order to assess future remediation of the E&P wastes and impacted soils. This included excavating trenches in the areas of the four side walls where the 2009 COGCC aerial photograph indicated that the former skim pit was located, excavation to a depth below materials that exhibited elevated PID readings or evidence of E&P wastes or soil impacts.

Soil samples were selected for laboratory analysis on the basis of the highest headspace screened PID reading, evidence of staining and hydrocarbon odor, or the sample from the bottom of the trench excavation. These soil samples were placed into laboratory-provided sample jars, labeled with the location, depth, requested parameters, and stored in a cooler on ice pending delivery to the laboratory. A chain-of-custody was filled out for the soil samples and identified the parameters requested for analysis as defined by the COGCC Table 910-1 soil parameters. Maps showing the locations of the trenches and soil analytical results for samples collected in the former skim pit are included as Figure 4, Figure 5, and Figure 6.

The former skim pit was estimated to measure approximately 25 feet by 25 feet, and was located to the west of an earthen berm surrounding the produced water pit, and to the south of an earthen berm surrounding the 300-barrel capacity produced water AST.

Trenches were excavated to assess the side walls and base in the area of the former pit:

- On the east side wall of the former skim pit, near the earthen berm for the produced water pit
- On the north side wall of the former skim pit near the 300-barrel produced water AST earthen berm
- On the south side wall of the former skim pit parallel to south berm of the produced water pit; and
- On the west side wall of the former skim pit near the produced water tank stairs.

Soil samples were also collected from these locations and submitted for laboratory analysis of the COGCC Table 910-1 soil parameters.

Groundwater was not encountered in any of the trenches. Olsson reviewed available water well records and the reported depth to groundwater in the vicinity of the site is more than 200 feet below ground surface (bgs).

2.3 Soil Sample Analyses

Soil samples were submitted for analysis utilizing the following analytes and laboratory analytical methods. Please note that selected analyses for individual samples varied depending on the sample location.

- Total petroleum hydrocarbons (TPH) as gasoline range organics (GRO) by EPA Method 8260, and diesel range organics by EPA modified Method 8015
- Benzene, toluene, ethylbenzene, and xylenes (BTEX) by EPA Method 8260
- Polycyclic aromatic hydrocarbons (PAHs) including acenaphthene, anthracene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, chrysene, dibenzo(a,h)anthracene, fluoranthene, fluorene,

indeno(1,2,3,c,d) pyrene, naphthalene, and pyrene by EPA Method 8270C-selective ion monitoring (SIM)

- Electrical Conductivity (EC) (also referred to as specific conductivity) by Method Standard Method (SM) 2510B-2011 modified
- Total metals concentrations for arsenic (EPA Method SW 846 6020A), barium, cadmium, chromium, copper, lead, nickel, selenium, silver, and zinc (EPA Method SW 846 6010C), and mercury by EPA Method 7471B
- Sodium adsorption ratio (SAR) by USDA Handbook 60 Method
- pH by SW 846 9045D

The soil samples were submitted for these analyses on a standard turn-around time from the laboratory. The laboratory results are summarized in Table 2 and Table 3. A copy of the Accutest laboratory report is provided in Appendix B.

2.4 Former Skim Pit Field Screening and Soil Sampling

The first trench was excavated on the east side of the former skim pit location as indicated in the 2009 aerial photograph, and along the west earthen berm of the produced water pit. Impacted soil was encountered at approximately 2.5 feet below ground surface (bgs) and extended to approximately 9 feet bgs.

The PID screening headspace reading were 92 parts per million (ppm) for stained soil collected at 2.5 feet, 165 ppm at 4 feet bgs, 268 ppm at 9 feet bgs, and 137 ppm at 10.5 feet bgs. Olsson collected a soil sample, CMSJW-SP @ 9E, at the 9 foot interval, which was submitted for BTEX, GRO, and DRO. Olsson also collected at soil sample, CMSJW-SP @ 10.5E, which was submitted for BTEX, GRO, DRO, and PAH. Excavation further to the east was limited by the produced water pit onsite.

Olsson then directed Mr. Crow to excavate a trench on the north side of the former skim pit area. Impacted soils were encountered at approximately 4.5 feet bgs as indicated by gray to black staining and hydrocarbon odor. The PID headspace reading at 4.5 feet bgs was 94 ppm, and the soils observed were clay and silty clay. The north trench was advanced to a maximum of 8 feet bgs and the PID headspace reading was recorded at 154 ppm. Soils consisted of silty clay and still exhibited some gray staining and hydrocarbon odor.

Olsson collected a soil sample, CMSJW-SP @ 4.5 N which was submitted for analysis of BTEX, GRO, DRO, PAH, total metals, pH, EC, and SAR. Olsson also collected a soil sample, CMSJW-SP @ 8N, which was submitted for laboratory analysis of BTEX, GRO, DRO, and PAH. Excavation further to the north was limited by the produced water tank and earthen berm; however, the trenches were excavated in the vicinity of where the former skim pit was shown on the 2009 aerial photograph.

Olsson directed Mr. Crow to excavate a trench in the area of the south wall of the former skim pit. The soils in this area did not exhibit any soil staining or odor from the surface

down to 8 feet bgs. The PID screening headspace reading was 15 ppm for soils collected from the 8 foot interval indicating the lateral and vertical extent of impacts were defined to the south. Olsson collected a soil sample, CMSJW-SP @ 8S, which was submitted for BTEX, GRO, DRO, and PAH analysis.

Olsson directed Mr. Crow to excavate soils from the area of the west side wall of the former skim pit. Petroleum hydrocarbon-impacted soils were encountered at approximately 4 feet bgs. The PID headspace reading was 86 ppm at 4 feet, and the soils consisted of sandy clay.

The PID headspace reading of a soil sample collected at 5 feet bgs was 204 ppm, and the soils consisted of clay and silty clay. The soils showed some gray staining and petroleum hydrocarbon odor. Olsson collected soil sample CMSJW-SP @ 5W which was submitted for laboratory analysis of BTEX, GRO, DRO, PAH, total metals, EC, pH, and SAR.

The PID headspace reading at 8 feet bgs was 20 ppm. Olsson collected soil sample CMSJW-SP @ 8W, which was submitted for laboratory analysis of BTEX, GRO, and DRO, and PAH.

Olsson delivered the soil samples to Accutest Mountain States Laboratories in Wheat Ridge, Colorado on March 28, 2014 and requested the samples be analyzed for the soil parameters listed in COGCC Table 910-1.

2.5 Background Soil Sampling and Analysis

Olsson personnel collected two background soil samples near the Oliver Warren #1 location, one (CMOW-BG1 @ 0.2) to the northeast of the produced water pit near the farmed field access road, and one (CMOW-BG2 @ 0.2) to the southeast of the Oliver Warren #1 tank battery near the farmed field. Both soil samples were collected from the surface to 0.2 feet bgs. Olsson also collected a background soil sample located to the north of the S.J. Warren skim tank and produced water pit (CMSJW-SP BG3). The background soil samples were submitted to the laboratory for analysis of the COGCC Table 910-1 total metals, EC, pH, and SAR.

3.0 Laboratory Analytical Results

The laboratory analytical results show that petroleum hydrocarbon constituents were reported in some of the soil samples at concentrations above their respective COGCC Table 910-1 concentration levels. A discussion of the laboratory results for the soil samples collected from each pit is presented below.

The laboratory results for soil sample CMSJW-SP @ 9E collected at 9 feet bgs show that benzene was reported at 0.221 milligrams per kilogram (mg/kg), toluene was reportedly not detected, ethylbenzene was reported at 20.7 mg/kg, and total xylenes were reported at 0.206 mg/kg qualified with a "J" indicating that it was an estimated value below the laboratory reporting limit of 0.34 mg/kg, but above the method detection limit (MDL) of 0.17 mg/kg. The DRO concentration was reported at 6,460 mg/kg. The benzene concentration and the DRO concentration were above their Table 910-1 concentration levels.

The laboratory results for soil sample CMSJW-SP @ 10.5E collected from 10.5 feet in the east trench showed that benzene was reported at 0.0371 mg/kg, and qualified with a "J" value. Toluene was not detected in the sample. Ethylbenzene was reported at 4.17 mg/kg, and total xylenes were reported at 1.0 mg/kg. The GRO results were reported at 155 mg/kg, and the DRO results were reported at 8,660 mg/kg. The reported DRO concentration is above the Table 910-1 concentration level.

The soil sample CMSJW-SP @ 10.5E PAH laboratory results show that benzo(b)fluoranthene was reported at 0.419 mg/kg, benzo(a)pyrene was reported at 0.206 mg/kg, chrysene at 2.68 mg/kg, fluoranthene at 0.547 mg/kg, fluorene at 5.45 mg/kg, naphthalene at 18.0 mg/kg, and pyrene at 1.58 mg/kg. The other PAH compounds were not detected. The benzo(b)fluoranthene and benzo(a)pyrene concentrations were above their Table 910-1 concentration levels.

Soil sample CMSJW-SP @ 4.5N was collected from the north trench at 4.5 feet bgs. The laboratory results reported an estimated benzene concentration 0.0671 mg/kg and ethylbenzene was reported at 4.9 mg/kg. Toluene and total xylenes were not reported in the CMSJW-SP @ 4.5N soil sample. The GRO concentration was reported at 104 mg/kg, which was below the Table 910-1 concentration level, but the DRO result was reported at 11,600 mg/kg, above the Table 910-1 concentration level of 500 mg/kg.

The PAH results for the CMSJW-SP @ 4.5N soil sample reported acenaphthene at 2.02 mg/kg, benzo(b)fluoranthene at 0.865 mg/kg, benzo(a)pyrene at 0.447 mg/kg, chrysene at 5.11 mg/kg, fluorene at 11.9 mg/kg, naphthalene at 22 mg/kg, and pyrene at 3.01 mg/kg. The benzo(b)fluoranthene and the benzo(a)pyrene are above their Table 910-1 concentration levels.

The inorganic analyses for the CMSJW-SP @ 4.5N soil sample reported arsenic at 6.3 mg/kg which is above the Table 910-1 concentration level of 0.39 mg/kg and the maximum background arsenic concentration of 3.6 mg/kg but is less than the average concentration of 11 mg/kg for Colorado soil listed in the Colorado Department of Public

Health and Environmental (CDPHE) Risk Management Guidance for Evaluating Arsenic Concentrations in Soil (June 2011) document.

The results for soil sample CMSJW-SP @8N collected from the north trench at a depth of 8 feet bgs, reported concentrations of benzene were reported at 0.0905 mg/kg, which is below the COGCC Table 910-1 concentration level of 0.17 mg/kg benzene.

Ethylbenzene was reported at 6.96 mg/kg, which is below the Table 910-1 concentration level of 100 mg/kg for ethylbenzene. Toluene and total xylenes were not detected in the soil sample. The laboratory reported GRO at 317 mg/kg, below the COGCC Table 910-1 concentration level. The laboratory reported DRO at 11,300 mg/kg which is above the Table 910-1 concentration level in the CMSJW-SP @8N soil sample. Concentrations of PAH compounds were not detected above the laboratory reporting limits; however, the sample was diluted due to matrix interference so that the reporting limits were above the Table 910-1 concentration levels for some of the compounds.

Impacted soils were not encountered in the south trench from the surface down to a depth of 8 feet bgs. The laboratory results for the soil sample CMSJW-SP @8S show that concentrations of petroleum hydrocarbon constituents were not detected. Therefore, the lateral and vertical extent of the former skim pit has been defined to the south.

Petroleum hydrocarbon-impacted soils were encountered in the west trench at a depth of 5 feet bgs. The laboratory analysis for soil sample CMSJW-SP@5W reported benzene was at 0.199 mg/kg, which is above the Table 910-1 concentration level of 0.17 mg/kg. Ethylbenzene was reported at 17.9 mg/kg which is below the Table 910-1 concentration level of 100 mg/kg. Toluene and total xylenes were not detected above the laboratory reporting limits. The laboratory reported that GRO at 483 mg/kg which is below the Table 910-1 concentration of 500 mg/kg.

The DRO concentration was reported at 11,500 mg/kg. PAH were reported including benzo(b)fluoranthene at 1.85 mg/kg, benzo(a)pyrene at 0.89 mg/kg, chrysene at 105 mg/kg, and naphthalene at 48.3 mg/kg. These PAH concentrations were above their respective Table 910-1 concentration levels for these compounds.

The inorganic analysis for CMSJW-SP @5W for arsenic was reported at 3.3 mg/kg which is above the Table 910-1 concentration level of 0.39 mg/kg, but is less than the maximum site specific background concentration of 3.9 mg/kg and CDPHE arsenic guidance concentration of 11 mg/kg. The pH was reported at 9.09 and SAR was reported at 15.8 which are above their respective Table 910 levels 9 and 12.

The laboratory reported that benzene, toluene, and total xylenes were not detected above the reporting limit in the CMSJW-SP @8W soil sample. Ethylbenzene was reported at 0.126 mg/kg. The laboratory reported GRO at 591 mg/kg which is above the Table 910-1 concentration level of 500 mg/kg.

The laboratory reported the DRO concentration at 9,760 mg/kg. Concentrations of PAH compounds were not detected or were reported below their respective Table 910-1 concentration levels. The analytical results show a decrease in the organic compound concentrations in the CMSJW-SP @8W as compared to the concentrations in the CMSJW-SP @5W soil sample.

4.0 Summary

The field observations and laboratory results show that concentrations of petroleum hydrocarbon constituents are above the COGCC Table 910-1 soil concentration levels in samples from the former skim pit at the S.J. Warren #1 facility. The E&P wastes and impacted soils in the pit appear to be located closer to the north and east side of the former skim pit.

The results show that Olsson was able to define the vertical and lateral extent of the impacts to the south of the former skim pit. Olsson personnel collected soil samples that are below the Table 910-1 to the south of the former pit location.

According to Mr. Sam Spears, the 300-barrel skim tank was installed by Delta Petroleum, and the produced water line from the vertical separator to the produced water tank is located to the north of the former skim pit.

Benzene and toluene are the two most mobile constituents and have the potential to impact groundwater; however, considering the depth to groundwater in this area and the silty clay soils present in the area, it does not appear likely that these compounds pose a threat to groundwater resources. There are no surface waters in the immediate vicinity of the site, other than the produced water pit. There are no residential properties in close proximity to the site.

Olsson recommends that the soils in the skim pit be excavated and either disposed offsite at a commercial landfill facility or that CM Production obtain permission from the surface landowner and the COGCC to landfarm the impacted soils onsite to meet the Table 910-1 concentration levels.

A Form 27, Remediation Workplan will need to be prepared explaining how the soils are to be landfarmed. Once the COGCC approves the landfarm request, CM Production would be able to excavate the impacted soils, construct the necessary land treatment facility onsite, and would be allowed to treat the soils for a maximum of three years.

If CM Production decides to dispose of the impacted soils at a commercial landfill facility, copies of the waste manifests will need to be provided to the COGCC to document that the wastes were disposed.

In order to meet the COGCC conditions of approval, CM Production will need to provide the COGCC confirmation soil sample results from the base and side walls of the excavation meet the Table 910-1 concentration levels and documenting that the impacted soil has been removed. CM Production will need to inform Mr. Noto of the COGCC of its intent to backfill the excavations with clean, non-impacted soils prior to closing the excavations.

Side wall samples will need to be collected from the side walls following excavation to document that the nature and lateral extent have been defined. Soil samples should be collected from a depth of approximately 5 feet bgs on each of the side walls following over excavation to remove impacted soils. These soil samples will need to be submitted for laboratory analysis of BTEX, PAHs, GRO, and DRO. A soil sample from the base of the former pit will be collected and submitted for the Table 910-1 soil parameter concentration levels have been met.

Upon receipt of the laboratory analytical results, Olsson will prepare a copy of the laboratory report to the COGCC prior to backfilling the excavation. Olsson and CM Production would like to meet with the COGCC representative onsite prior to closure of the skim pit excavation. Olsson will prepare a final report for the pit closure that provides the laboratory results and details the observations made in the field during the excavation activities.

TABLES

TABLE 1

Photoionization Detector Field Screening Readings

**CM Production, LLC
S.J. Warren #1 Skim Pit Assessment - COGCC REM #8179
Washington County, Colorado**

Sample ID and Depth (feet)/Location	Date	PID Reading (ppm)	Comments
COGCC T910-1			
CMSJW-SP @ 2.5E	3/27/2014	92	East trench - parallel produced water pit earthen berm. Impacted soils encountered at 2.5 feet bgs.
CMSJW-SP @ 4E	3/27/2014	165	East trench - Staining and odor at 4 feet bgs. Sandy/clay.
CMSJW-SP @ 9E	3/27/2014	268	East trench - staining and odor at 9 feet bgs. Fine sand/clay. Soil sample submitted for laboratory analysis.
CMSJW-SP @ 10.5E	3/27/2014	137	East trench - staining and odor. Collected soil sample at 10.5 feet bgs for laboratory submittal.
CMSJW-SP @ 4.5N	3/27/2014	94	North trench - black staining and odor. Clay/silty clay. Collect soil sample for laboratory analysis.
CMSJW-SP @ 8N	3/27/2014	154	North trench - gray staining and odor detected. Silty clay. Collect soil sample for laboratory analysis.
CMSJW-SP @ 8S	3/27/2014	15	South trench - no impacted soils were encountered from the surface down to the bottom of the excavation at 8 ft bgs. Collect soil sample for laboratory analysis.
CMSJW-SP @ 4W	3/27/2014	86	West trench - at 4 feet bgs Sandy clay
CMSJW-SP @ 5W	3/27/2014	204	West trench - Impacted soils at 5 feet bgs. Clay/silty clay
CMSJW-SP @ 8W	3/27/2014	20	West trench - Gray brown soils, clayey silt at 8 feet bgs. Collect soil sample for laboratory analysis.

PID = photoionization detector
ppm = parts per million

TABLE 2

Organic Compound Analytical Results

CM Production, LLC
S.J. Warren #1 Skim Pit Assessment - COGCC REM # 8179
Washington County, Colorado

Sample ID and Depth (feet)/Location	Date	Volatile Organic Compounds in Soil				TPH in Soil	
		Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Xylenes (mg/kg)	GRO (mg/kg)	DRO (mg/kg)
COGCC T910-1		0.17	85	100	175	500	500
CMSJW-SP @ 9E	3/27/2014	0.221	< 0.170	20.7	0.206 J	323	6,460
CMSJW-SP @ 10.5E	3/27/2014	0.0371 J	< 0.140	4.17	1.0	155	8,660
CMSJW-SP @ 4.5N	3/27/2014	0.0671 J	< 0.140	4.9	< 0.28	104	11,600
CMSJW-SP @ 8N	3/27/2014	0.0905	< 0.140	6.96	< 0.28	317	11,300
CMSJW-SP @ 8S	3/27/2014	< 0.059	< 0.120	< 0.120	< 0.24	< 12	< 7.3
CMSJW-SP @ 5W	3/27/2014	0.199	< 0.180	17.9	< 0.36	483	11,500
CMSJW-SP @ 8W	3/27/2014	< 0.060	< 0.120	0.126	< 0.24	591	9,760

Sample ID and Depth (feet)/Location	Date	PAH Compounds in Soil												
		Acenaph- thene (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)	Fluor anthene (mg/kg)	Fluorene (mg/kg)	Indeno (1,2,3, c,d) pyrene (mg/kg)	Napthalene (mg/kg)	Pyrene (mg/kg)
COGCC T910-1		1000	1000	0.22	0.22	2.2	0.022	22	0.022	1,000	1,000	0.22	23	1,000
CMSJW-SP @ 9E	3/27/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CMSJW-SP @ 10.5E	3/27/2014	< 0.051	< 0.051	< 0.051	0.419	< 0.051	0.206	2.68	< 0.051	0.547	5.45	< 0.051	18	1.58
CMSJW-SP @ 4.5N	3/27/2014	2.02	< 0.26	< 0.26	0.865	< 0.26	0.447	5.11	< 0.26	< 0.26	11.9	< 0.26	22	3.01
CMSJW-SP @ 8N	3/27/2014	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
CMSJW-SP @ 8S	3/27/2014	< 0.0047	< 0.0047	< 0.0047	< 0.0047	< 0.0047	< 0.0047	< 0.0047	< 0.0047	< 0.0047	< 0.0047	< 0.0047	< 0.0047	< 0.0047
CMSJW-SP @ 5W	3/27/2014	4.02	< 0.46	< 0.46	1.85	< 0.46	0.89	105	< 0.46	< 0.46	21.7	< 0.46	48.3	6.22
CMSJW-SP @ 8W	3/27/2014	0.624 J	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	3.29	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	1.5

COGCC - T 910-1: Colorado Oil and Gas Conservation Commission Table 910-1 concentration levels

mg/kg - milligrams per kilogram

TPH - Total Petroleum Hydrocarbons

GRO - Gasoline Range Organics

DRO - Diesel Range Organics

< - Compound/Parameter was not detected above the laboratory reporting limit (RL)

J - Compound was reported above the laboratory method detection limit (MDL) but was below the laboratory reporting limit.

Note: Bold Orange type indicates that the compound/parameter was reported above the COGCC Table 910-1 concentration level. 910-1 concentration level

Gray shaded cells indicate that the compound/parameter was not detected, but the laboratory reporting limit is greater than the COGCC Table

TABLE 3

Inorganic Compound Analytical Results

CM Production, LLC
 S.J. Warren #1 Skim Pits Assessment - COGCC REM# 8179
 Washington County, Colorado

Sample ID and Depth (feet)/Location	Date	Total Metals in Soil													Inorganic Parameters in Soil			
		Arsenic (mg/kg)	Barium (mg/kg)	Cadmium (mg/kg)	Calcium (mg/kg)	Chromium (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Magnesium (mg/kg)	Mercury (mg/kg)	Nickel (mg/kg)	Selenium (mg/kg)	Sodium (mg/kg)	Silver (mg/kg)	Zinc (mg/kg)	pH (s.u.)	EC (mmhos/cm)	SAR
COGCC T910-1		0.39	15,000	70	N/A	23*	3,100	400	N/A	23	1,600	390	N/A	390	23,000	6 to 9	< 4 or 2x BG	< 12
CMSJW-SP @ 4.5N	3/27/2014	6.3	143	< 1.1	5.68	8.3	17.4	17.9	< 1.0	< 0.092	15.2	< 5.5	124	< 3.3	870	8.52	0.542	12.6
CMSJW-SP @ 5W	3/27/2014	3.3	223	< 1.3	5.72	9.3	12.2	12.8	1.1	< 0.11	12.1	< 6.6	158	< 3.9	518	9.09	0.65	15.8
Background Samples																		
CMOW-BG1 @ 0.2	3/27/2014	3.6	157	< 1.1	90.6	7.9	11.8	10.5	23.5	< 0.091	8.1	< 5.7	33.5	< 3.4	53.2	7.83	1.17	0.811
CMOW-BG2 @ 0.2	3/27/2014	2.6	142	< 1.1	33.9	6.1	8.4	8.8	5.35	< 0.088	6.9	< 5.3	22.1	< 3.2	37.3	8.38	0.534	0.93
CMSJW-BG3	3/27/2014	2.7	142	< 1.1	53.8	7.2	7.7	10.9	5.80	< 0.092	7.7	< 5.7	93.6	< 3.4	53.4	8.41	0.753	3.23

mg/kg - milligrams per kilogram

BG - Background Samples: CMOW-BG1 @ 0.2 feet was collected northeast of the produced water pit near the farm field and access road, CMOW-BG2 @ 0.2 feet was collected southeast of the Oliver Warren #1 tank battery near the farmed field, CMSJW-BG3 was collected on the north side of the S.J. Warren Produced Water pit.

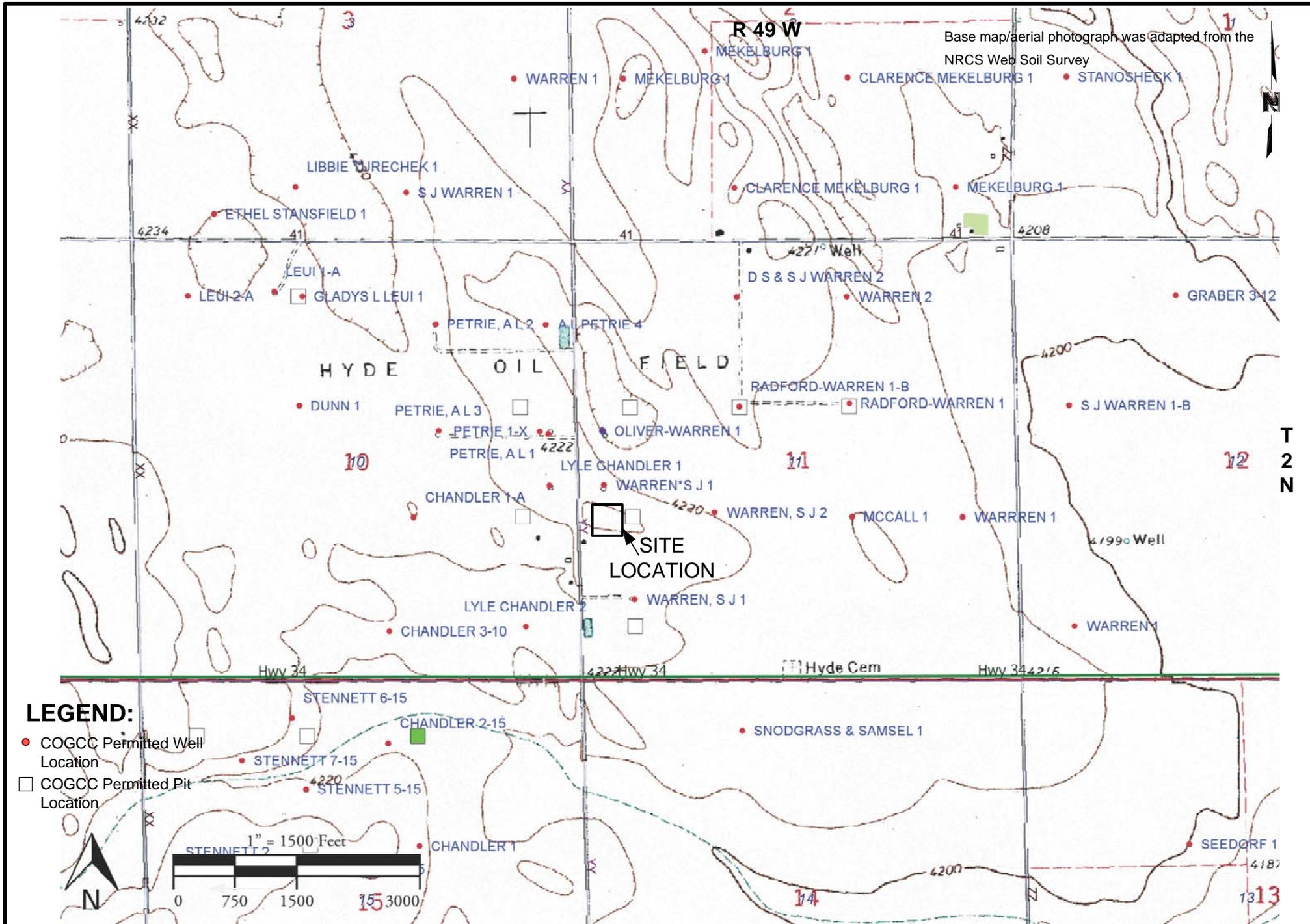
s.u. - standard units for soil pH

SAR - sodium adsorption ratio

Values shown in **bold orange** type are above the COGCC Table 910-1 Concentration Levels.

Arsenic concentrations were generally in similar ranges as the site specific background samples.

FIGURES



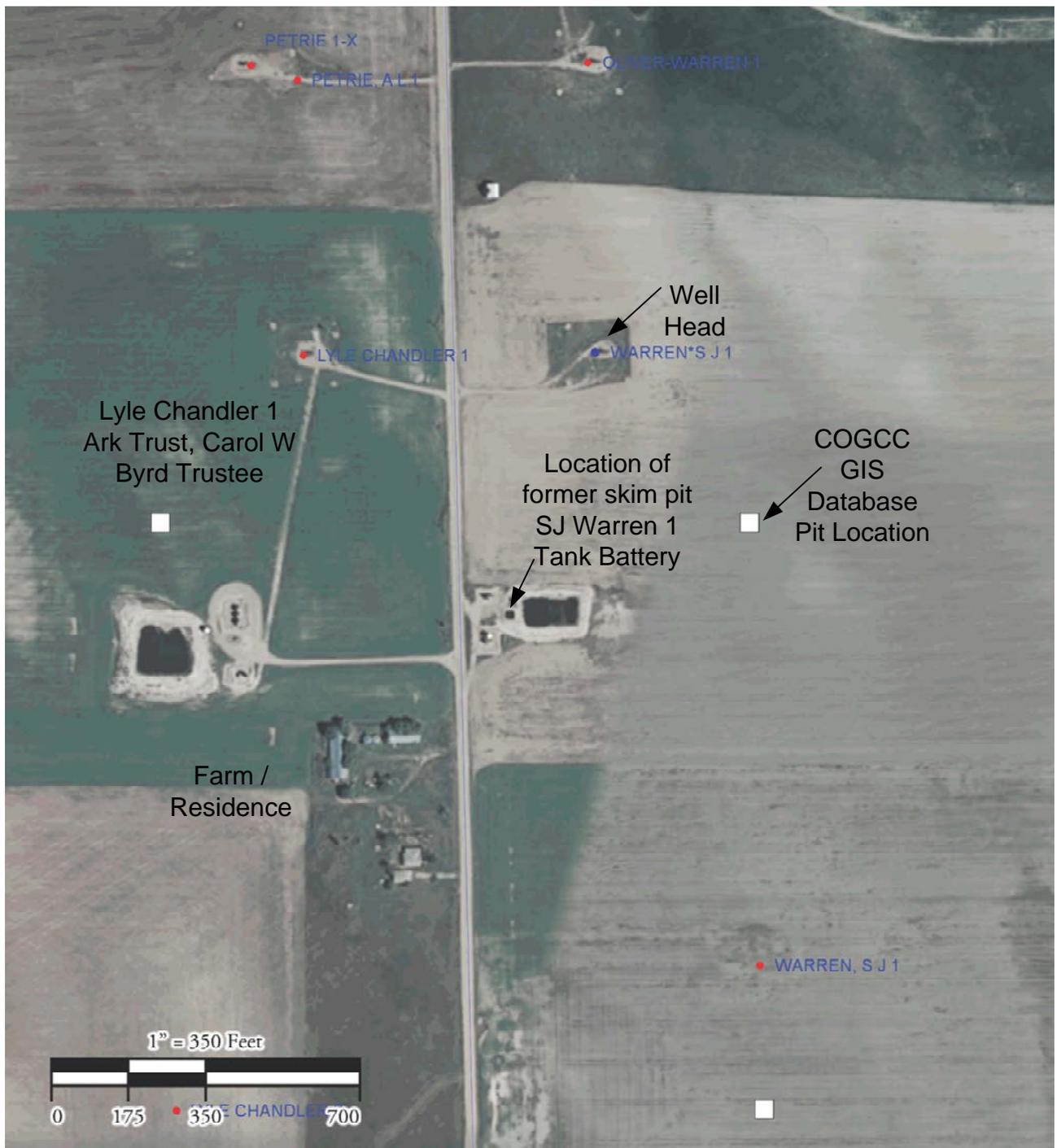
PROJECT NO:	013-1681
DRAWN BY:	JWH
DATE:	04/14/14

CM Production, LLC
 S.J. Warren #1 – Skim Pit Subsurface Investigation
 Site Location Map

OLSSON ASSOCIATES

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

FIGURE
1



LEGEND:

- WARREN 1 Well Location
- Tank Location
- COGCC Pit Location (Status Unknown)

Scale: As Shown

Base map adapted from the Colorado Oil and Gas Conservation Commission GIS Database Online.



PROJECT NO:	01-1681
DRAWN BY:	JWH
DATE:	05/01/2014

CM Production, LLC
 SJ Warren 1 Skim Pit
 2009 Aerial Photograph



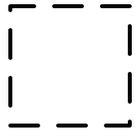
4690 Table Mountain Dr. #200
 Golden, CO 80403
 TEL 303.237.2072
 FAX 303.237-2659

FIGURE
2

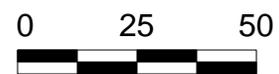


Base Map Google™ Earth image
Imagery Date 6/1/2013

LEGEND:



Approximate
Former Skim Pit Location



Approximate Scale
in Feet 1" = 50'



PROJECT NO: 013-1681
DRAWN BY: JWH
DATE: 04/30/2014

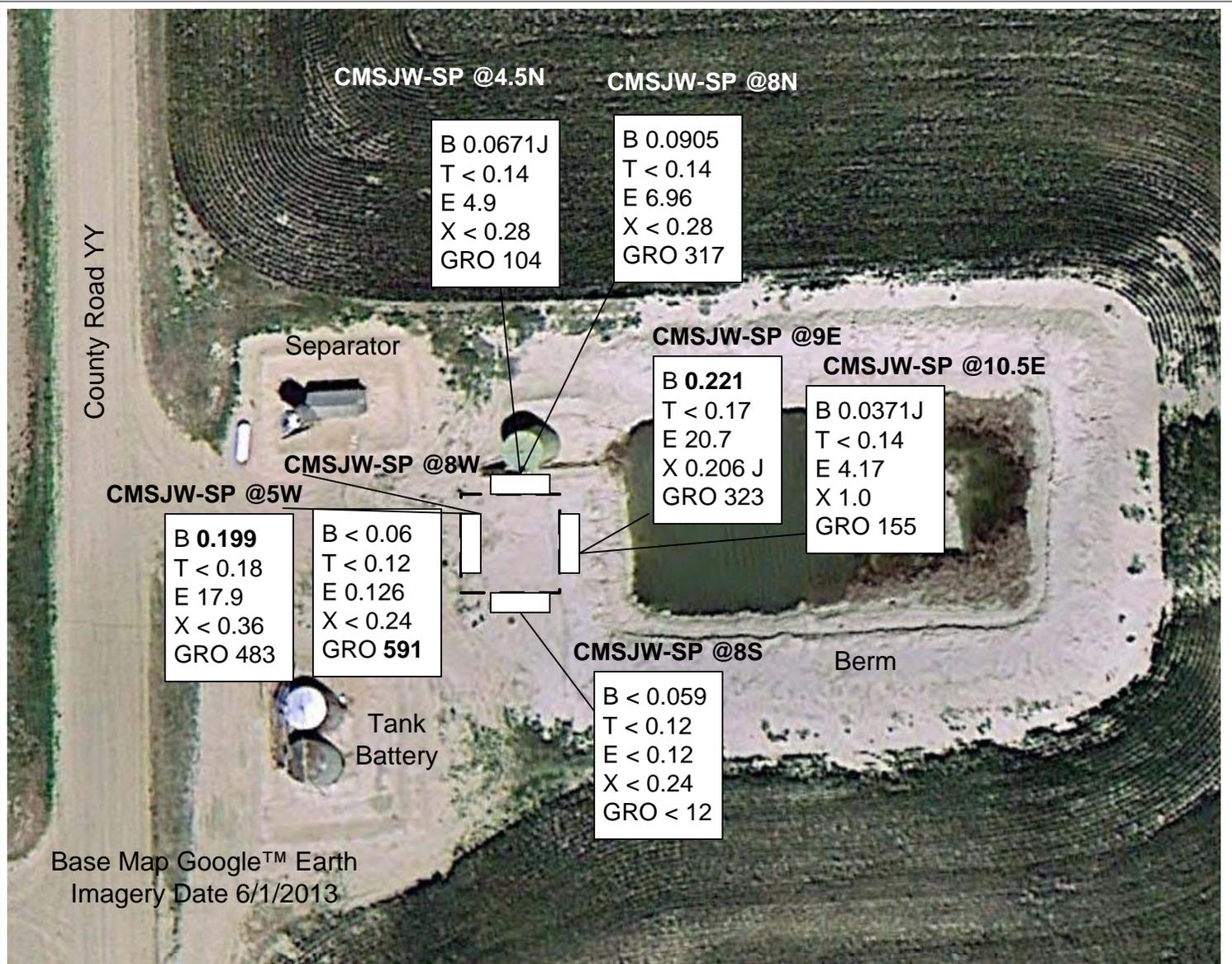
CM Production, LLC
SJ Warren 1 Skim Pit
2013 Aerial Photograph



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Golden, CO 80403
TEL 303.237.2072
FAX 303.237-2659

FIGURE

3



LEGEND:

Approximate Former Skim Pit Location
 And Backhoe Test Trench
 Locations

CMSJW-SP @4.5N Soil Sample Location and
 Depth (feet)

B – Benzene (0.17)
 T – Toluene (85)
 E – Ethylbenzene (100)
 X – Total Xylenes (1000)

GRO – Gasoline Range Organics (500)

Numbers in parentheses are the COGCC Table 910-1 Concentration Levels

All Results Reported in milligrams per kilogram (mg/kg)

< - Analyte was not detected above the laboratory reporting limit
 J – Reported value is estimated above the laboratory method detection limit, but below the laboratory reporting limit.

Values in bold are above the COGCC Table 910-1 Concentration Level

BTEX and GRO were analyzed by EPA Method 8260B by Accutest Mountain States in Wheat Ridge, Colorado



Approximate Scale in Feet 1" = 50'



PROJECT NO: 013-1681
 DRAWN BY: JWH
 DATE: 04/30/2014

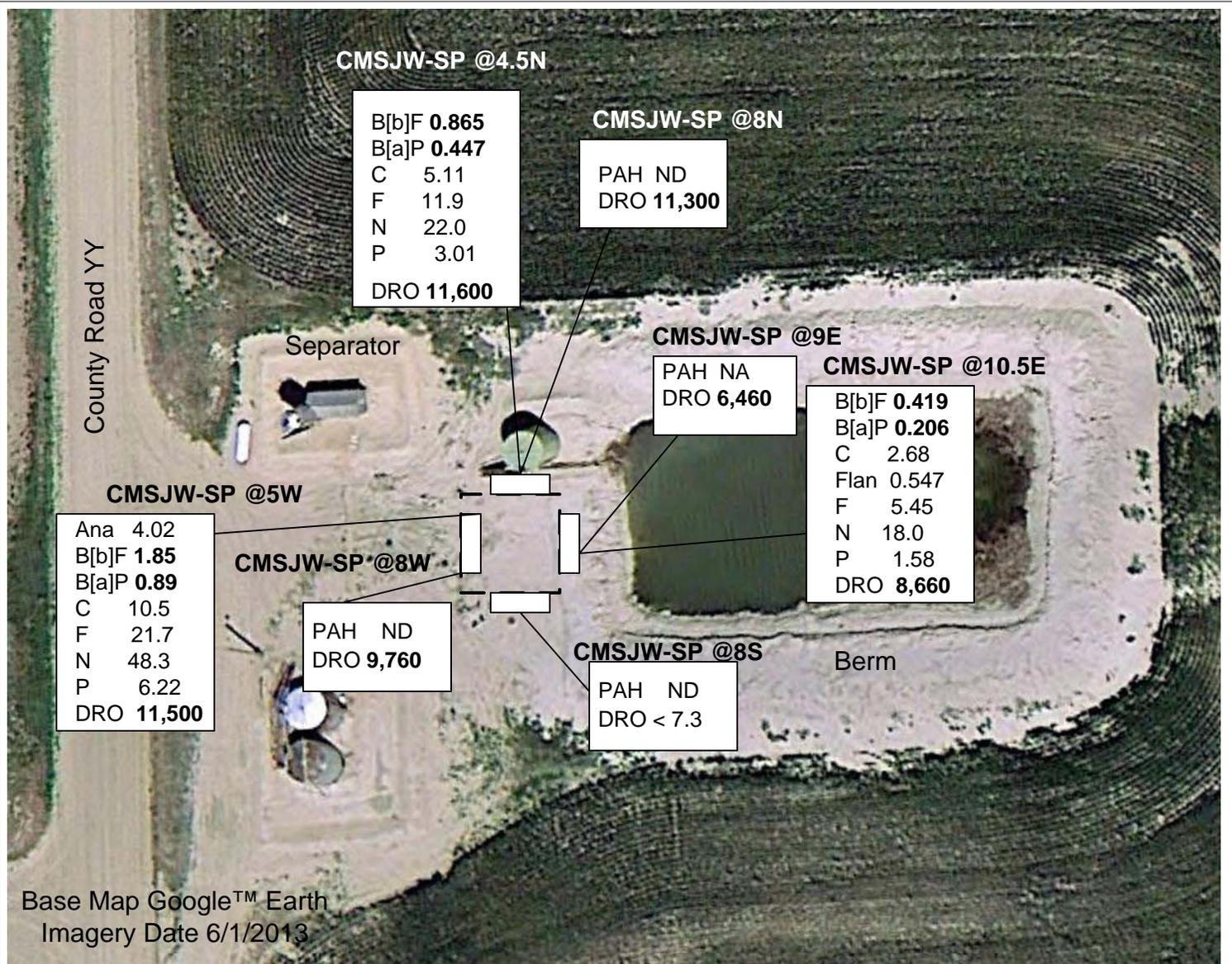
CM Production, LLC
 SJ Warren 1 Skim Pit
 BTEX and GRO Results



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 FAX 303.237-2659

FIGURE

4



LEGEND:

Former Skim Pit Location
 And Backhoe Test Trench Locations

CMSJW-SP @4.5N Soil Sample Location and Depth (feet)

- Ana – acenaphthene (1,000 mg/kg)
- B[a]A - benzo[a]anthracene (0.22 mg/kg)
- B[b]F - benzo[b]fluoranthene (0.22 mg/kg)
- B[a]P - benzo[a]pyrene (0.022 mg/kg)
- C – chysene (22 mg/kg)
- Flan – fluoranthene (1,000 mg/kg)
- Fl – fluorene (1,000 mg/kg)
- N – naphthalene (23 mg/kg)
- P – pyrene (1,000 mg/kg)
- PAH – Polycyclic aromatic hydrocarbons
- DRO – Diesel Range Organics (500 mg/kg)

All results reported in milligrams per kilogram (mg/kg)

NA – Not Analyzed

ND – Not Detected

< - Analyte was not detected above the laboratory reporting limit

J - Reported value is estimated above the laboratory method detection limit, but below the laboratory reporting limit.

Values in bold are above the COGCC Table 910-1 Concentration Level

PAH and DRO were analyzed by EPA Method 8270B and EPA modified Method 8015, respectively, by Accutest Mountain States in Wheat Ridge, Colorado



Approximate Scale in Feet 1" = 50'



PROJECT NO: 013-1681
 DRAWN BY: JWH
 DATE: 04/30/2014

CM Production, LLC
 SJ Warren 1 Skim Pit
 PAH and DRO Results



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 Golden, CO 80403
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FIGURE

5



CMSJW-SP @4.5N

As	6.3
Ba	143
Cd	< 1.1
Cr	8.3
Cu	17.4
Pb	17.9
Hg	< 0.092
Ni	15.2
Se	< 5.5
Ag	< 3.3
Zn	870
pH	8.52
EC	0.542
SAR	12.6

CMSJW-SP @5W

As	3.3
Ba	223
Cd	< 1.3
Cr	9.3
Cu	12.2
Pb	12.8
Hg	< 0.11
Ni	12.1
Se	< 6.6
Ag	< 3.9
Zn	518
pH	8.52
EC	0.650
SAR	15.8

LEGEND:

- Former Skim Pit Location
- And Backhoe Test Trench
- Locations

< - Analyte was not detected above the laboratory reporting limit

Values in bold are above the COGCC Table 910-1 Concentration Level shown in parentheses in the legend

CMSJW-SP @4.5N Soil Sample Location and Analytes: Depth (feet)

Results reported in milligrams per kilogram (mg/kg) unless otherwise specified

- As – Arsenic (0.39)
- Ba – Barium (15,000)
- Cd – Cadmium (70)
- Cr – Chromium (23)
- Cu – Copper (3,100)
- Pb – Lead (400)
- Hg – Mercury (23)
- Ni – Nickel (1,600)
- Se – Selenium (390)
- Ag – Silver (390)
- Zn – Zinc (23,000)

- pH – standard pH units (6 to 9)
- EC – Electrical Conductance in micromohs per centimeter (mmhos/cm) (<4 mmhos/cm or 2x background)
- SAR – Sodium Adsorption Ratio (< 12)



Samples were analyzed by Accutest Mountain States in Wheat Ridge, Colorado

Approximate Scale in Feet 1" = 50'

PROJECT NO: 013-1681
 DRAWN BY: JWH
 DATE: 04/30/2014

CM Production, LLC
 SJ Warren 1 Skim Pit
 Inorganic Results



4690 Table Mountain Dr. #200
 Golden, CO 80403
 TEL 303.237.2072
 FAX 303.237-2659

FIGURE
 6

APPENDIX A
SITE PHOTOGRAPHS



Subject: The S.J. Warren Lease Tank Battery sign and the excavator in the background working on the east side trench of the former skim pit from the production tank battery located to the southwest.

Date: 03/27/2014

View: East



Subject: The S.J. Warren former skim pit was located on the west side of the produced water pit (upper left) as shown in a 2009 aerial photograph from the COGCC website. Impacted soils were encountered.

Date: 03/27/2014

View: Southeast



Subject: Impacted soils were encountered at approximately 2.5 feet below ground surface (bgs) in the trench on the east side of their former skim pit. The impacted soils had an odor and were observed to have black staining which extended to approximately 9 feet bgs.

Date: 03/27/2014

View: South



Subject: A 300-barrel capacity produced water tank was present on the northwest corner of the produced water pit, and was present in the 2009 Aerial Photograph showing the former skim pit.

Date: 03/27/2014

View: North



Subject: A north side wall trench was excavated in the area of the former skim pit location. Impacted soils were encountered at approximately 4.5 feet bgs.

Date: 03/27/2014

View: Northeast



Subject: Photograph shows soil staining and the north side wall trench in the vicinity of the former skim pit. The photoionization detector (PID) headspace reading at 4.5 feet bgs was 94 parts per million (ppm), and the PID headspace reading at 8 feet was 154 ppm.

Date: 03/27/2014

View: Northeast



Subject: A trench was excavated on the northwest side of the former skim pit near the produced water tank. Some impacted soils were encountered.

Date: 03/27/2014

View: Northwest



Subject: A trench was excavated in the vicinity of the north side wall of the former skim pit as based on a 2009 aerial photograph on the COGCC website. The vertical extent of impact was defined.

Date: 03/27/2014

View: Northwest



Subject: Impacted soils were not detected in the north trench skim pit side wall excavation at a depth of 8 feet bgs. The photoionization detector (PID) headspace reading was 20 parts per million (ppm) at 8 feet, and was 204 ppm at 5 feet bgs.

Date: 03/27/2014

View: West



Subject: Impacted soils were not encountered in the trench excavated on the south side of the former skim pit. The soils did not exhibit signs of impact from the surface down to approximately 8 feet bgs. Soils consisted of sandy silt and silty clay.

Date: 03/27/2014

View: South



Subject: Photograph shows the location of the south side wall trench in the vicinity of the former skim pit. Impacted soils were not encountered in the south trench.

Date: 03/27/2014

View: North



Subject: Photograph shows the location of the south side wall trench in the vicinity of the former skim pit and the produced water pit south berm. Impacted soils were not encountered in the south trench.

Date: 03/27/2014

View: East - Northeast



Subject: Impacted soils exhibiting staining and odor were detected in the west side wall trench excavated in the vicinity of the former skim pit. Impacted soils were encountered at approximately 4.5 feet bgs.

Date: 03/27/2014

View: North



Subject: Photograph shows stained soils excavated from approximately 4.5 feet bgs in the west trench. Soils consisted of sandy clay to clayey silts.

The maximum photoionization detector (PID) headspace reading was 204 parts per million (ppm) at a depth of approximately 5 feet below ground surface (bgs).

Date: 03/27/2014

View: East



Subject: The vertical extent was defined in the west side wall trench by excavating to approximately 8 feet bgs. Soils consisting of clayey silt did not exhibit staining or odor. The headspace PID reading was 20 ppm at 8 feet bgs.

Date: 03/27/2014

View: North

APPENDIX B
ACCUTEST LABORATORIES
SOIL SAMPLE RESULTS

Technical Report for

Olsson Associates - Denver

CM Production-S.J. Warren #1

013-1681

Accutest Job Number: D56367

Sampling Date: 03/27/14

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: 117



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.



**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)

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Sample Summary

Olsson Associates - Denver

Job No: D56367

CM Production-S.J. Warren #1

Project No: 013-1681

Sample Number	Collected		Received	Matrix		Client Sample ID
	Date	Time By		Code	Type	
D56367-1	03/27/14	12:50 JH	03/28/14	SO	Soil	CMOW-BG1@0.2
D56367-1A	03/27/14	12:50 JH	03/28/14	SO	Soil	CMOW-BG1@0.2
D56367-2	03/27/14	13:33 JH	03/28/14	SO	Soil	CMOW-BG2@0.2
D56367-2A	03/27/14	13:33 JH	03/28/14	SO	Soil	CMOW-BG2@0.2
D56367-3	03/27/14	14:20 JH	03/28/14	SO	Soil	CMSJW-SP@9E
D56367-4	03/27/14	14:22 JH	03/28/14	SO	Soil	CMSJW-SP@10.5E
D56367-5	03/27/14	14:40 JH	03/28/14	SO	Soil	CMSJW-SP@4.5N
D56367-5A	03/27/14	14:40 JH	03/28/14	SO	Soil	CMSJW-SP@4.5N
D56367-6	03/27/14	14:45 JH	03/28/14	SO	Soil	CMSJW-SP@8N
D56367-7	03/27/14	15:02 JH	03/28/14	SO	Soil	CMSJW-SP@8S
D56367-8	03/27/14	15:20 JH	03/28/14	SO	Soil	CMSJW-SP@5W
D56367-8A	03/27/14	15:20 JH	03/28/14	SO	Soil	CMSJW-SP@5W
D56367-9	03/27/14	15:25 JH	03/28/14	SO	Soil	CMSJW-SP@8W

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



Sample Summary (continued)

Olsson Associates - Denver

Job No: D56367

CM Production-S.J. Warren #1
Project No: 013-1681

Sample Number	Collected		Received	Matrix		Client Sample ID
	Date	Time By		Code	Type	
D56367-10	03/27/14	15:50 JH	03/28/14	SO	Soil	CMSJW-BG3
D56367-10A	03/27/14	15:50 JH	03/28/14	SO	Soil	CMSJW-BG3

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

CASE NARRATIVE / CONFORMANCE SUMMARY

Client: Olsson Associates - Denver

Job No D56367

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

Report Date 4/11/2014 1:34:57 PM

On 03/28/2014, 10 sample(s), 0 Trip Blank(s), and 0 Field Blank(s) were received at Accutest Mountain States (AMS) at a temperature of 3.4 °C. The samples were intact and properly preserved, unless noted below. An AMS Job Number of D56367 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: V3V1751
------------------	--------------------------

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D56609-10MS, D56609-11DUP were used as the QC samples indicated.

Matrix SO	Batch ID: V3V1753
------------------	--------------------------

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D56389-18MS, D56577-1DUP were used as the QC samples indicated.

Matrix SO	Batch ID: V5V1885
------------------	--------------------------

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D56366-2MS, D56366-3DUP were used as the QC samples indicated.

Extractables by GCMS By Method SW846 8270C BY SIM

Matrix SO	Batch ID: OP9676
------------------	-------------------------

- All samples were extracted within the recommended method holding time.
- All samples were analyzed within the recommended method holding time.
- Sample(s) D56387-6MS, D56387-6MSD were used as the QC samples indicated.
- All method blanks for this batch meet method specific criteria.
- The matrix spike (MS) recovery(s) of Anthracene, Benzo(a)pyrene, Fluorene are outside control limits. Outside control limits due to possible matrix interference.
- The matrix spike duplicate (MSD) recovery(s) of Benzo(a)pyrene are outside control limits. Probable cause due to matrix interference.
- The RPD(s) for the MS and MSD recoveries of Anthracene are outside control limits for sample OP9676-MSD. Variability of recovery may be due to sample matrix/homogeneity.
- D56367-8 for Terphenyl-d14: Outside control limits due to dilution.
- D56367-5 for Terphenyl-d14: Outside control limits due to dilution.

Extractables by GC By Method SW846-8015B

Matrix SO	Batch ID: OP9681
------------------	-------------------------

- All samples were extracted within the recommended method holding time.
- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D56366-6MS, D56366-6MSD were used as the QC samples indicated.

Matrix SO	Batch ID: OP9692
------------------	-------------------------

- All samples were extracted within the recommended method holding time.
- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D56389-1MS, D56389-1MSD were used as the QC samples indicated.

Metals By Method SW846 6010C

Matrix AQ	Batch ID: MP12634
------------------	--------------------------

- All samples were digested within the recommended method holding time.
- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D56271-13AMS, D56271-13AMSD, D56271-13ASDL were used as the QC samples for the metals analysis.
- The matrix spike (MS) recovery(s) of Sodium are outside control limits. Spike amount low relative to the sample amount. Refer to lab control or spike blank for recovery information.

Matrix SO	Batch ID: MP12622
------------------	--------------------------

- All samples were digested within the recommended method holding time.
- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D56366-1MS, D56366-1MSD, D56366-1SDL were used as the QC samples for the metals analysis.
- The matrix spike (MS) recovery(s) of Silver are outside control limits. Spike recovery indicates possible matrix interference.
- The serial dilution RPD(s) for Cadmium, Lead, Barium, Chromium, Copper, Zinc are outside control limits for sample MP12622-SD1. Percent difference acceptable due to low initial sample concentration (< 50 times IDL).
- MP12622-SD1 for Chromium: Serial dilution indicates possible matrix interference.
- MP12622-SD1 for Copper: Serial dilution indicates possible matrix interference.
- MP12622-SD1 for Barium: Serial dilution indicates possible matrix interference.
- MP12622-SD1 for Zinc: Serial dilution indicates possible matrix interference.

Metals By Method SW846 6020A

Matrix SO	Batch ID: MP12624
------------------	--------------------------

- All samples were digested within the recommended method holding time.
- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D56366-1MS, D56366-1MSD, D56366-1SDL were used as the QC samples for the metals analysis.

Metals By Method SW846 7471B

Matrix SO	Batch ID: MP12636
------------------	--------------------------

- All samples were digested within the recommended method holding time.
- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D56367-1MS, D56367-1MSD were used as the QC samples for the metals analysis.

Wet Chemistry By Method ASTM D1498-76M

Matrix SO	Batch ID: GN24155
------------------	--------------------------

- Sample(s) D56387-3DUP were used as the QC samples for the Redox Potential Vs H2 analysis.

Wet Chemistry By Method SM 2510B-2011 MOD

Matrix SO	Batch ID: GP12270
------------------	--------------------------

- The data for SM 2510B-2011 MOD meets quality control requirements.

Wet Chemistry By Method SM2540G-2011 M

Matrix SO	Batch ID: GN24172
------------------	--------------------------

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

Wet Chemistry By Method SW846 3060A/7196A

Matrix SO	Batch ID: GP12302
------------------	--------------------------

- All samples were prepared within the recommended method holding time.
- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D56390-2DUP, D56390-2MS, D56390-2MSD were used as the QC samples for the Chromium, Hexavalent analysis.

Wet Chemistry By Method SW846 3060A/7196A M

Matrix SO	Batch ID: R21058
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- The data for SW846 3060A/7196A M meets quality control requirements.
- D56367-2 for Chromium, Trivalent: Calculated as: (Chromium) - (Chromium, Hexavalent)

Matrix SO	Batch ID: R21059
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- The data for SW846 3060A/7196A M meets quality control requirements.
- D56367-5 for Chromium, Trivalent: Calculated as: (Chromium) - (Chromium, Hexavalent)

Matrix SO	Batch ID: R21060
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- The data for SW846 3060A/7196A M meets quality control requirements.
- D56367-8 for Chromium, Trivalent: Calculated as: (Chromium) - (Chromium, Hexavalent)

Matrix SO	Batch ID: R21072
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- The data for SW846 3060A/7196A M meets quality control requirements.
- D56367-1 for Chromium, Trivalent: Calculated as: (Chromium) - (Chromium, Hexavalent)

Matrix SO	Batch ID: R21074
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- The data for SW846 3060A/7196A M meets quality control requirements.
- D56367-10 for Chromium, Trivalent: Calculated as: (Chromium) - (Chromium, Hexavalent)

Wet Chemistry By Method SW846 9045D

Matrix SO

Batch ID: GN24162

- The following samples were run outside of holding time for method SW846 9045D: D56367-1, D56367-10, D56367-2, D56367-5, D56367-8

Wet Chemistry By Method USDA HANDBOOK 60

Matrix SO

Batch ID: MP12634

- D56367-8A for Sodium Adsorption Ratio: Calculated as: $(\text{Na meq/L}) / \sqrt{[(\text{Ca meq/L})+(\text{Mg meq/L})/2]}$
- D56367-5A for Sodium Adsorption Ratio: Calculated as: $(\text{Na meq/L}) / \sqrt{[(\text{Ca meq/L})+(\text{Mg meq/L})/2]}$
- D56367-2A for Sodium Adsorption Ratio: Calculated as: $(\text{Na meq/L}) / \sqrt{[(\text{Ca meq/L})+(\text{Mg meq/L})/2]}$
- D56367-1A for Sodium Adsorption Ratio: Calculated as: $(\text{Na meq/L}) / \sqrt{[(\text{Ca meq/L})+(\text{Mg meq/L})/2]}$
- D56367-10A 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: D56367
Account: Olsson Associates - Denver
Project: CM Production-S.J. Warren #1
Collected: 03/27/14



Lab Sample ID	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
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D56367-1 CMOW-BG1@0.2

Arsenic	3.6	0.11			mg/kg	SW846 6020A
Barium	157	1.1			mg/kg	SW846 6010C
Chromium	7.9	1.1			mg/kg	SW846 6010C
Copper	11.8	1.1			mg/kg	SW846 6010C
Lead	10.5	5.7			mg/kg	SW846 6010C
Nickel	8.1	3.4			mg/kg	SW846 6010C
Zinc	53.2	3.4			mg/kg	SW846 6010C
Specific Conductivity	1170	1.0			umhos/cm	SM 2510B-2011 MOD
Chromium, Trivalent ^a	7.9	2.1			mg/kg	SW846 3060A/7196A M
Redox Potential Vs H2	523				mv	ASTM D1498-76M
pH	7.83				su	SW846 9045D

D56367-1A CMOW-BG1@0.2

Calcium	90.6	2.0			mg/l	SW846 6010C
Magnesium	23.5	1.0			mg/l	SW846 6010C
Sodium	33.5	2.0			mg/l	SW846 6010C
Sodium Adsorption Ratio ^b	0.811				ratio	USDA HANDBOOK 60

D56367-2 CMOW-BG2@0.2

Arsenic	2.6	0.11			mg/kg	SW846 6020A
Barium	142	1.1			mg/kg	SW846 6010C
Chromium	6.1	1.1			mg/kg	SW846 6010C
Copper	8.4	1.1			mg/kg	SW846 6010C
Lead	8.8	5.3			mg/kg	SW846 6010C
Nickel	6.9	3.2			mg/kg	SW846 6010C
Zinc	37.3	3.2			mg/kg	SW846 6010C
Specific Conductivity	534	1.0			umhos/cm	SM 2510B-2011 MOD
Chromium, Trivalent ^a	5.5	2.1			mg/kg	SW846 3060A/7196A M
Redox Potential Vs H2	459				mv	ASTM D1498-76M
pH	8.38				su	SW846 9045D

D56367-2A CMOW-BG2@0.2

Calcium	33.9	2.0			mg/l	SW846 6010C
Magnesium	5.35	1.0			mg/l	SW846 6010C
Sodium	22.1	2.0			mg/l	SW846 6010C
Sodium Adsorption Ratio ^b	0.930				ratio	USDA HANDBOOK 60

D56367-3 CMSJW-SP@9E

Benzene	221	84	32		ug/kg	SW846 8260B
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Summary of Hits

Job Number: D56367
Account: Olsson Associates - Denver
Project: CM Production-S.J. Warren #1
Collected: 03/27/14



Lab Sample ID	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
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Ethylbenzene		20700	340	64	ug/kg	SW846 8260B
Xylene (total)		206 J	340	170	ug/kg	SW846 8260B
TPH-GRO (C6-C10)		323000	17000	8400	ug/kg	SW846 8260B
TPH-DRO (C10-C28)		6460	450	340	mg/kg	SW846-8015B

D56367-4 CMSJW-SP@10.5E

Benzene		37.1 J	69	26	ug/kg	SW846 8260B
Ethylbenzene		4170	140	26	ug/kg	SW846 8260B
Xylene (total)		1000	280	140	ug/kg	SW846 8260B
TPH-GRO (C6-C10)		155000	14000	6900	ug/kg	SW846 8260B
Benzo(b)fluoranthene		419	51	32	ug/kg	SW846 8270C BY SIM
Benzo(a)pyrene		206	51	25	ug/kg	SW846 8270C BY SIM
Chrysene		2680	51	25	ug/kg	SW846 8270C BY SIM
Fluoranthene		547	51	29	ug/kg	SW846 8270C BY SIM
Fluorene		5450	51	37	ug/kg	SW846 8270C BY SIM
Naphthalene		18000	51	31	ug/kg	SW846 8270C BY SIM
Pyrene		1580	51	30	ug/kg	SW846 8270C BY SIM
TPH-DRO (C10-C28)		8660	160	120	mg/kg	SW846-8015B

D56367-5 CMSJW-SP@4.5N

Benzene		67.1 J	69	26	ug/kg	SW846 8260B
Ethylbenzene		4900	140	26	ug/kg	SW846 8260B
TPH-GRO (C6-C10)		104000	14000	6900	ug/kg	SW846 8260B
Acenaphthene		2020	260	200	ug/kg	SW846 8270C BY SIM
Benzo(b)fluoranthene		865	260	160	ug/kg	SW846 8270C BY SIM
Benzo(a)pyrene		447	260	120	ug/kg	SW846 8270C BY SIM
Chrysene		5110	260	120	ug/kg	SW846 8270C BY SIM
Fluorene		11900	260	180	ug/kg	SW846 8270C BY SIM
Naphthalene		22000	260	150	ug/kg	SW846 8270C BY SIM
Pyrene		3010	260	150	ug/kg	SW846 8270C BY SIM
TPH-DRO (C10-C28)		11600	160	120	mg/kg	SW846-8015B
Arsenic		6.3	0.11		mg/kg	SW846 6020A
Barium		143	1.1		mg/kg	SW846 6010C
Chromium		8.3	1.1		mg/kg	SW846 6010C
Copper		17.4	1.1		mg/kg	SW846 6010C
Lead		17.9	5.5		mg/kg	SW846 6010C
Nickel		15.2	3.3		mg/kg	SW846 6010C
Zinc		870	3.3		mg/kg	SW846 6010C
Specific Conductivity		542	1.0		umhos/cm	SM 2510B-2011 MOD
Chromium, Trivalent ^a		8.3	2.1		mg/kg	SW846 3060A/7196A M
Redox Potential Vs H2		304			mv	ASTM D1498-76M
pH		8.52			su	SW846 9045D

Summary of Hits

Job Number: D56367
Account: Olsson Associates - Denver
Project: CM Production-S.J. Warren #1
Collected: 03/27/14



Lab Sample ID	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
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D56367-5A CMSJW-SP@4.5N

Calcium	5.68	2.0			mg/l	SW846 6010C
Sodium	124	2.0			mg/l	SW846 6010C
Sodium Adsorption Ratio ^b	12.6				ratio	USDA HANDBOOK 60

D56367-6 CMSJW-SP@8N

Benzene	90.5	69	26		ug/kg	SW846 8260B
Ethylbenzene	6960	140	26		ug/kg	SW846 8260B
TPH-GRO (C6-C10)	317000	14000	6900		ug/kg	SW846 8260B
TPH-DRO (C10-C28)	11300	160	120		mg/kg	SW846-8015B

D56367-7 CMSJW-SP@8S

No hits reported in this sample.

D56367-8 CMSJW-SP@5W

Benzene	199	90	34		ug/kg	SW846 8260B
Ethylbenzene	17900	180	34		ug/kg	SW846 8260B
TPH-GRO (C6-C10)	483000	18000	9000		ug/kg	SW846 8260B
Acenaphthene	4020	460	350		ug/kg	SW846 8270C BY SIM
Benzo(b)fluoranthene	1850	460	280		ug/kg	SW846 8270C BY SIM
Benzo(a)pyrene	890	460	220		ug/kg	SW846 8270C BY SIM
Chrysene	10500	460	220		ug/kg	SW846 8270C BY SIM
Fluorene	21700	460	330		ug/kg	SW846 8270C BY SIM
Naphthalene	48300	460	270		ug/kg	SW846 8270C BY SIM
Pyrene	6220	460	270		ug/kg	SW846 8270C BY SIM
TPH-DRO (C10-C28)	11500	190	140		mg/kg	SW846-8015B
Arsenic	3.3	0.13			mg/kg	SW846 6020A
Barium	223	1.3			mg/kg	SW846 6010C
Chromium	9.3	1.3			mg/kg	SW846 6010C
Copper	12.2	1.3			mg/kg	SW846 6010C
Lead	12.8	6.6			mg/kg	SW846 6010C
Nickel	12.1	3.9			mg/kg	SW846 6010C
Zinc	518	3.9			mg/kg	SW846 6010C
Specific Conductivity	650	1.0			umhos/cm	SM 2510B-2011 MOD
Chromium, Trivalent ^a	9.3	2.3			mg/kg	SW846 3060A/7196A M
Redox Potential Vs H2	352				mv	ASTM D1498-76M
pH	9.09				su	SW846 9045D

D56367-8A CMSJW-SP@5W

Calcium	5.72	2.0			mg/l	SW846 6010C
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Summary of Hits

Job Number: D56367
Account: Olsson Associates - Denver
Project: CM Production-S.J. Warren #1
Collected: 03/27/14



Lab Sample ID	Client Sample ID	Result/ Analyte	RL	MDL	Units	Method
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Magnesium		1.10	1.0		mg/l	SW846 6010C
Sodium		158	2.0		mg/l	SW846 6010C
Sodium Adsorption Ratio ^b		15.8			ratio	USDA HANDBOOK 60

D56367-9 CMSJW-SP@8W

Ethylbenzene		126	120	23	ug/kg	SW846 8260B
TPH-GRO (C6-C10)		59100	12000	6000	ug/kg	SW846 8260B
TPH-DRO (C10-C28)		9760	150	110	mg/kg	SW846-8015B

D56367-10 CMSJW-BG3

Arsenic		2.7	0.11		mg/kg	SW846 6020A
Barium		142	1.1		mg/kg	SW846 6010C
Chromium		7.2	1.1		mg/kg	SW846 6010C
Copper		7.7	1.1		mg/kg	SW846 6010C
Lead		10.9	5.7		mg/kg	SW846 6010C
Nickel		7.7	3.4		mg/kg	SW846 6010C
Zinc		53.4	3.4		mg/kg	SW846 6010C
Specific Conductivity		753	1.0		umhos/cm	SM 2510B-2011 MOD
Chromium, Trivalent ^a		6.9	2.1		mg/kg	SW846 3060A/7196A M
Redox Potential Vs H2		440			mv	ASTM D1498-76M
pH		8.41			su	SW846 9045D

D56367-10A CMSJW-BG3

Calcium		53.8	2.0		mg/l	SW846 6010C
Magnesium		5.80	1.0		mg/l	SW846 6010C
Sodium		93.6	2.0		mg/l	SW846 6010C
Sodium Adsorption Ratio ^b		3.23			ratio	USDA HANDBOOK 60

(a) Calculated as: (Chromium) - (Chromium, Hexavalent)
 (b) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

Sample Results

Report of Analysis

Report of Analysis

Client Sample ID: CMOW-BG1@0.2 Lab Sample ID: D56367-1 Matrix: SO - Soil Project: CM Production-S.J. Warren #1	Date Sampled: 03/27/14 Date Received: 03/28/14 Percent Solids: 86.2
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Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Arsenic	3.6	0.11	mg/kg	5	04/01/14	04/04/14 NT	SW846 6020A ⁴	SW846 3050B ⁶
Barium	157	1.1	mg/kg	1	04/01/14	04/01/14 KV	SW846 6010C ¹	SW846 3050B ⁵
Cadmium	< 1.1	1.1	mg/kg	1	04/01/14	04/01/14 KV	SW846 6010C ¹	SW846 3050B ⁵
Chromium	7.9	1.1	mg/kg	1	04/01/14	04/01/14 KV	SW846 6010C ¹	SW846 3050B ⁵
Copper	11.8	1.1	mg/kg	1	04/01/14	04/02/14 KV	SW846 6010C ²	SW846 3050B ⁵
Lead	10.5	5.7	mg/kg	1	04/01/14	04/01/14 KV	SW846 6010C ¹	SW846 3050B ⁵
Mercury	< 0.091	0.091	mg/kg	1	04/03/14	04/03/14 KV	SW846 7471B ³	SW846 7471B ⁷
Nickel	8.1	3.4	mg/kg	1	04/01/14	04/01/14 KV	SW846 6010C ¹	SW846 3050B ⁵
Selenium	< 5.7	5.7	mg/kg	1	04/01/14	04/01/14 KV	SW846 6010C ¹	SW846 3050B ⁵
Silver	< 3.4	3.4	mg/kg	1	04/01/14	04/01/14 KV	SW846 6010C ¹	SW846 3050B ⁵
Zinc	53.2	3.4	mg/kg	1	04/01/14	04/01/14 KV	SW846 6010C ¹	SW846 3050B ⁵

- (1) Instrument QC Batch: MA4609
- (2) Instrument QC Batch: MA4617
- (3) Instrument QC Batch: MA4621
- (4) Instrument QC Batch: MA4626
- (5) Prep QC Batch: MP12622
- (6) Prep QC Batch: MP12624
- (7) Prep QC Batch: MP12636

RL = Reporting Limit

4.1
4

Report of Analysis

Client Sample ID: CMOW-BG1@0.2 Lab Sample ID: D56367-1 Matrix: SO - Soil Project: CM Production-S.J. Warren #1	Date Sampled: 03/27/14 Date Received: 03/28/14 Percent Solids: 86.2
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General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
%solids							
Solids, Percent	86.2		%	1	04/01/14	SWT	SM2540G-2011 M
prep: DEPT.OF AG, BOOK N9							
Specific Conductivity	1170	1.0	umhos/cm	1	04/01/14	AK	SM 2510B-2011 MOD
Chromium, Hexavalent	< 1.0	1.0	mg/kg	1	04/07/14	AK	SW846 3060A/7196A
Chromium, Trivalent ^a	7.9	2.1	mg/kg	1	04/07/14	AK	SW846 3060A/7196A M
Redox Potential Vs H2	523		mv	1	03/31/14	JD	ASTM D1498-76M
pH	7.83		su	1	03/31/14 13:00	JB	SW846 9045D

(a) Calculated as: (Chromium) - (Chromium, Hexavalent)

RL = Reporting Limit

4.1
4

Report of Analysis

Client Sample ID: CMOW-BG1@0.2	Date Sampled: 03/27/14
Lab Sample ID: D56367-1A	Date Received: 03/28/14
Matrix: SO - Soil	Percent Solids: 86.2
Project: CM Production-S.J. Warren #1	

SAR Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Calcium	90.6	2.0	mg/l	1	04/02/14	04/03/14 JB	SW846 6010C ²	SW846 3010A/M ³
Magnesium	23.5	1.0	mg/l	1	04/02/14	04/02/14 KV	SW846 6010C ¹	SW846 3010A/M ³
Sodium	33.5	2.0	mg/l	1	04/02/14	04/03/14 JB	SW846 6010C ²	SW846 3010A/M ³

- (1) Instrument QC Batch: MA4617
- (2) Instrument QC Batch: MA4620
- (3) Prep QC Batch: MP12634

RL = Reporting Limit

4.2
4

Report of Analysis

Client Sample ID: CMOW-BG1@0.2	Date Sampled: 03/27/14
Lab Sample ID: D56367-1A	Date Received: 03/28/14
Matrix: SO - Soil	Percent Solids: 86.2
Project: CM Production-S.J. Warren #1	

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio ^a	0.811		ratio	1	04/03/14 18:47	JB	USDA HANDBOOK 60

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

RL = Reporting Limit

4.2
 4

Report of Analysis

Client Sample ID: CMOW-BG2@0.2 Lab Sample ID: D56367-2 Matrix: SO - Soil Project: CM Production-S.J. Warren #1	Date Sampled: 03/27/14 Date Received: 03/28/14 Percent Solids: 86.4
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Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Arsenic	2.6	0.11	mg/kg	5	04/01/14	04/04/14 NT	SW846 6020A ⁴	SW846 3050B ⁶
Barium	142	1.1	mg/kg	1	04/01/14	04/01/14 KV	SW846 6010C ¹	SW846 3050B ⁵
Cadmium	< 1.1	1.1	mg/kg	1	04/01/14	04/01/14 KV	SW846 6010C ¹	SW846 3050B ⁵
Chromium	6.1	1.1	mg/kg	1	04/01/14	04/01/14 KV	SW846 6010C ¹	SW846 3050B ⁵
Copper	8.4	1.1	mg/kg	1	04/01/14	04/02/14 KV	SW846 6010C ²	SW846 3050B ⁵
Lead	8.8	5.3	mg/kg	1	04/01/14	04/01/14 KV	SW846 6010C ¹	SW846 3050B ⁵
Mercury	< 0.088	0.088	mg/kg	1	04/03/14	04/03/14 KV	SW846 7471B ³	SW846 7471B ⁷
Nickel	6.9	3.2	mg/kg	1	04/01/14	04/01/14 KV	SW846 6010C ¹	SW846 3050B ⁵
Selenium	< 5.3	5.3	mg/kg	1	04/01/14	04/01/14 KV	SW846 6010C ¹	SW846 3050B ⁵
Silver	< 3.2	3.2	mg/kg	1	04/01/14	04/01/14 KV	SW846 6010C ¹	SW846 3050B ⁵
Zinc	37.3	3.2	mg/kg	1	04/01/14	04/01/14 KV	SW846 6010C ¹	SW846 3050B ⁵

- (1) Instrument QC Batch: MA4609
- (2) Instrument QC Batch: MA4617
- (3) Instrument QC Batch: MA4621
- (4) Instrument QC Batch: MA4626
- (5) Prep QC Batch: MP12622
- (6) Prep QC Batch: MP12624
- (7) Prep QC Batch: MP12636

RL = Reporting Limit

4.3
4

Report of Analysis

Client Sample ID: CMOW-BG2@0.2 Lab Sample ID: D56367-2 Matrix: SO - Soil Project: CM Production-S.J. Warren #1	Date Sampled: 03/27/14 Date Received: 03/28/14 Percent Solids: 86.4
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General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
%solids							
Solids, Percent	86.4		%	1	04/01/14	SWT	SM2540G-2011 M
prep: DEPT.OF AG, BOOK N9							
Specific Conductivity	534	1.0	umhos/cm	1	04/01/14	AK	SM 2510B-2011 MOD
Chromium, Hexavalent	< 1.0	1.0	mg/kg	1	04/07/14	AK	SW846 3060A/7196A
Chromium, Trivalent ^a	5.5	2.1	mg/kg	1	04/07/14	AK	SW846 3060A/7196A M
Redox Potential Vs H2	459		mv	1	03/31/14	JD	ASTM D1498-76M
pH	8.38		su	1	03/31/14 13:00	JB	SW846 9045D

(a) Calculated as: (Chromium) - (Chromium, Hexavalent)

RL = Reporting Limit

4.3
4

Report of Analysis

Client Sample ID: CMOW-BG2@0.2	Date Sampled: 03/27/14
Lab Sample ID: D56367-2A	Date Received: 03/28/14
Matrix: SO - Soil	Percent Solids: 86.4
Project: CM Production-S.J. Warren #1	

SAR Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Calcium	33.9	2.0	mg/l	1	04/02/14	04/03/14 JB	SW846 6010C ²	SW846 3010A/M ³
Magnesium	5.35	1.0	mg/l	1	04/02/14	04/02/14 KV	SW846 6010C ¹	SW846 3010A/M ³
Sodium	22.1	2.0	mg/l	1	04/02/14	04/03/14 JB	SW846 6010C ²	SW846 3010A/M ³

- (1) Instrument QC Batch: MA4617
- (2) Instrument QC Batch: MA4620
- (3) Prep QC Batch: MP12634

RL = Reporting Limit

4.4
4

Report of Analysis

Client Sample ID: CMOW-BG2@0.2		Date Sampled: 03/27/14
Lab Sample ID: D56367-2A		Date Received: 03/28/14
Matrix: SO - Soil		Percent Solids: 86.4
Project: CM Production-S.J. Warren #1		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio ^a	0.930		ratio	1	04/03/14 18:52	JB	USDA HANDBOOK 60

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

RL = Reporting Limit

4.4
4

Report of Analysis

Client Sample ID: CMSJW-SP@9E		Date Sampled: 03/27/14
Lab Sample ID: D56367-3		Date Received: 03/28/14
Matrix: SO - Soil		Percent Solids: 74.3
Method: SW846 8260B		
Project: CM Production-S.J. Warren #1		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	5V31480.D	1	04/05/14	JL	n/a	n/a	V5V1885
Run #2	3V29999.D	1	04/10/14	JL	n/a	n/a	V3V1753

Run #	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.06 g	5.0 ml	100 ul
Run #2	5.06 g	5.0 ml	50.0 ul

Purgeable Aromatics+ GRO

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	221	84	32	ug/kg	
108-88-3	Toluene	ND	170	84	ug/kg	
100-41-4	Ethylbenzene	20700 ^a	340	64	ug/kg	
1330-20-7	Xylene (total)	206	340	170	ug/kg	J
	TPH-GRO (C6-C10)	323000	17000	8400	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
2037-26-5	Toluene-D8	91%	98%	64-130%
460-00-4	4-Bromofluorobenzene	112%	121%	62-131%
17060-07-0	1,2-Dichloroethane-D4	77%	101%	70-130%

(a) Result is from Run# 2

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

4.5
4

Report of Analysis

Client Sample ID:	CMSJW-SP@9E	Date Sampled:	03/27/14
Lab Sample ID:	D56367-3	Date Received:	03/28/14
Matrix:	SO - Soil	Percent Solids:	74.3
Method:	SW846-8015B SW846 3546		
Project:	CM Production-S.J. Warren #1		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	FI11834.D	50	04/10/14	JJ	04/04/14	OP9681	GFI741
Run #2							

Run #	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)	6460	450	340	mg/kg	
CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits		
84-15-1	o-Terphenyl	71%		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

4.5
4

Report of Analysis

Client Sample ID: CMSJW-SP@10.5E		Date Sampled: 03/27/14
Lab Sample ID: D56367-4		Date Received: 03/28/14
Matrix: SO - Soil		Percent Solids: 83.8
Method: SW846 8260B		
Project: CM Production-S.J. Warren #1		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	5V31481.D	1	04/05/14	JL	n/a	n/a	V5V1885
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	37.1	69	26	ug/kg	J
108-88-3	Toluene	ND	140	69	ug/kg	
100-41-4	Ethylbenzene	4170	140	26	ug/kg	
1330-20-7	Xylene (total)	1000	280	140	ug/kg	
	TPH-GRO (C6-C10)	155000	14000	6900	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
2037-26-5	Toluene-D8	89%		64-130%
460-00-4	4-Bromofluorobenzene	105%		62-131%
17060-07-0	1,2-Dichloroethane-D4	76%		70-130%

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

4.6
4

Report of Analysis

Client Sample ID:	CMSJW-SP@10.5E	Date Sampled:	03/27/14
Lab Sample ID:	D56367-4	Date Received:	03/28/14
Matrix:	SO - Soil	Percent Solids:	83.8
Method:	SW846 8270C BY SIM SW846 3546		
Project:	CM Production-S.J. Warren #1		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	3G18925.D	5	04/05/14	DC	04/03/14	OP9676	E3G938
Run #2							

	Initial Weight	Final Volume
Run #1	30.2 g	2.0 ml
Run #2		

COGCC Table 910-1 PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	51	40	ug/kg	
120-12-7	Anthracene	ND	51	36	ug/kg	
56-55-3	Benzo(a)anthracene	ND	51	25	ug/kg	
205-99-2	Benzo(b)fluoranthene	419	51	32	ug/kg	
207-08-9	Benzo(k)fluoranthene	ND	51	25	ug/kg	
50-32-8	Benzo(a)pyrene	206	51	25	ug/kg	
218-01-9	Chrysene	2680	51	25	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	51	25	ug/kg	
206-44-0	Fluoranthene	547	51	29	ug/kg	
86-73-7	Fluorene	5450	51	37	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	51	25	ug/kg	
91-20-3	Naphthalene	18000	51	31	ug/kg	
129-00-0	Pyrene	1580	51	30	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
4165-60-0	Nitrobenzene-d5	144%		10-175%
321-60-8	2-Fluorobiphenyl	82%		25-130%
1718-51-0	Terphenyl-d14	113%		41-133%

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: CMSJW-SP@10.5E	Date Sampled: 03/27/14
Lab Sample ID: D56367-4	Date Received: 03/28/14
Matrix: SO - Soil	Percent Solids: 83.8
Method: SW846-8015B SW846 3540C	
Project: CM Production-S.J. Warren #1	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	FD30270.D	10	04/10/14	JJ	04/07/14	OP9692	GFD1463
Run #2							

Run #	Initial Weight	Final Volume
Run #1	30.1 g	2.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	8660	160	120	mg/kg	
CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits		
84-15-1	o-Terphenyl	84%		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

4.6
4

Report of Analysis

Client Sample ID: CMSJW-SP@4.5N	Date Sampled: 03/27/14
Lab Sample ID: D56367-5	Date Received: 03/28/14
Matrix: SO - Soil	Percent Solids: 83.7
Method: SW846 8260B	
Project: CM Production-S.J. Warren #1	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	5V31482.D	1	04/05/14	JL	n/a	n/a	V5V1885
Run #2							

Run #	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.02 g	5.0 ml	100 ul
Run #2			

Purgeable Aromatics+ GRO

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	67.1	69	26	ug/kg	J
108-88-3	Toluene	ND	140	69	ug/kg	
100-41-4	Ethylbenzene	4900	140	26	ug/kg	
1330-20-7	Xylene (total)	ND	280	140	ug/kg	
	TPH-GRO (C6-C10)	104000	14000	6900	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
2037-26-5	Toluene-D8	89%		64-130%
460-00-4	4-Bromofluorobenzene	130%		62-131%
17060-07-0	1,2-Dichloroethane-D4	72%		70-130%

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

4.7
4

Report of Analysis

Client Sample ID: CMSJW-SP@4.5N	
Lab Sample ID: D56367-5	Date Sampled: 03/27/14
Matrix: SO - Soil	Date Received: 03/28/14
Method: SW846 8270C BY SIM SW846 3546	Percent Solids: 83.7
Project: CM Production-S.J. Warren #1	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	3G18926.D	5	04/05/14	DC	04/03/14	OP9676	E3G938
Run #2							

Run #	Initial Weight	Final Volume
Run #1	30.1 g	10.0 ml
Run #2		

COGCC Table 910-1 PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	2020	260	200	ug/kg	
120-12-7	Anthracene	ND	260	180	ug/kg	
56-55-3	Benzo(a)anthracene	ND	260	120	ug/kg	
205-99-2	Benzo(b)fluoranthene	865	260	160	ug/kg	
207-08-9	Benzo(k)fluoranthene	ND	260	130	ug/kg	
50-32-8	Benzo(a)pyrene	447	260	120	ug/kg	
218-01-9	Chrysene	5110	260	120	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	260	120	ug/kg	
206-44-0	Fluoranthene	ND	260	140	ug/kg	
86-73-7	Fluorene	11900	260	180	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	260	120	ug/kg	
91-20-3	Naphthalene	22000	260	150	ug/kg	
129-00-0	Pyrene	3010	260	150	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
4165-60-0	Nitrobenzene-d5	125%		10-175%
321-60-8	2-Fluorobiphenyl	119%		25-130%
1718-51-0	Terphenyl-d14	137% ^a		41-133%

(a) Outside control limits due to dilution.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

4.7
 4

Report of Analysis

Client Sample ID: CMSJW-SP@4.5N	Date Sampled: 03/27/14
Lab Sample ID: D56367-5	Date Received: 03/28/14
Matrix: SO - Soil	Percent Solids: 83.7
Method: SW846-8015B SW846 3540C	
Project: CM Production-S.J. Warren #1	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	FD30272.D	10	04/10/14	JJ	04/07/14	OP9692	GFD1463
Run #2							

Run #	Initial Weight	Final Volume
Run #1	30.0 g	2.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	11600	160	120	mg/kg	
CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits		
84-15-1	o-Terphenyl	72%		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

4.7
4

Report of Analysis

Client Sample ID: CMSJW-SP@4.5N**Lab Sample ID:** D56367-5**Matrix:** SO - Soil**Project:** CM Production-S.J. Warren #1**Date Sampled:** 03/27/14**Date Received:** 03/28/14**Percent Solids:** 83.7**Metals Analysis**

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Arsenic	6.3	0.11	mg/kg	5	04/01/14	04/04/14 NT	SW846 6020A ⁴	SW846 3050B ⁶
Barium	143	1.1	mg/kg	1	04/01/14	04/01/14 KV	SW846 6010C ¹	SW846 3050B ⁵
Cadmium	< 1.1	1.1	mg/kg	1	04/01/14	04/01/14 KV	SW846 6010C ¹	SW846 3050B ⁵
Chromium	8.3	1.1	mg/kg	1	04/01/14	04/01/14 KV	SW846 6010C ¹	SW846 3050B ⁵
Copper	17.4	1.1	mg/kg	1	04/01/14	04/02/14 KV	SW846 6010C ²	SW846 3050B ⁵
Lead	17.9	5.5	mg/kg	1	04/01/14	04/01/14 KV	SW846 6010C ¹	SW846 3050B ⁵
Mercury	< 0.092	0.092	mg/kg	1	04/03/14	04/03/14 KV	SW846 7471B ³	SW846 7471B ⁷
Nickel	15.2	3.3	mg/kg	1	04/01/14	04/01/14 KV	SW846 6010C ¹	SW846 3050B ⁵
Selenium	< 5.5	5.5	mg/kg	1	04/01/14	04/02/14 KV	SW846 6010C ²	SW846 3050B ⁵
Silver	< 3.3	3.3	mg/kg	1	04/01/14	04/01/14 KV	SW846 6010C ¹	SW846 3050B ⁵
Zinc	870	3.3	mg/kg	1	04/01/14	04/01/14 KV	SW846 6010C ¹	SW846 3050B ⁵

(1) Instrument QC Batch: MA4609

(2) Instrument QC Batch: MA4617

(3) Instrument QC Batch: MA4621

(4) Instrument QC Batch: MA4626

(5) Prep QC Batch: MP12622

(6) Prep QC Batch: MP12624

(7) Prep QC Batch: MP12636

RL = Reporting Limit

Report of Analysis

Client Sample ID: CMSJW-SP@4.5N		Date Sampled: 03/27/14
Lab Sample ID: D56367-5		Date Received: 03/28/14
Matrix: SO - Soil		Percent Solids: 83.7
Project: CM Production-S.J. Warren #1		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
%solids							
Solids, Percent	83.7		%	1	04/01/14	SWT	SM2540G-2011 M
prep: DEPT.OF AG, BOOK N9							
Specific Conductivity	542	1.0	umhos/cm	1	04/01/14	AK	SM 2510B-2011 MOD
Chromium, Hexavalent	< 1.0	1.0	mg/kg	1	04/07/14	AK	SW846 3060A/7196A
Chromium, Trivalent ^a	8.3	2.1	mg/kg	1	04/07/14	AK	SW846 3060A/7196A M
Redox Potential Vs H2	304		mv	1	03/31/14	JD	ASTM D1498-76M
pH	8.52		su	1	03/31/14 13:00	JB	SW846 9045D

(a) Calculated as: (Chromium) - (Chromium, Hexavalent)

RL = Reporting Limit

4.7
4

Report of Analysis

Client Sample ID: CMSJW-SP@4.5N Lab Sample ID: D56367-5A Matrix: SO - Soil Project: CM Production-S.J. Warren #1	Date Sampled: 03/27/14 Date Received: 03/28/14 Percent Solids: 83.7
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SAR Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Calcium	5.68	2.0	mg/l	1	04/02/14	04/03/14 JB	SW846 6010C ²	SW846 3010A/M ³
Magnesium	< 1.0	1.0	mg/l	1	04/02/14	04/02/14 KV	SW846 6010C ¹	SW846 3010A/M ³
Sodium	124	2.0	mg/l	1	04/02/14	04/03/14 JB	SW846 6010C ²	SW846 3010A/M ³

- (1) Instrument QC Batch: MA4617
- (2) Instrument QC Batch: MA4620
- (3) Prep QC Batch: MP12634

RL = Reporting Limit

4.8
4

Report of Analysis

Client Sample ID: CMSJW-SP@4.5N	Date Sampled: 03/27/14
Lab Sample ID: D56367-5A	Date Received: 03/28/14
Matrix: SO - Soil	Percent Solids: 83.7
Project: CM Production-S.J. Warren #1	

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio ^a	12.6		ratio	1	04/03/14 18:57	JB	USDA HANDBOOK 60

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

RL = Reporting Limit

Report of Analysis

Client Sample ID: CMSJW-SP@8N		Date Sampled: 03/27/14
Lab Sample ID: D56367-6		Date Received: 03/28/14
Matrix: SO - Soil		Percent Solids: 83.4
Method: SW846 8260B		
Project: CM Production-S.J. Warren #1		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	3V29949.D	1	04/09/14	JL	n/a	n/a	V3V1751
Run #2							

Run #	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	90.5	69	26	ug/kg	
108-88-3	Toluene	ND	140	69	ug/kg	
100-41-4	Ethylbenzene	6960	140	26	ug/kg	
1330-20-7	Xylene (total)	ND	280	140	ug/kg	
	TPH-GRO (C6-C10)	317000	14000	6900	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
2037-26-5	Toluene-D8	94%		64-130%
460-00-4	4-Bromofluorobenzene	126%		62-131%
17060-07-0	1,2-Dichloroethane-D4	103%		70-130%

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

4.9
4

Report of Analysis

Client Sample ID: CMSJW-SP@8N Lab Sample ID: D56367-6 Matrix: SO - Soil Method: SW846-8015B SW846 3540C Project: CM Production-S.J. Warren #1	Date Sampled: 03/27/14 Date Received: 03/28/14 Percent Solids: 83.4
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	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	FD30274.D	10	04/10/14	JJ	04/07/14	OP9692	GFD1463
Run #2							

	Initial Weight	Final Volume
Run #1	30.1 g	2.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	11300	160	120	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

4.9
4

Report of Analysis

Client Sample ID: CMSJW-SP@8S	Date Sampled: 03/27/14
Lab Sample ID: D56367-7	Date Received: 03/28/14
Matrix: SO - Soil	Percent Solids: 91.5
Method: SW846 8260B	
Project: CM Production-S.J. Warren #1	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	3V29950.D	1	04/09/14	JL	n/a	n/a	V3V1751
Run #2							

Run #	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.02 g	5.0 ml	100 ul
Run #2			

Purgeable Aromatics+ GRO

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	59	22	ug/kg	
108-88-3	Toluene	ND	120	59	ug/kg	
100-41-4	Ethylbenzene	ND	120	22	ug/kg	
1330-20-7	Xylene (total)	ND	240	120	ug/kg	
	TPH-GRO (C6-C10)	ND	12000	5900	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
2037-26-5	Toluene-D8	90%		64-130%
460-00-4	4-Bromofluorobenzene	104%		62-131%
17060-07-0	1,2-Dichloroethane-D4	103%		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

4.10
 4

Report of Analysis

Client Sample ID: CMSJW-SP@8S		Date Sampled: 03/27/14
Lab Sample ID: D56367-7		Date Received: 03/28/14
Matrix: SO - Soil		Percent Solids: 91.5
Method: SW846 8270C BY SIM SW846 3546		
Project: CM Production-S.J. Warren #1		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	3G18922.D	1	04/05/14	DC	04/03/14	OP9676	E3G938
Run #2							

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

COGCC Table 910-1 PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	4.7	3.6	ug/kg	
120-12-7	Anthracene	ND	4.7	3.3	ug/kg	
56-55-3	Benzo(a)anthracene	ND	4.7	2.3	ug/kg	
205-99-2	Benzo(b)fluoranthene	ND	4.7	2.9	ug/kg	
207-08-9	Benzo(k)fluoranthene	ND	4.7	2.3	ug/kg	
50-32-8	Benzo(a)pyrene	ND	4.7	2.3	ug/kg	
218-01-9	Chrysene	ND	4.7	2.3	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	4.7	2.3	ug/kg	
206-44-0	Fluoranthene	ND	4.7	2.6	ug/kg	
86-73-7	Fluorene	ND	4.7	3.4	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	4.7	2.3	ug/kg	
91-20-3	Naphthalene	ND	4.7	2.8	ug/kg	
129-00-0	Pyrene	ND	4.7	2.8	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
4165-60-0	Nitrobenzene-d5	107%		10-175%
321-60-8	2-Fluorobiphenyl	92%		25-130%
1718-51-0	Terphenyl-d14	119%		41-133%

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

4.10
 4

Report of Analysis

Client Sample ID: CMSJW-SP@8S	Date Sampled: 03/27/14
Lab Sample ID: D56367-7	Date Received: 03/28/14
Matrix: SO - Soil	Percent Solids: 91.5
Method: SW846-8015B SW846 3540C	
Project: CM Production-S.J. Warren #1	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	FI11780.D	1	04/09/14	JJ	04/07/14	OP9692	GF1739
Run #2							

Run #	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	7.3	5.4	mg/kg	
CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits		
84-15-1	o-Terphenyl	69%		20-130%		

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

4.10
4

Report of Analysis

Client Sample ID: CMSJW-SP@5W		Date Sampled: 03/27/14
Lab Sample ID: D56367-8		Date Received: 03/28/14
Matrix: SO - Soil		Percent Solids: 71.1
Method: SW846 8260B		
Project: CM Production-S.J. Warren #1		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	3V29951.D	1	04/09/14	JL	n/a	n/a	V3V1751
Run #2							

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.06 g	5.0 ml	100 ul
Run #2			

Purgeable Aromatics+ GRO

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	199	90	34	ug/kg	
108-88-3	Toluene	ND	180	90	ug/kg	
100-41-4	Ethylbenzene	17900	180	34	ug/kg	
1330-20-7	Xylene (total)	ND	360	180	ug/kg	
	TPH-GRO (C6-C10)	483000	18000	9000	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
2037-26-5	Toluene-D8	96%		64-130%
460-00-4	4-Bromofluorobenzene	129%		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

Client Sample ID: CMSJW-SP@5W		Date Sampled: 03/27/14
Lab Sample ID: D56367-8		Date Received: 03/28/14
Matrix: SO - Soil		Percent Solids: 71.1
Method: SW846 8270C BY SIM SW846 3546		
Project: CM Production-S.J. Warren #1		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	3G18927.D	5	04/05/14	DC	04/03/14	OP9676	E3G938
Run #2							

Run #	Initial Weight	Final Volume
Run #1	30.0 g	15.0 ml
Run #2		

COGCC Table 910-1 PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	4020	460	350	ug/kg	
120-12-7	Anthracene	ND	460	320	ug/kg	
56-55-3	Benzo(a)anthracene	ND	460	220	ug/kg	
205-99-2	Benzo(b)fluoranthene	1850	460	280	ug/kg	
207-08-9	Benzo(k)fluoranthene	ND	460	230	ug/kg	
50-32-8	Benzo(a)pyrene	890	460	220	ug/kg	
218-01-9	Chrysene	10500	460	220	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	460	220	ug/kg	
206-44-0	Fluoranthene	ND	460	260	ug/kg	
86-73-7	Fluorene	21700	460	330	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	460	220	ug/kg	
91-20-3	Naphthalene	48300	460	270	ug/kg	
129-00-0	Pyrene	6220	460	270	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
4165-60-0	Nitrobenzene-d5	106%		10-175%
321-60-8	2-Fluorobiphenyl	108%		25-130%
1718-51-0	Terphenyl-d14	141% ^a		41-133%

(a) Outside control limits due to dilution.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

4.11
4

Report of Analysis

Client Sample ID: CMSJW-SP@5W	Date Sampled: 03/27/14
Lab Sample ID: D56367-8	Date Received: 03/28/14
Matrix: SO - Soil	Percent Solids: 71.1
Method: SW846-8015B SW846 3540C	
Project: CM Production-S.J. Warren #1	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	FD30276.D	10	04/10/14	JJ	04/07/14	OP9692	GFD1463
Run #2							

Run #	Initial Weight	Final Volume
Run #1	30.1 g	2.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	11500	190	140	mg/kg	
CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits		
84-15-1	o-Terphenyl	50%		20-130%		

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

4.11
4

Report of Analysis

Client Sample ID: CMSJW-SP@5W Lab Sample ID: D56367-8 Matrix: SO - Soil Project: CM Production-S.J. Warren #1	Date Sampled: 03/27/14 Date Received: 03/28/14 Percent Solids: 71.1
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Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Arsenic	3.3	0.13	mg/kg	5	04/01/14	04/04/14 NT	SW846 6020A ⁴	SW846 3050B ⁶
Barium	223	1.3	mg/kg	1	04/01/14	04/01/14 KV	SW846 6010C ¹	SW846 3050B ⁵
Cadmium	< 1.3	1.3	mg/kg	1	04/01/14	04/01/14 KV	SW846 6010C ¹	SW846 3050B ⁵
Chromium	9.3	1.3	mg/kg	1	04/01/14	04/01/14 KV	SW846 6010C ¹	SW846 3050B ⁵
Copper	12.2	1.3	mg/kg	1	04/01/14	04/02/14 KV	SW846 6010C ²	SW846 3050B ⁵
Lead	12.8	6.6	mg/kg	1	04/01/14	04/01/14 KV	SW846 6010C ¹	SW846 3050B ⁵
Mercury	< 0.11	0.11	mg/kg	1	04/03/14	04/03/14 KV	SW846 7471B ³	SW846 7471B ⁷
Nickel	12.1	3.9	mg/kg	1	04/01/14	04/01/14 KV	SW846 6010C ¹	SW846 3050B ⁵
Selenium	< 6.6	6.6	mg/kg	1	04/01/14	04/01/14 KV	SW846 6010C ¹	SW846 3050B ⁵
Silver	< 3.9	3.9	mg/kg	1	04/01/14	04/01/14 KV	SW846 6010C ¹	SW846 3050B ⁵
Zinc	518	3.9	mg/kg	1	04/01/14	04/01/14 KV	SW846 6010C ¹	SW846 3050B ⁵

- (1) Instrument QC Batch: MA4609
- (2) Instrument QC Batch: MA4617
- (3) Instrument QC Batch: MA4621
- (4) Instrument QC Batch: MA4626
- (5) Prep QC Batch: MP12622
- (6) Prep QC Batch: MP12624
- (7) Prep QC Batch: MP12636

RL = Reporting Limit

4.11
4

Report of Analysis

Client Sample ID: CMSJW-SP@5W	Date Sampled: 03/27/14
Lab Sample ID: D56367-8	Date Received: 03/28/14
Matrix: SO - Soil	Percent Solids: 71.1
Project: CM Production-S.J. Warren #1	

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
%solids							
Solids, Percent	71.1		%	1	04/01/14	SWT	SM2540G-2011 M
prep: DEPT.OF AG, BOOK N9							
Specific Conductivity	650	1.0	umhos/cm	1	04/01/14	AK	SM 2510B-2011 MOD
Chromium, Hexavalent	< 1.0	1.0	mg/kg	1	04/07/14	AK	SW846 3060A/7196A
Chromium, Trivalent ^a	9.3	2.3	mg/kg	1	04/07/14	AK	SW846 3060A/7196A M
Redox Potential Vs H2	352		mv	1	03/31/14	JD	ASTM D1498-76M
pH	9.09		su	1	03/31/14 13:00	JB	SW846 9045D

(a) Calculated as: (Chromium) - (Chromium, Hexavalent)

RL = Reporting Limit

4.11
 4

Report of Analysis

Client Sample ID: CMSJW-SP@5W	Date Sampled: 03/27/14
Lab Sample ID: D56367-8A	Date Received: 03/28/14
Matrix: SO - Soil	Percent Solids: 71.1
Project: CM Production-S.J. Warren #1	

SAR Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Calcium	5.72	2.0	mg/l	1	04/02/14	04/03/14 JB	SW846 6010C ²	SW846 3010A/M ³
Magnesium	1.10	1.0	mg/l	1	04/02/14	04/02/14 KV	SW846 6010C ¹	SW846 3010A/M ³
Sodium	158	2.0	mg/l	1	04/02/14	04/03/14 JB	SW846 6010C ²	SW846 3010A/M ³

(1) Instrument QC Batch: MA4617

(2) Instrument QC Batch: MA4620

(3) Prep QC Batch: MP12634

RL = Reporting Limit

4.12
4

Report of Analysis

Client Sample ID: CMSJW-SP@5W		Date Sampled: 03/27/14
Lab Sample ID: D56367-8A		Date Received: 03/28/14
Matrix: SO - Soil		Percent Solids: 71.1
Project: CM Production-S.J. Warren #1		

4.12
4

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio ^a	15.8		ratio	1	04/03/14 19:02	JB	USDA HANDBOOK 60

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

RL = Reporting Limit

Report of Analysis

Client Sample ID: CMSJW-SP@8W	Date Sampled: 03/27/14
Lab Sample ID: D56367-9	Date Received: 03/28/14
Matrix: SO - Soil	Percent Solids: 90.5
Method: SW846 8260B	
Project: CM Production-S.J. Warren #1	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	3V29952.D	1	04/09/14	JL	n/a	n/a	V3V1751
Run #2							

Run #	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	60	23	ug/kg	
108-88-3	Toluene	ND	120	60	ug/kg	
100-41-4	Ethylbenzene	126	120	23	ug/kg	
1330-20-7	Xylene (total)	ND	240	120	ug/kg	
	TPH-GRO (C6-C10)	59100	12000	6000	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
2037-26-5	Toluene-D8	91%		64-130%
460-00-4	4-Bromofluorobenzene	113%		62-131%
17060-07-0	1,2-Dichloroethane-D4	101%		70-130%

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

4.13
4

Report of Analysis

Client Sample ID: CMSJW-SP@8W	Date Sampled: 03/27/14
Lab Sample ID: D56367-9	Date Received: 03/28/14
Matrix: SO - Soil	Percent Solids: 90.5
Method: SW846-8015B SW846 3540C	
Project: CM Production-S.J. Warren #1	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	FD30278.D	10	04/10/14	JJ	04/07/14	OP9692	GFD1463
Run #2							

Run #	Initial Weight	Final Volume
Run #1	30.0 g	2.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	9760	150	110	mg/kg	
CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits		
84-15-1	o-Terphenyl	80%		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

4.13
4

Report of Analysis

Client Sample ID: CMSJW-BG3	Date Sampled: 03/27/14
Lab Sample ID: D56367-10	Date Received: 03/28/14
Matrix: SO - Soil	Percent Solids: 87.4
Project: CM Production-S.J. Warren #1	

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Arsenic	2.7	0.11	mg/kg	5	04/01/14	04/04/14 NT	SW846 6020A ⁴	SW846 3050B ⁶
Barium	142	1.1	mg/kg	1	04/01/14	04/01/14 KV	SW846 6010C ¹	SW846 3050B ⁵
Cadmium	< 1.1	1.1	mg/kg	1	04/01/14	04/01/14 KV	SW846 6010C ¹	SW846 3050B ⁵
Chromium	7.2	1.1	mg/kg	1	04/01/14	04/02/14 KV	SW846 6010C ²	SW846 3050B ⁵
Copper	7.7	1.1	mg/kg	1	04/01/14	04/02/14 KV	SW846 6010C ²	SW846 3050B ⁵
Lead	10.9	5.7	mg/kg	1	04/01/14	04/01/14 KV	SW846 6010C ¹	SW846 3050B ⁵
Mercury	< 0.092	0.092	mg/kg	1	04/03/14	04/03/14 KV	SW846 7471B ³	SW846 7471B ⁷
Nickel	7.7	3.4	mg/kg	1	04/01/14	04/01/14 KV	SW846 6010C ¹	SW846 3050B ⁵
Selenium	< 5.7	5.7	mg/kg	1	04/01/14	04/01/14 KV	SW846 6010C ¹	SW846 3050B ⁵
Silver	< 3.4	3.4	mg/kg	1	04/01/14	04/01/14 KV	SW846 6010C ¹	SW846 3050B ⁵
Zinc	53.4	3.4	mg/kg	1	04/01/14	04/01/14 KV	SW846 6010C ¹	SW846 3050B ⁵

- (1) Instrument QC Batch: MA4609
- (2) Instrument QC Batch: MA4617
- (3) Instrument QC Batch: MA4621
- (4) Instrument QC Batch: MA4626
- (5) Prep QC Batch: MP12622
- (6) Prep QC Batch: MP12624
- (7) Prep QC Batch: MP12636

RL = Reporting Limit

Report of Analysis

Client Sample ID: CMSJW-BG3	Date Sampled: 03/27/14
Lab Sample ID: D56367-10	Date Received: 03/28/14
Matrix: SO - Soil	Percent Solids: 87.4
Project: CM Production-S.J. Warren #1	

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
%solids							
Solids, Percent	87.4		%	1	04/01/14	SWT	SM2540G-2011 M
prep: DEPT.OF AG, BOOK N9							
Specific Conductivity	753	1.0	umhos/cm	1	04/08/14	JD	SM 2510B-2011 MOD
Chromium, Hexavalent	< 1.0	1.0	mg/kg	1	04/07/14	AK	SW846 3060A/7196A
Chromium, Trivalent ^a	6.9	2.1	mg/kg	1	04/07/14	AK	SW846 3060A/7196A M
Redox Potential Vs H2	440		mv	1	03/31/14	JD	ASTM D1498-76M
pH	8.41		su	1	03/31/14 13:00	JB	SW846 9045D

(a) Calculated as: (Chromium) - (Chromium, Hexavalent)

RL = Reporting Limit

4.14
4

Report of Analysis

Client Sample ID: CMSJW-BG3	Date Sampled: 03/27/14
Lab Sample ID: D56367-10A	Date Received: 03/28/14
Matrix: SO - Soil	Percent Solids: 87.4
Project: CM Production-S.J. Warren #1	

SAR Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Calcium	53.8	2.0	mg/l	1	04/02/14	04/03/14 JB	SW846 6010C ²	SW846 3010A/M ³
Magnesium	5.80	1.0	mg/l	1	04/02/14	04/02/14 KV	SW846 6010C ¹	SW846 3010A/M ³
Sodium	93.6	2.0	mg/l	1	04/02/14	04/03/14 JB	SW846 6010C ²	SW846 3010A/M ³

- (1) Instrument QC Batch: MA4617
- (2) Instrument QC Batch: MA4620
- (3) Prep QC Batch: MP12634

RL = Reporting Limit

4.15
4

Report of Analysis

Client Sample ID: CMSJW-BG3	Date Sampled: 03/27/14
Lab Sample ID: D56367-10A	Date Received: 03/28/14
Matrix: SO - Soil	Percent Solids: 87.4
Project: CM Production-S.J. Warren #1	

4.15
4

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio ^a	3.23		ratio	1	04/03/14 19:07	JB	USDA HANDBOOK 60

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

RL = Reporting Limit

Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody

GC/MS Volatiles

QC Data Summaries

Includes the following where applicable:

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

Method Blank Summary

Job Number: D56367
Account: COCSCOG Olsson Associates - Denver
Project: CM Production-S.J. Warren #1

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V5V1885-MB	5V31463.D	1	04/04/14	JL	n/a	n/a	V5V1885

The QC reported here applies to the following samples:

Method: SW846 8260B

D56367-3, D56367-4, D56367-5

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	100	ug/kg	
	TPH-GRO (C6-C10)	ND	10000	5000	ug/kg	

CAS No.	Surrogate Recoveries	Limits
2037-26-5	Toluene-D8	89% 64-130%
460-00-4	4-Bromofluorobenzene	98% 62-131%
17060-07-0	1,2-Dichloroethane-D4	83% 70-130%

Method Blank Summary

Job Number: D56367
Account: COCSCOG Olsson Associates - Denver
Project: CM Production-S.J. Warren #1

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V3V1751-MB	3V29940.D	1	04/08/14	JL	n/a	n/a	V3V1751

The QC reported here applies to the following samples:

Method: SW846 8260B

D56367-6, D56367-7, D56367-8, D56367-9

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	100	ug/kg	
	TPH-GRO (C6-C10)	ND	10000	5000	ug/kg	

CAS No.	Surrogate Recoveries	Limits
2037-26-5	Toluene-D8	98% 64-130%
460-00-4	4-Bromofluorobenzene	95% 62-131%
17060-07-0	1,2-Dichloroethane-D4	105% 70-130%

Method Blank Summary

Job Number: D56367
Account: COCSCOG Olsson Associates - Denver
Project: CM Production-S.J. Warren #1

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V3V1753-MB	3V29987.D	1	04/10/14	JL	n/a	n/a	V3V1753

The QC reported here applies to the following samples:

Method: SW846 8260B

D56367-3

CAS No.	Compound	Result	RL	MDL	Units	Q
100-41-4	Ethylbenzene	ND	100	19	ug/kg	

CAS No.	Surrogate Recoveries	Limits	
2037-26-5	Toluene-D8	98%	64-130%
460-00-4	4-Bromofluorobenzene	93%	62-131%
17060-07-0	1,2-Dichloroethane-D4	106%	70-130%

Blank Spike Summary

Job Number: D56367
Account: COCSCOG Olsson Associates - Denver
Project: CM Production-S.J. Warren #1

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V5V1885-BS	5V31464.D	1	04/04/14	JL	n/a	n/a	V5V1885

The QC reported here applies to the following samples:

Method: SW846 8260B

D56367-3, D56367-4, D56367-5

CAS No.	Compound	Spike ug/kg	BSP ug/kg	BSP %	Limits
71-43-2	Benzene	2500	2460	98	70-130
100-41-4	Ethylbenzene	2500	2550	102	70-130
108-88-3	Toluene	2500	2320	93	70-130
1330-20-7	Xylene (total)	7500	7270	97	70-130

CAS No.	Surrogate Recoveries	BSP	Limits
2037-26-5	Toluene-D8	92%	64-130%
460-00-4	4-Bromofluorobenzene	104%	62-131%
17060-07-0	1,2-Dichloroethane-D4	79%	70-130%

* = Outside of Control Limits.

Blank Spike Summary

Job Number: D56367
Account: COCSCOG Olsson Associates - Denver
Project: CM Production-S.J. Warren #1

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V5V1885-BS	5V31465.D	1	04/04/14	JL	n/a	n/a	V5V1885

The QC reported here applies to the following samples:

Method: SW846 8260B

D56367-3, D56367-4, D56367-5

CAS No.	Compound	Spike ug/kg	BSP ug/kg	BSP %	Limits
	TPH-GRO (C6-C10)	110000	77300	70	58-130

CAS No.	Surrogate Recoveries	BSP	Limits
2037-26-5	Toluene-D8	92%	64-130%
460-00-4	4-Bromofluorobenzene	96%	62-131%
17060-07-0	1,2-Dichloroethane-D4	73%	70-130%

* = Outside of Control Limits.

Blank Spike Summary

Job Number: D56367
Account: COCSCOG Olsson Associates - Denver
Project: CM Production-S.J. Warren #1

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V3V1751-BS	3V29941.D	1	04/08/14	JL	n/a	n/a	V3V1751

The QC reported here applies to the following samples:

Method: SW846 8260B

D56367-6, D56367-7, D56367-8, D56367-9

CAS No.	Compound	Spike ug/kg	BSP ug/kg	BSP %	Limits
71-43-2	Benzene	2500	2470	99	70-130
100-41-4	Ethylbenzene	2500	2550	102	70-130
108-88-3	Toluene	2500	2450	98	70-130
1330-20-7	Xylene (total)	7500	7330	98	70-130

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

* = Outside of Control Limits.

Blank Spike Summary

Job Number: D56367
Account: COCSCOG Olsson Associates - Denver
Project: CM Production-S.J. Warren #1

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V3V1751-BS	3V29942.D	1	04/08/14	JL	n/a	n/a	V3V1751

The QC reported here applies to the following samples:

Method: SW846 8260B

D56367-6, D56367-7, D56367-8, D56367-9

CAS No.	Compound	Spike ug/kg	BSP ug/kg	BSP %	Limits
	TPH-GRO (C6-C10)	110000	79900	73	58-130

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

* = Outside of Control Limits.

Blank Spike Summary

Job Number: D56367
Account: COCSCOG Olsson Associates - Denver
Project: CM Production-S.J. Warren #1

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V3V1753-BS	3V29988.D	1	04/10/14	JL	n/a	n/a	V3V1753

The QC reported here applies to the following samples:

Method: SW846 8260B

D56367-3

CAS No.	Compound	Spike ug/kg	BSP ug/kg	BSP %	Limits
100-41-4	Ethylbenzene	2500	2670	107	70-130

CAS No.	Surrogate Recoveries	BSP	Limits
2037-26-5	Toluene-D8	100%	64-130%
460-00-4	4-Bromofluorobenzene	100%	62-131%
17060-07-0	1,2-Dichloroethane-D4	101%	70-130%

* = Outside of Control Limits.

Matrix Spike Summary

Job Number: D56367
Account: COCSCOG Olsson Associates - Denver
Project: CM Production-S.J. Warren #1

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
D56366-2MS	5V31467.D	1	04/04/14	JL	n/a	n/a	V5V1885
D56366-2	5V31469.D	1	04/04/14	JL	n/a	n/a	V5V1885

The QC reported here applies to the following samples:

Method: SW846 8260B

D56367-3, D56367-4, D56367-5

CAS No.	Compound	D56366-2 ug/kg	Spike Q	MS ug/kg	MS %	Limits
71-43-2	Benzene	ND	3790	3400	90	64-139
100-41-4	Ethylbenzene	ND	3790	3330	88	68-136
108-88-3	Toluene	ND	3790	3030	80	60-130
1330-20-7	Xylene (total)	ND	11400	9700	85	58-142

CAS No.	Surrogate Recoveries	MS	D56366-2	Limits
2037-26-5	Toluene-D8	85%	85%	64-130%
460-00-4	4-Bromofluorobenzene	105%	108%	62-131%
17060-07-0	1,2-Dichloroethane-D4	77%	77%	70-130%

* = Outside of Control Limits.

Matrix Spike Summary

Job Number: D56367
Account: COCSCOG Olsson Associates - Denver
Project: CM Production-S.J. Warren #1

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
D56366-2MS	5V31468.D	1	04/04/14	JL	n/a	n/a	V5V1885
D56366-2	5V31469.D	1	04/04/14	JL	n/a	n/a	V5V1885

The QC reported here applies to the following samples:

Method: SW846 8260B

D56367-3, D56367-4, D56367-5

CAS No.	Compound	D56366-2 ug/kg	Spike Q	MS ug/kg	MS %	Limits
	TPH-GRO (C6-C10)	ND		167000	117000	70 14-174

CAS No.	Surrogate Recoveries	MS	D56366-2	Limits
2037-26-5	Toluene-D8	88%	85%	64-130%
460-00-4	4-Bromofluorobenzene	106%	108%	62-131%
17060-07-0	1,2-Dichloroethane-D4	73%	77%	70-130%

* = Outside of Control Limits.

Matrix Spike Summary

Job Number: D56367
Account: COCSCOG Olsson Associates - Denver
Project: CM Production-S.J. Warren #1

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
D56609-10MS	3V29943.D	1	04/09/14	JL	n/a	n/a	V3V1751
D56609-10	3V29945.D	1	04/09/14	JL	n/a	n/a	V3V1751

The QC reported here applies to the following samples:

Method: SW846 8260B

D56367-6, D56367-7, D56367-8, D56367-9

CAS No.	Compound	D56609-10 ug/kg	Spike Q	MS ug/kg	MS %	Limits
71-43-2	Benzene	ND		3610	3310	92 64-139
100-41-4	Ethylbenzene	ND		3610	3410	94 68-136
108-88-3	Toluene	ND		3610	3060	85 60-130
1330-20-7	Xylene (total)	ND		10800	9990	92 58-142

CAS No.	Surrogate Recoveries	MS	D56609-10	Limits
2037-26-5	Toluene-D8	91%	90%	64-130%
460-00-4	4-Bromofluorobenzene	104%	99%	62-131%
17060-07-0	1,2-Dichloroethane-D4	98%	104%	70-130%

* = Outside of Control Limits.

Matrix Spike Summary

Job Number: D56367
Account: COCSCOG Olsson Associates - Denver
Project: CM Production-S.J. Warren #1

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
D56609-10MS	3V29944.D	1	04/09/14	JL	n/a	n/a	V3V1751
D56609-10	3V29945.D	1	04/09/14	JL	n/a	n/a	V3V1751

The QC reported here applies to the following samples:

Method: SW846 8260B

D56367-6, D56367-7, D56367-8, D56367-9

CAS No.	Compound	D56609-10 ug/kg	Spike Q	MS ug/kg	MS %	Limits
	TPH-GRO (C6-C10)	ND		159000	113000	71 14-174

CAS No.	Surrogate Recoveries	MS	D56609-10	Limits
2037-26-5	Toluene-D8	92%	90%	64-130%
460-00-4	4-Bromofluorobenzene	103%	99%	62-131%
17060-07-0	1,2-Dichloroethane-D4	99%	104%	70-130%

* = Outside of Control Limits.

Matrix Spike Summary

Job Number: D56367
Account: COCSCOG Olsson Associates - Denver
Project: CM Production-S.J. Warren #1

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
D56389-18MS	3V29989.D	1	04/10/14	JL	n/a	n/a	V3V1753
D56389-18	3V29990.D	1	04/10/14	JL	n/a	n/a	V3V1753

The QC reported here applies to the following samples:

Method: SW846 8260B

D56367-3

CAS No.	Compound	D56389-18 ug/kg	Spike Q	MS ug/kg	MS %	Limits
100-41-4	Ethylbenzene	ND		3400	3370	99 68-136

CAS No.	Surrogate Recoveries	MS	D56389-18	Limits
2037-26-5	Toluene-D8	92%	89%	64-130%
460-00-4	4-Bromofluorobenzene	105%	100%	62-131%
17060-07-0	1,2-Dichloroethane-D4	101%	104%	70-130%

* = Outside of Control Limits.

Duplicate Summary

Job Number: D56367
Account: COCSCOG Olsson Associates - Denver
Project: CM Production-S.J. Warren #1

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
D56366-3DUP	5V31471.D	1	04/04/14	JL	n/a	n/a	V5V1885
D56366-3	5V31470.D	1	04/04/14	JL	n/a	n/a	V5V1885

The QC reported here applies to the following samples:

Method: SW846 8260B

D56367-3, D56367-4, D56367-5

CAS No.	Compound	D56366-3 ug/kg	DUP 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	D56366-3	Limits
2037-26-5	Toluene-D8	86%	86%	64-130%
460-00-4	4-Bromofluorobenzene	106%	106%	62-131%
17060-07-0	1,2-Dichloroethane-D4	80%	83%	70-130%

* = Outside of Control Limits.

Duplicate Summary

Job Number: D56367
Account: COCSCOG Olsson Associates - Denver
Project: CM Production-S.J. Warren #1

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
D56609-11DUP	3V29947.D	1	04/09/14	JL	n/a	n/a	V3V1751
D56609-11	3V29946.D	1	04/09/14	JL	n/a	n/a	V3V1751

The QC reported here applies to the following samples:

Method: SW846 8260B

D56367-6, D56367-7, D56367-8, D56367-9

CAS No.	Compound	D56609-11 ug/kg	DUP Q	D56609-11 ug/kg	DUP 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	D56609-11	Limits
2037-26-5	Toluene-D8	90%	90%	64-130%
460-00-4	4-Bromofluorobenzene	100%	100%	62-131%
17060-07-0	1,2-Dichloroethane-D4	102%	104%	70-130%

* = Outside of Control Limits.

Duplicate Summary

Job Number: D56367
Account: COCSCOG Olsson Associates - Denver
Project: CM Production-S.J. Warren #1

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
D56577-1DUP	3V29992.D	1	04/10/14	JL	n/a	n/a	V3V1753
D56577-1	3V29991.D	1	04/10/14	JL	n/a	n/a	V3V1753

The QC reported here applies to the following samples:

Method: SW846 8260B

D56367-3

CAS No.	Compound	D56577-1 ug/kg	DUP Q	RPD	Limits
100-41-4	Ethylbenzene	ND	ND	nc	30

CAS No.	Surrogate Recoveries	DUP	D56577-1	Limits
2037-26-5	Toluene-D8	88%	88%	64-130%
460-00-4	4-Bromofluorobenzene	104%	107%	62-131%
17060-07-0	1,2-Dichloroethane-D4	105%	109%	70-130%

* = Outside of Control Limits.

GC/MS Semi-volatiles

QC Data Summaries

Includes the following where applicable:

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

Method Blank Summary

Job Number: D56367
Account: COCSCOG Olsson Associates - Denver
Project: CM Production-S.J. Warren #1

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP9676-MB	3G18904.D	1	04/04/14	DC	04/03/14	OP9676	E3G938

The QC reported here applies to the following samples:

Method: SW846 8270C BY SIM

D56367-4, D56367-5, D56367-7, D56367-8

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	4.3	3.3	ug/kg	
120-12-7	Anthracene	ND	4.3	3.0	ug/kg	
56-55-3	Benzo(a)anthracene	ND	4.3	2.1	ug/kg	
205-99-2	Benzo(b)fluoranthene	ND	4.3	2.7	ug/kg	
207-08-9	Benzo(k)fluoranthene	ND	4.3	2.1	ug/kg	
50-32-8	Benzo(a)pyrene	ND	4.3	2.1	ug/kg	
218-01-9	Chrysene	ND	4.3	2.1	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	4.3	2.1	ug/kg	
206-44-0	Fluoranthene	ND	4.3	2.4	ug/kg	
86-73-7	Fluorene	ND	4.3	3.1	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	4.3	2.1	ug/kg	
91-20-3	Naphthalene	ND	4.3	2.6	ug/kg	
129-00-0	Pyrene	ND	4.3	2.5	ug/kg	

CAS No.	Surrogate Recoveries	Limits
4165-60-0	Nitrobenzene-d5	98% 10-175%
321-60-8	2-Fluorobiphenyl	97% 25-130%
1718-51-0	Terphenyl-d14	110% 41-133%

7.1.1
7

Blank Spike Summary

Job Number: D56367
Account: COCSCOG Olsson Associates - Denver
Project: CM Production-S.J. Warren #1

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP9676-BS	3G18905.D	1	04/04/14	DC	04/03/14	OP9676	E3G938

The QC reported here applies to the following samples:

Method: SW846 8270C BY SIM

D56367-4, D56367-5, D56367-7, D56367-8

CAS No.	Compound	Spike ug/kg	BSP ug/kg	BSP %	Limits
83-32-9	Acenaphthene	83.3	81.7	98	55-130
120-12-7	Anthracene	83.3	74.8	90	60-130
56-55-3	Benzo(a)anthracene	83.3	84.0	101	62-130
205-99-2	Benzo(b)fluoranthene	83.3	64.1	77	55-130
207-08-9	Benzo(k)fluoranthene	83.3	106	127	59-130
50-32-8	Benzo(a)pyrene	83.3	82.3	99	64-130
218-01-9	Chrysene	83.3	89.8	108	70-130
53-70-3	Dibenzo(a,h)anthracene	83.3	84.8	102	56-130
206-44-0	Fluoranthene	83.3	71.5	86	59-130
86-73-7	Fluorene	83.3	79.9	96	58-130
193-39-5	Indeno(1,2,3-cd)pyrene	83.3	84.6	102	60-130
91-20-3	Naphthalene	83.3	82.8	99	56-130
129-00-0	Pyrene	83.3	80.6	97	65-130

CAS No.	Surrogate Recoveries	BSP	Limits
4165-60-0	Nitrobenzene-d5	100%	10-175%
321-60-8	2-Fluorobiphenyl	95%	25-130%
1718-51-0	Terphenyl-d14	107%	41-133%

* = Outside of Control Limits.

7.2.1
 7

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: D56367
Account: COCSCOG Olsson Associates - Denver
Project: CM Production-S.J. Warren #1

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP9676-MS	3G18907.D	1	04/04/14	DC	04/03/14	OP9676	E3G938
OP9676-MSD	3G18908.D	1	04/04/14	DC	04/03/14	OP9676	E3G938
D56387-6	3G18906.D	1	04/04/14	DC	04/03/14	OP9676	E3G938

The QC reported here applies to the following samples:

Method: SW846 8270C BY SIM

D56367-4, D56367-5, D56367-7, D56367-8

CAS No.	Compound	D56387-6 ug/kg	Spike Q	ug/kg	MS ug/kg	MS %	MSD ug/kg	MSD %	RPD	Limits Rec/RPD
83-32-9	Acenaphthene	ND	92.2	97.0	105	82.9	90	16	29-139/30	
120-12-7	Anthracene	ND	92.2	902	978* a	98.9	107	160* b	10-182/30	
56-55-3	Benzo(a)anthracene	ND	92.2	108	117	109	118	1	35-149/30	
205-99-2	Benzo(b)fluoranthene	ND	92.2	82.1	89	76.3	83	7	22-174/30	
207-08-9	Benzo(k)fluoranthene	ND	92.2	113	123	101	110	11	10-185/30	
50-32-8	Benzo(a)pyrene	154	92.2	118	-39* a	94.7	-64* a	22	10-168/30	
218-01-9	Chrysene	476	92.2	522	50	442	-37* c	17	10-168/30	
53-70-3	Dibenzo(a,h)anthracene	ND	92.2	97.4	106	98.1	106	1	12-160/30	
206-44-0	Fluoranthene	ND	92.2	115	125	109	118	5	20-156/30	
86-73-7	Fluorene	175	92.2	447	295* a	350	190* a	24	10-164/30	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	92.2	102	111	95.3	103	7	29-136/30	
91-20-3	Naphthalene	428	92.2	639	229	562	145	13	10-258/30	
129-00-0	Pyrene	87.2	92.2	212	135	196	118	8	10-196/30	

CAS No.	Surrogate Recoveries	MS	MSD	D56387-6	Limits
4165-60-0	Nitrobenzene-d5	137%	135%	113%	10-175%
321-60-8	2-Fluorobiphenyl	84%	77%	69%	25-130%
1718-51-0	Terphenyl-d14	109%	104%	105%	41-133%

- (a) Outside control limits due to possible matrix interference.
- (b) Variability of recovery may be due to sample matrix/homogeneity.
- (c) Outside control limits due to high level in sample relative to spike amount.

* = Outside of Control Limits.

7.3.1
7

GC Semi-volatiles

QC Data Summaries

Includes the following where applicable:

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

Method Blank Summary

Job Number: D56367
Account: COCSCOG Olsson Associates - Denver
Project: CM Production-S.J. Warren #1

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP9681-MB	FI11606.D	1	04/04/14	JS	04/04/14	OP9681	GFI733

The QC reported here applies to the following samples:

Method: SW846-8015B

D56367-3

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%

8.1.1
8

Method Blank Summary

Job Number: D56367
Account: COCSCOG Olsson Associates - Denver
Project: CM Production-S.J. Warren #1

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP9692-MB	FI11766.D	1	04/09/14	JJ	04/07/14	OP9692	GFI739

The QC reported here applies to the following samples:

Method: SW846-8015B

D56367-4, D56367-5, D56367-6, D56367-7, D56367-8, D56367-9

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	78% 20-130%

Blank Spike Summary

Job Number: D56367
Account: COCSCOG Olsson Associates - Denver
Project: CM Production-S.J. Warren #1

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP9681-BS	FI11608.D	1	04/04/14	JS	04/04/14	OP9681	GFI733

The QC reported here applies to the following samples:

Method: SW846-8015B

D56367-3

CAS No.	Compound	Spike mg/kg	BSP mg/kg	BSP %	Limits
	TPH-DRO (C10-C28)	167	115	69	42-130

CAS No.	Surrogate Recoveries	BSP	Limits
84-15-1	o-Terphenyl	98%	20-130%

8.2.1
8

* = Outside of Control Limits.

Blank Spike Summary

Job Number: D56367
Account: COCSCOG Olsson Associates - Denver
Project: CM Production-S.J. Warren #1

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP9692-BS	FI11768.D	1	04/09/14	JJ	04/07/14	OP9692	GFI739

The QC reported here applies to the following samples:

Method: SW846-8015B

D56367-4, D56367-5, D56367-6, D56367-7, D56367-8, D56367-9

CAS No.	Compound	Spike mg/kg	BSP mg/kg	BSP %	Limits
	TPH-DRO (C10-C28)	167	98.7	59	42-130

CAS No.	Surrogate Recoveries	BSP	Limits
84-15-1	o-Terphenyl	75%	20-130%

8.2.2

8

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: D56367
Account: COCSCOG Olsson Associates - Denver
Project: CM Production-S.J. Warren #1

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP9681-MS	FI11610.D	1	04/04/14	JS	04/04/14	OP9681	GFI733
OP9681-MSD	FI11612.D	1	04/04/14	JS	04/04/14	OP9681	GFI733
D56366-6	FI11613.D	1	04/04/14	JS	04/04/14	OP9681	GFI734

The QC reported here applies to the following samples:

Method: SW846-8015B

D56367-3

CAS No.	Compound	D56366-6 mg/kg	Spike mg/kg	MS mg/kg	MS %	MSD mg/kg	MSD %	RPD	Limits Rec/RPD
	TPH-DRO (C10-C28)	8.43	198	135	64	132	62	2	20-150/30

CAS No.	Surrogate Recoveries	MS	MSD	D56366-6	Limits
84-15-1	o-Terphenyl	88%	87%	83%	20-130%

8.3.1
8

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: D56367
Account: COCSCOG Olsson Associates - Denver
Project: CM Production-S.J. Warren #1

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP9692-MS	FI11770.D	1	04/09/14	JJ	04/07/14	OP9692	GFI739
OP9692-MSD	FI11772.D	1	04/09/14	JJ	04/07/14	OP9692	GFI739
D56389-1	FI11774.D	1	04/09/14	JJ	04/07/14	OP9692	GFI739

The QC reported here applies to the following samples:

Method: SW846-8015B

D56367-4, D56367-5, D56367-6, D56367-7, D56367-8, D56367-9

CAS No.	Compound	D56389-1 mg/kg	Spike Q	MS mg/kg	MS %	MSD mg/kg	MSD %	RPD	Limits Rec/RPD
	TPH-DRO (C10-C28)	ND	180	103	57	106	59	3	20-150/30

CAS No.	Surrogate Recoveries	MS	MSD	D56389-1	Limits
84-15-1	o-Terphenyl	69%	70%	70%	20-130%

8.3.2
8

* = Outside of Control Limits.

Metals Analysis

QC Data Summaries

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: D56367
Account: COCSCOG - Olsson Associates - Denver
Project: CM Production-S.J. Warren #1

QC Batch ID: MP12622
Matrix Type: SOLID

Methods: SW846 6010C
Units: mg/kg

Prep Date: 04/02/14

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	0.080	<1.0
Beryllium	1.0	.08	.06		
Boron	5.0	.08	.16		
Cadmium	1.0	.02	.28	-0.010	<1.0
Calcium	40	.22	6.8		
Chromium	1.0	.03	.03	0.020	<1.0
Cobalt	0.50	.04	.039		
Copper	1.0	.08	.13	0.030	<1.0
Iron	7.0	.15	1.8		
Lead	5.0	.21	.25	-0.25	<5.0
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	0.030	<3.0
Phosphorus	10	1.5	1.2		
Potassium	200	9.9	12		
Selenium	5.0	.71	1.1	0.49	<5.0
Silicon	5.0	.47	1.1		
Silver	3.0	.03	.05	0.060	<3.0
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	1.2	<3.0

Associated samples MP12622: D56367-1, D56367-2, D56367-5, D56367-8, D56367-10

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

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: D56367
Account: COCSCOG - Olsson Associates - Denver
Project: CM Production-S.J. Warren #1

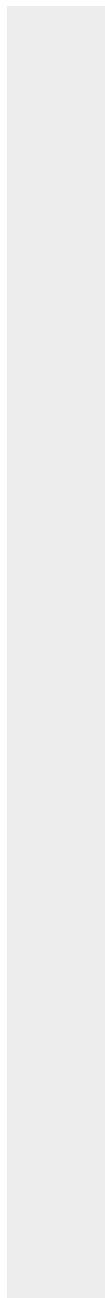
QC Batch ID: MP12622
Matrix Type: SOLID

Methods: SW846 6010C
Units: mg/kg

Prep Date: 04/02/14

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



MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D56367
 Account: COCSCOG - Olsson Associates - Denver
 Project: CM Production-S.J. Warren #1

QC Batch ID: MP12622
 Matrix Type: SOLID

Methods: SW846 6010C
 Units: mg/kg

Prep Date: 04/02/14

Metal	D56366-1 Original MS		SpikeLot ICPAL2	% Rec	QC Limits
Aluminum					
Antimony					
Arsenic	anr				
Barium	248	433	231	80.1	75-125
Beryllium					
Boron					
Cadmium	0.23	47.5	57.7	81.9	75-125
Calcium					
Chromium	10.5	58.3	57.7	83.2	75-125
Cobalt					
Copper	115	166	57.7	88.4	75-125
Iron					
Lead	10.8	107	115	81.5	75-125
Lithium					
Magnesium					
Manganese					
Molybdenum					
Nickel	9.5	57.0	57.7	81.3	75-125
Phosphorus					
Potassium					
Selenium	0.0	89.4	115	77.4	75-125
Silicon					
Silver	0.0	17.1	23.1	74.1N(a)	75-125
Sodium					
Strontium					
Thallium					
Tin					
Titanium					
Uranium					
Vanadium					
Zinc	222	284	57.7	107.4	75-125

Associated samples MP12622: D56367-1, D56367-2, D56367-5, D56367-8, D56367-10

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

9.1.2
 9

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D56367
Account: COCSCOG - Olsson Associates - Denver
Project: CM Production-S.J. Warren #1

QC Batch ID: MP12622
Matrix Type: SOLID

Methods: SW846 6010C
Units: mg/kg

Prep Date: 04/02/14

Metal	D56366-1 Original MS	Spike/lot ICPALL2	% Rec	QC Limits
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(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested
(a) Spike recovery indicates possible matrix interference.

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D56367
 Account: COCSCOG - Olsson Associates - Denver
 Project: CM Production-S.J. Warren #1

QC Batch ID: MP12622
 Matrix Type: SOLID

Methods: SW846 6010C
 Units: mg/kg

Prep Date: 04/02/14

Metal	D56366-1 Original MSD		SpikeLot ICPAL2 % Rec		MSD RPD	QC Limit
Aluminum						
Antimony						
Arsenic	anr					
Barium	248	435	229	81.8	0.5	20
Beryllium						
Boron						
Cadmium	0.23	46.8	57.2	81.5	1.5	20
Calcium						
Chromium	10.5	57.9	57.2	83.3	0.7	20
Cobalt						
Copper	115	166	57.2	89.2	0.0	20
Iron						
Lead	10.8	105	114	80.6	1.9	20
Lithium						
Magnesium						
Manganese						
Molybdenum						
Nickel	9.5	56.3	57.2	80.8	1.2	20
Phosphorus						
Potassium						
Selenium	0.0	88.5	114	77.4	1.0	20
Silicon						
Silver	0.0	17.3	22.9	75.7	1.2	20
Sodium						
Strontium						
Thallium						
Tin						
Titanium						
Uranium						
Vanadium						
Zinc	222	279	57.2	99.7	1.8	20

Associated samples MP12622: D56367-1, D56367-2, D56367-5, D56367-8, D56367-10

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

9.1.2
 9

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D56367
Account: COCSCOG - Olsson Associates - Denver
Project: CM Production-S.J. Warren #1

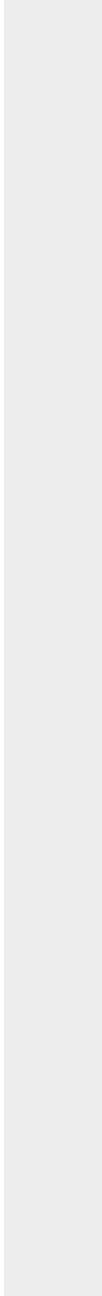
QC Batch ID: MP12622
Matrix Type: SOLID

Methods: SW846 6010C
Units: mg/kg

Prep Date: 04/02/14

Metal	D56366-1 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



SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D56367
 Account: COCSCOG - Olsson Associates - Denver
 Project: CM Production-S.J. Warren #1

QC Batch ID: MP12622
 Matrix Type: SOLID

Methods: SW846 6010C
 Units: mg/kg

Prep Date: 04/02/14

Metal	BSP Result	Spikelot ICPALL2	% Rec	QC Limits
Aluminum				
Antimony				
Arsenic	anr			
Barium	180	200	90.0	80-120
Beryllium				
Boron				
Cadmium	46.7	50	93.4	80-120
Calcium				
Chromium	48.5	50	97.0	80-120
Cobalt				
Copper	46.1	50	92.2	80-120
Iron				
Lead	96.9	100	96.9	80-120
Lithium				
Magnesium				
Manganese				
Molybdenum				
Nickel	49.1	50	98.2	80-120
Phosphorus				
Potassium				
Selenium	95.6	100	95.6	80-120
Silicon				
Silver	19.7	20	98.5	80-120
Sodium				
Strontium				
Thallium				
Tin				
Titanium				
Uranium				
Vanadium				
Zinc	52.6	50	105.2	80-120

Associated samples MP12622: D56367-1, D56367-2, D56367-5, D56367-8, D56367-10

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

9.1.3
 9

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D56367
Account: COCSCOG - Olsson Associates - Denver
Project: CM Production-S.J. Warren #1

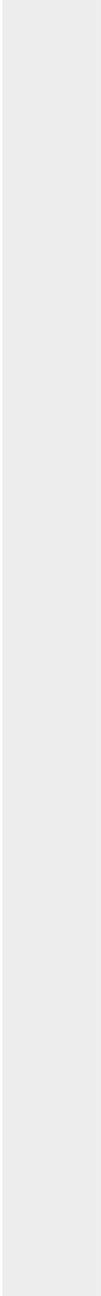
QC Batch ID: MP12622
Matrix Type: SOLID

Methods: SW846 6010C
Units: mg/kg

Prep Date: 04/02/14

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



SERIAL DILUTION RESULTS SUMMARY

Login Number: D56367
 Account: COCSCOG - Olsson Associates - Denver
 Project: CM Production-S.J. Warren #1

QC Batch ID: MP12622
 Matrix Type: SOLID

Methods: SW846 6010C
 Units: ug/l

Prep Date: 04/02/14

Metal	D56366-1 Original SDL 1:5		%DIF	QC Limits
Aluminum				
Antimony				
Arsenic	anr			
Barium	2300	2830	23.3*(a)	0-10
Beryllium				
Boron				
Cadmium	2.10	0.00	100.0(b)	0-10
Calcium				
Chromium	96.7	119	24.2*(a)	0-10
Cobalt				
Copper	1070	1180	11.0*(a)	0-10
Iron				
Lead	120	171	42.9 (b)	0-10
Lithium				
Magnesium				
Manganese				
Molybdenum				
Nickel	88.1	91.0	2.7	0-10
Phosphorus				
Potassium				
Selenium	0.00	0.00	NC	0-10
Silicon				
Silver	0.00	0.00	NC	0-10
Sodium				
Strontium				
Thallium				
Tin				
Titanium				
Uranium				
Vanadium				
Zinc	2050	2790	35.8*(a)	0-10

Associated samples MP12622: D56367-1, D56367-2, D56367-5, D56367-8, D56367-10

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

9.1.4
 9

SERIAL DILUTION RESULTS SUMMARY

Login Number: D56367
Account: COCSCOG - Olsson Associates - Denver
Project: CM Production-S.J. Warren #1

QC Batch ID: MP12622
Matrix Type: SOLID

Methods: SW846 6010C
Units: ug/l

Prep Date: 04/02/14

Metal	D56366-1	QC
	Original SDL 1:5 %DIF	Limits

- (anr) Analyte not requested
- (a) Serial dilution indicates possible matrix interference.
- (b) Percent difference acceptable due to low initial sample concentration (< 50 times IDL).

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: D56367
Account: COCSCOG - Olsson Associates - Denver
Project: CM Production-S.J. Warren #1

QC Batch ID: MP12624
Matrix Type: SOLID

Methods: SW846 6020A
Units: mg/kg

Prep Date: 04/01/14

Metal	RL	IDL	MDL	MB raw	final
Aluminum	25	.55	.75		
Antimony	0.20	.0011	.029		
Arsenic	0.10	.0085	.024	-0.0070	<0.10
Barium	1.0	.008	.16		
Beryllium	0.10	.008	.049		
Boron	20	.25	.07		
Cadmium	0.050	.018	.038		
Calcium	200	2.8	13		
Chromium	1.0	.027	.11		
Cobalt	0.10	.0025	.0085		
Copper	1.0	.03	.1		
Iron	5.0	1.8	1.8		
Lead	0.25	.004	.0075		
Magnesium	50	.65	.65		
Manganese	0.50	.06	.07		
Molybdenum	0.50	.025	.046		
Nickel	1.0	.0044	.17		
Phosphorus	30	1.3	4.9		
Potassium	100	1.5	2.5		
Selenium	0.20	.03	.13		
Silver	0.050	.00095	.01		
Sodium	250	2.5	5.5		
Strontium	10	.005	.027		
Thallium	0.10	.0012	.0075		
Tin	5.0	.032	2.3		
Titanium	1.0	.03	.085		
Uranium	0.25	.00085	.0015		
Vanadium	2.0	.019	.11		
Zinc	5.0	.11	1.4		

Associated samples MP12624: D56367-1, D56367-2, D56367-5, D56367-8, D56367-10

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

9.2.1
9

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D56367
 Account: COCSCOG - Olsson Associates - Denver
 Project: CM Production-S.J. Warren #1

QC Batch ID: MP12624
 Matrix Type: SOLID

Methods: SW846 6020A
 Units: mg/kg

Prep Date: 04/01/14

Metal	D56366-1 Original MS		SpikeLot ICPALL2 % Rec		QC Limits
Aluminum					
Antimony					
Arsenic	2.6	123	115	104.3	75-125
Barium					
Beryllium					
Boron					
Cadmium					
Calcium					
Chromium					
Cobalt					
Copper					
Iron					
Lead					
Magnesium					
Manganese					
Molybdenum					
Nickel					
Phosphorus					
Potassium					
Selenium					
Silver					
Sodium					
Strontium					
Thallium					
Tin					
Titanium					
Uranium	anr				
Vanadium					
Zinc					

Associated samples MP12624: D56367-1, D56367-2, D56367-5, D56367-8, D56367-10

Results < IDL are shown as zero for calculation purposes
 (*) Outside of QC limits
 (N) Matrix Spike Rec. outside of QC limits
 (anr) Analyte not requested

9.2.2
 9

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D56367
 Account: COCSCOG - Olsson Associates - Denver
 Project: CM Production-S.J. Warren #1

QC Batch ID: MP12624
 Matrix Type: SOLID

Methods: SW846 6020A
 Units: mg/kg

Prep Date: 04/01/14

Metal	D56366-1 Original MSD		SpikeLot ICPALL2	% Rec	MSD RPD	QC Limit
Aluminum						
Antimony						
Arsenic	2.6	121	114	103.6	1.6	20
Barium						
Beryllium						
Boron						
Cadmium						
Calcium						
Chromium						
Cobalt						
Copper						
Iron						
Lead						
Magnesium						
Manganese						
Molybdenum						
Nickel						
Phosphorus						
Potassium						
Selenium						
Silver						
Sodium						
Strontium						
Thallium						
Tin						
Titanium						
Uranium	anr					
Vanadium						
Zinc						

Associated samples MP12624: D56367-1, D56367-2, D56367-5, D56367-8, D56367-10

Results < IDL are shown as zero for calculation purposes
 (*) Outside of QC limits
 (N) Matrix Spike Rec. outside of QC limits
 (anr) Analyte not requested

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D56367
 Account: COCSCOG - Olsson Associates - Denver
 Project: CM Production-S.J. Warren #1

QC Batch ID: MP12624
 Matrix Type: SOLID

Methods: SW846 6020A
 Units: mg/kg

Prep Date: 04/01/14

Metal	BSP Result	Spikelot ICPALL2	QC % Rec	QC Limits
Aluminum				
Antimony				
Arsenic	102	100	102.0	80-120
Barium				
Beryllium				
Boron				
Cadmium				
Calcium				
Chromium				
Cobalt				
Copper				
Iron				
Lead				
Magnesium				
Manganese				
Molybdenum				
Nickel				
Phosphorus				
Potassium				
Selenium				
Silver				
Sodium				
Strontium				
Thallium				
Tin				
Titanium				
Uranium	anr			
Vanadium				
Zinc				

Associated samples MP12624: D56367-1, D56367-2, D56367-5, D56367-8, D56367-10

Results < IDL are shown as zero for calculation purposes
 (*) Outside of QC limits
 (anr) Analyte not requested

9.2.3
 9

SERIAL DILUTION RESULTS SUMMARY

Login Number: D56367
 Account: COCSCOG - Olsson Associates - Denver
 Project: CM Production-S.J. Warren #1

QC Batch ID: MP12624
 Matrix Type: SOLID

Methods: SW846 6020A
 Units: ug/l

Prep Date: 04/01/14

Metal	D56366-1			QC
	Original	SDL 5:25	%DIF	Limits

Aluminum				
Antimony				
Arsenic	24.0	22.9	4.4	0-10
Barium				
Beryllium				
Boron				
Cadmium				
Calcium				
Chromium				
Cobalt				
Copper				
Iron				
Lead				
Magnesium				
Manganese				
Molybdenum				
Nickel				
Phosphorus				
Potassium				
Selenium				
Silver				
Sodium				
Strontium				
Thallium				
Tin				
Titanium				
Uranium	anr			
Vanadium				
Zinc				

Associated samples MP12624: D56367-1, D56367-2, D56367-5, D56367-8, D56367-10

Results < IDL are shown as zero for calculation purposes
 (*) Outside of QC limits
 (anr) Analyte not requested

9.2.4
 9

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: D56367
Account: COCSCOG - Olsson Associates - Denver
Project: CM Production-S.J. Warren #1

QC Batch ID: MP12634
Matrix Type: AQUEOUS

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

Prep Date: 04/02/14

Metal	RL	IDL	MDL	MB raw	final
Aluminum	500	43	210		
Antimony	150	11	95		
Arsenic	130	19	28		
Barium	50	1	7		
Beryllium	50	4	6		
Boron	250	4	33		
Cadmium	50	1	1.8		
Calcium	2000	11	210	-1.5	<2000
Chromium	50	1.5	2		
Cobalt	25	2	2.9		
Copper	50	4	9.5		
Iron	350	7.5	48		
Lead	250	11	110		
Lithium	25	2	14		
Magnesium	1000	34	95	9.5	<1000
Manganese	25	.05	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	25	850	151	<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 MP12634: D56367-1A, D56367-2A, D56367-5A, D56367-8A, D56367-10A

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

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: D56367
Account: COCSCOG - Olsson Associates - Denver
Project: CM Production-S.J. Warren #1

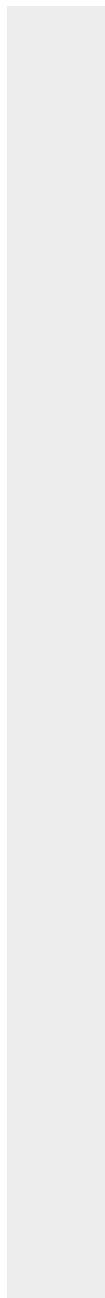
QC Batch ID: MP12634
Matrix Type: AQUEOUS

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

Prep Date: 04/02/14

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



MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D56367
 Account: COCSCOG - Olsson Associates - Denver
 Project: CM Production-S.J. Warren #1

QC Batch ID: MP12634
 Matrix Type: AQUEOUS

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

Prep Date: 04/02/14

Metal	D56271-13A Original MS		SpikeLot ICPAL2 % Rec		QC Limits
Aluminum					
Antimony					
Arsenic					
Barium					
Beryllium					
Boron					
Cadmium					
Calcium	45600	186000	125000	112.3	75-125
Chromium					
Cobalt					
Copper					
Iron					
Lead					
Lithium					
Magnesium	3300	135000	125000	105.4	75-125
Manganese					
Molybdenum					
Nickel					
Phosphorus					
Potassium					
Selenium					
Silicon					
Silver					
Sodium	583000	752000	125000	135.2(a)	75-125
Strontium					
Thallium					
Tin					
Titanium					
Uranium					
Vanadium					
Zinc					

Associated samples MP12634: D56367-1A, D56367-2A, D56367-5A, D56367-8A, D56367-10A

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

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D56367
Account: COCSCOG - Olsson Associates - Denver
Project: CM Production-S.J. Warren #1

QC Batch ID: MP12634
Matrix Type: AQUEOUS

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

Prep Date: 04/02/14

Metal	D56271-13A 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.

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D56367
 Account: COCSCOG - Olsson Associates - Denver
 Project: CM Production-S.J. Warren #1

QC Batch ID: MP12634
 Matrix Type: AQUEOUS

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

Prep Date: 04/02/14

Metal	D56271-13A Original MSD	Spikelot ICPAL2	% Rec	MSD RPD	QC Limit	
Aluminum						
Antimony						
Arsenic						
Barium						
Beryllium						
Boron						
Cadmium						
Calcium	45600	191000	125000	116.3	2.7	20
Chromium						
Cobalt						
Copper						
Iron						
Lead						
Lithium						
Magnesium	3300	136000	125000	106.2	0.7	20
Manganese						
Molybdenum						
Nickel						
Phosphorus						
Potassium						
Selenium						
Silicon						
Silver						
Sodium	583000	778000	125000	156.0(a)	3.4	20
Strontium						
Thallium						
Tin						
Titanium						
Uranium						
Vanadium						
Zinc						

Associated samples MP12634: D56367-1A, D56367-2A, D56367-5A, D56367-8A, D56367-10A

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

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D56367
Account: COCSCOG - Olsson Associates - Denver
Project: CM Production-S.J. Warren #1

QC Batch ID: MP12634
Matrix Type: AQUEOUS

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

Prep Date: 04/02/14

Metal	D56271-13A 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: D56367
 Account: COCSCOG - Olsson Associates - Denver
 Project: CM Production-S.J. Warren #1

QC Batch ID: MP12634
 Matrix Type: AQUEOUS

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

Prep Date: 04/02/14

Metal	BSP Result	Spikelot ICPALL2	% Rec	QC Limits
Aluminum				
Antimony				
Arsenic				
Barium				
Beryllium				
Boron				
Cadmium				
Calcium	137000	125000	109.6	80-120
Chromium				
Cobalt				
Copper				
Iron				
Lead				
Lithium				
Magnesium	130000	125000	104.0	80-120
Manganese				
Molybdenum				
Nickel				
Phosphorus				
Potassium				
Selenium				
Silicon				
Silver				
Sodium	132000	125000	105.6	80-120
Strontium				
Thallium				
Tin				
Titanium				
Uranium				
Vanadium				
Zinc				

Associated samples MP12634: D56367-1A, D56367-2A, D56367-5A, D56367-8A, D56367-10A

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

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D56367
Account: COCSCOG - Olsson Associates - Denver
Project: CM Production-S.J. Warren #1

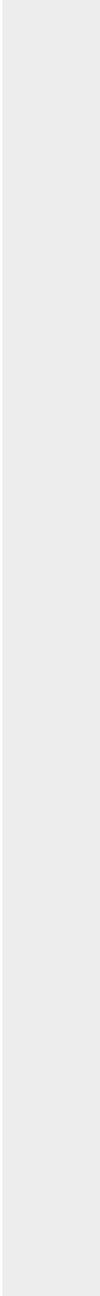
QC Batch ID: MP12634
Matrix Type: AQUEOUS

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

Prep Date: 04/02/14

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



SERIAL DILUTION RESULTS SUMMARY

Login Number: D56367
 Account: COCSCOG - Olsson Associates - Denver
 Project: CM Production-S.J. Warren #1

QC Batch ID: MP12634
 Matrix Type: AQUEOUS

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

Prep Date: 04/02/14

Metal	D56271-13A Original SDL 1:5		%DIF	QC Limits
Aluminum				
Antimony				
Arsenic				
Barium				
Beryllium				
Boron				
Cadmium				
Calcium	9160	9070	0.7	0-10
Chromium				
Cobalt				
Copper				
Iron				
Lead				
Lithium				
Magnesium	660	703	6.2	0-10
Manganese				
Molybdenum				
Nickel				
Phosphorus				
Potassium				
Selenium				
Silicon				
Silver				
Sodium	117000	119000	1.9	0-10
Strontium				
Thallium				
Tin				
Titanium				
Uranium				
Vanadium				
Zinc				

Associated samples MP12634: D56367-1A, D56367-2A, D56367-5A, D56367-8A, D56367-10A

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

9.3.4
 9

SERIAL DILUTION RESULTS SUMMARY

Login Number: D56367
Account: COCSCOG - Olsson Associates - Denver
Project: CM Production-S.J. Warren #1

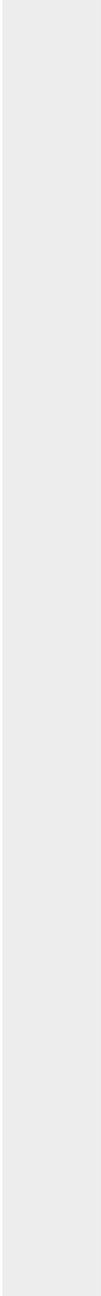
QC Batch ID: MP12634
Matrix Type: AQUEOUS

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

Prep Date: 04/02/14

Metal	D56271-13A	QC
	Original SDL 1:5 %DIF	Limits

(anr) Analyte not requested



BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: D56367
Account: COCSCOG - Olsson Associates - Denver
Project: CM Production-S.J. Warren #1

QC Batch ID: MP12636
Matrix Type: SOLID

Methods: SW846 7471B
Units: mg/kg

Prep Date: 04/03/14

Metal	RL	IDL	MDL	MB raw	final
Mercury	0.083	.00088	.0067	-0.0018	<0.083

Associated samples MP12636: D56367-1, D56367-2, D56367-5, D56367-8, D56367-10

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D56367
 Account: COCSCOG - Olsson Associates - Denver
 Project: CM Production-S.J. Warren #1

QC Batch ID: MP12636
 Matrix Type: SOLID

Methods: SW846 7471B
 Units: mg/kg

Prep Date: 04/03/14

Metal	D56367-1 Original MS	Spike HGWSR1	lot % Rec	QC Limits
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Mercury 0.0065 0.38 0.368 101.4 75-125

Associated samples MP12636: D56367-1, D56367-2, D56367-5, D56367-8, D56367-10

Results < IDL are shown as zero for calculation purposes
 (*) Outside of QC limits
 (N) Matrix Spike Rec. outside of QC limits
 (anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D56367
 Account: COCSCOG - Olsson Associates - Denver
 Project: CM Production-S.J. Warren #1

QC Batch ID: MP12636
 Matrix Type: SOLID

Methods: SW846 7471B
 Units: mg/kg

Prep Date: 04/03/14

Metal	D56367-1 Original MSD	Spike HGWSR1	lot % Rec	MSD RPD	QC Limit	
Mercury	0.0065	0.37	0.38	95.6	2.7	20

Associated samples MP12636: D56367-1, D56367-2, D56367-5, D56367-8, D56367-10

Results < IDL are shown as zero for calculation purposes
 (*) Outside of QC limits
 (N) Matrix Spike Rec. outside of QC limits
 (anr) Analyte not requested

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D56367
 Account: COCSCOG - Olsson Associates - Denver
 Project: CM Production-S.J. Warren #1

QC Batch ID: MP12636
 Matrix Type: SOLID

Methods: SW846 7471B
 Units: mg/kg

Prep Date: 04/03/14

Metal	BSP Result	Spikelot HGWSR1	% Rec	QC Limits
Mercury	0.32	0.333	96.0	80-120

Associated samples MP12636: D56367-1, D56367-2, D56367-5, D56367-8, D56367-10

Results < IDL are shown as zero for calculation purposes
 (*) Outside of QC limits
 (anr) Analyte not requested

General Chemistry

QC Data Summaries

Includes the following where applicable:

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

METHOD BLANK AND SPIKE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: D56367
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
Chromium, Hexavalent	GP12302/GN24234	1.0	0.0	mg/kg	141	142	100.7	80-120%
Specific Conductivity	GN24184			umhos/cm	9995	10000	100.1	90-110%
Specific Conductivity	GP12306/GN24252			umhos/cm	9995	9910	99.1	90-110%
pH	GN24162			su	8.00	8.03	100.4	99.3-100.7%

Associated Samples:

Batch GN24162: D56367-1, D56367-2, D56367-5, D56367-8, D56367-10

Batch GN24184: D56367-1, D56367-2, D56367-5, D56367-8

Batch GP12302: D56367-1, D56367-2, D56367-5, D56367-8, D56367-10

Batch GP12306: D56367-10

(*) Outside of QC limits

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DUPLICATE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: D56367
Account: COCSCOG - Olsson Associates - Denver
Project: CM Production-S.J. Warren #1

Analyte	Batch ID	QC Sample	Units	Original Result	DUP Result	RPD	QC Limits
Chromium, Hexavalent	GP12302/GN24234	D56390-2	mg/kg	0.0	0.0	0.0	0-20%
Redox Potential Vs H2	GN24155	D56387-3	mv	418	430	2.8	0-20%

Associated Samples:

Batch GN24155: D56367-1, D56367-2, D56367-5, D56367-8, D56367-10

Batch GP12302: D56367-1, D56367-2, D56367-5, D56367-8, D56367-10

(*) Outside of QC limits

10.2
10

MATRIX SPIKE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: D56367
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
Chromium, Hexavalent	GP12302/GN24234	D56390-2	mg/kg	0.0	40	35.9	89.7	75-125%

Associated Samples:

Batch GP12302: D56367-1, D56367-2, D56367-5, D56367-8, D56367-10

(*) Outside of QC limits

(N) Matrix Spike Rec. outside of QC limits

10.3
10

MATRIX SPIKE DUPLICATE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: D56367
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
Chromium, Hexavalent	GP12302/GN24234	D56390-2	mg/kg	0.0	40	38.8	7.8	20%

Associated Samples:

Batch GP12302: D56367-1, D56367-2, D56367-5, D56367-8, D56367-10

(*) Outside of QC limits

(N) Matrix Spike Rec. outside of QC limits

10.4
10



04/29/14

Technical Report for

Olsson Associates - Denver

CM Production-S.J. Warren #1

013-1681

Accutest Job Number: D56367R

Sampling Date: 03/27/14

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: **17**



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.

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)

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Test results relate only to samples analyzed.

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Sample Summary

Olsson Associates - Denver

Job No: D56367R

CM Production-S.J. Warren #1
Project No: 013-1681

Sample Number	Collected		Received	Matrix		Client Sample ID
	Date	Time By		Code	Type	
D56367-6R	03/27/14	14:45 JH	03/28/14	SO	Soil	CMSJW-SP@8N
D56367-9R	03/27/14	15:25 JH	03/28/14	SO	Soil	CMSJW-SP@8W

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



CASE NARRATIVE / CONFORMANCE SUMMARY

Client: Olsson Associates - Denver

Job No D56367R

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

Report Date 4/29/2014 9:22:05 AM

On 03/28/2014, 2 sample(s), 0 Trip Blank(s), and 0 Field Blank(s) were received at Accutest Mountain States (AMS) at a temperature of 3.4 °C. The samples were intact and properly preserved, unless noted below. An AMS Job Number of D56367R was assigned to the project. The lab sample ID, client sample ID, and date of sample collection are detailed in the report's Results Summary.

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

Extractables by GCMS By Method SW846 8270C

Matrix SO	Batch ID: OP9781
------------------	-------------------------

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D56951-5MS, D56951-5MSD were used as the QC samples indicated.
- The following samples were extracted outside of holding time for method SW846 8270C: D56367-6R Analysis performed past the recommended method holding time as per client instructions.
- D56367-6R: Analysis performed past the recommended method holding time as per client instructions.

Matrix SO	Batch ID: OP9783
------------------	-------------------------

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D57077-1MS, D57077-1MSD were used as the QC samples indicated.
- The following samples were extracted outside of holding time for method SW846 8270C: D56367-9R Analysis performed past the recommended method holding time per client instruction. Elevated reporting limits due to sample matrix, dilution required during sample prep and analysis.
- D56367-9R: Analysis performed past the recommended method holding time per client instruction. Elevated reporting limits due to sample matrix, dilution required during sample prep and analysis.

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: D56367R
Account: Olsson Associates - Denver
Project: CM Production-S.J. Warren #1
Collected: 03/27/14



Lab Sample ID	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
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D56367-6R **CMSJW-SP@8N**

No hits reported in this sample.

D56367-9R **CMSJW-SP@8W**

Acenaphthene ^a	624 J	1500	370	ug/kg	SW846 8270C
Benzo(g,h,i)perylene ^a	1410 J	1500	370	ug/kg	SW846 8270C
Chrysene ^a	3290	1500	370	ug/kg	SW846 8270C
Pyrene ^a	1500	1500	370	ug/kg	SW846 8270C

(a) Analysis performed past the recommended method holding time per client instruction. Elevated reporting limits due to sample matrix, dilution required during sample prep and analysis.

Sample Results

Report of Analysis

Report of Analysis

Client Sample ID:	CMSJW-SP@8N	Date Sampled:	03/27/14
Lab Sample ID:	D56367-6R	Date Received:	03/28/14
Matrix:	SO - Soil	Percent Solids:	83.4
Method:	SW846 8270C SW846 3546		
Project:	CM Production-S.J. Warren #1		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 ^a	3G19266.D	1	04/23/14	DC	04/22/14	OP9781	E3G954
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	80	20	ug/kg	
208-96-8	Acenaphthylene	ND	80	20	ug/kg	
120-12-7	Anthracene	ND	80	20	ug/kg	
56-55-3	Benzo(a)anthracene	ND	80	20	ug/kg	
205-99-2	Benzo(b)fluoranthene	ND	80	20	ug/kg	
207-08-9	Benzo(k)fluoranthene	ND	80	20	ug/kg	
191-24-2	Benzo(g,h,i)perylene	ND	80	20	ug/kg	
50-32-8	Benzo(a)pyrene	ND	80	20	ug/kg	
218-01-9	Chrysene	ND	80	20	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	80	20	ug/kg	
206-44-0	Fluoranthene	ND	80	20	ug/kg	
86-73-7	Fluorene	ND	80	20	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	80	20	ug/kg	
90-12-0	1-Methylnaphthalene	ND	80	20	ug/kg	
91-57-6	2-Methylnaphthalene	ND	80	40	ug/kg	
91-20-3	Naphthalene	ND	80	20	ug/kg	
85-01-8	Phenanthrene	ND	80	20	ug/kg	
129-00-0	Pyrene	ND	80	20	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
321-60-8	2-Fluorobiphenyl	83%		30-130%
4165-60-0	Nitrobenzene-d5	82%		19-130%
1718-51-0	Terphenyl-d14	80%		40-130%

(a) Analysis performed past the recommended method holding time as per client instructions.

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: CMSJW-SP@8W		
Lab Sample ID: D56367-9R		Date Sampled: 03/27/14
Matrix: SO - Soil		Date Received: 03/28/14
Method: SW846 8270C SW846 3546		Percent Solids: 90.5
Project: CM Production-S.J. Warren #1		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 ^a	3G19272.D	5	04/23/14	DC	04/23/14	OP9783	E3G954
Run #2							

Run #	Initial Weight	Final Volume
Run #1	30.1 g	4.0 ml
Run #2		

BN PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	624	1500	370	ug/kg	J
208-96-8	Acenaphthylene	ND	1500	370	ug/kg	
120-12-7	Anthracene	ND	1500	370	ug/kg	
56-55-3	Benzo(a)anthracene	ND	1500	370	ug/kg	
205-99-2	Benzo(b)fluoranthene	ND	1500	370	ug/kg	
207-08-9	Benzo(k)fluoranthene	ND	1500	370	ug/kg	
191-24-2	Benzo(g,h,i)perylene	1410	1500	370	ug/kg	J
50-32-8	Benzo(a)pyrene	ND	1500	370	ug/kg	
218-01-9	Chrysene	3290	1500	370	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	1500	370	ug/kg	
206-44-0	Fluoranthene	ND	1500	370	ug/kg	
86-73-7	Fluorene	ND	1500	370	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	1500	370	ug/kg	
90-12-0	1-Methylnaphthalene	ND	1500	370	ug/kg	
91-57-6	2-Methylnaphthalene	ND	1500	740	ug/kg	
91-20-3	Naphthalene	ND	1500	370	ug/kg	
85-01-8	Phenanthrene	ND	1500	370	ug/kg	
129-00-0	Pyrene	1500	1500	370	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
321-60-8	2-Fluorobiphenyl	108%		30-130%
4165-60-0	Nitrobenzene-d5	83%		19-130%
1718-51-0	Terphenyl-d14	118%		40-130%

(a) Analysis performed past the recommended method holding time per client instruction. Elevated reporting limits due to sample matrix, dilution required during sample prep and analysis.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

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 4

Misc. Forms

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Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody

GC/MS Semi-volatiles

QC Data Summaries

Includes the following where applicable:

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

Method Blank Summary

Job Number: D56367R
Account: COCSCOG Olsson Associates - Denver
Project: CM Production-S.J. Warren #1

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP9781-MB	3G19259.D	1	04/23/14	DC	04/22/14	OP9781	E3G954

The QC reported here applies to the following samples:

Method: SW846 8270C

D56367-6R

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	94%	30-130%
367-12-4	2-Fluorophenol	95%	16-130%
4165-60-0	Nitrobenzene-d5	98%	19-130%
4165-62-2	Phenol-d5	98%	18-130%
1718-51-0	Terphenyl-d14	90%	40-130%
118-79-6	2,4,6-Tribromophenol	87%	17-130%

Method Blank Summary

Job Number: D56367R
Account: COCSCOG Olsson Associates - Denver
Project: CM Production-S.J. Warren #1

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP9783-MB	3G19254.D	1	04/23/14	DC	04/23/14	OP9783	E3G954

The QC reported here applies to the following samples:

Method: SW846 8270C

D56367-9R

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	82%	30-130%
4165-60-0	Nitrobenzene-d5	82%	19-130%
1718-51-0	Terphenyl-d14	88%	40-130%

Blank Spike Summary

Job Number: D56367R
Account: COCSCOG Olsson Associates - Denver
Project: CM Production-S.J. Warren #1

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP9781-BS	3G19260.D	1	04/23/14	DC	04/22/14	OP9781	E3G954

The QC reported here applies to the following samples:

Method: SW846 8270C

D56367-6R

CAS No.	Compound	Spike ug/kg	BSP ug/kg	BSP %	Limits
83-32-9	Acenaphthene	1670	1400	84	58-130
208-96-8	Acenaphthylene	1670	1440	86	58-130
120-12-7	Anthracene	1670	1590	95	67-130
56-55-3	Benzo(a)anthracene	1670	1550	93	63-130
205-99-2	Benzo(b)fluoranthene	1670	1560	94	42-157
207-08-9	Benzo(k)fluoranthene	1670	1530	92	38-175
191-24-2	Benzo(g,h,i)perylene	1670	1670	100	49-152
50-32-8	Benzo(a)pyrene	1670	1620	97	47-155
218-01-9	Chrysene	1670	1510	91	68-130
53-70-3	Dibenzo(a,h)anthracene	1670	1710	103	48-152
206-44-0	Fluoranthene	1670	1570	94	64-130
86-73-7	Fluorene	1670	1470	88	58-130
193-39-5	Indeno(1,2,3-cd)pyrene	1670	1680	101	45-153
90-12-0	1-Methylnaphthalene	1670	1300	78	55-130
91-57-6	2-Methylnaphthalene	1670	1350	81	54-130
91-20-3	Naphthalene	1670	1330	80	53-130
85-01-8	Phenanthrene	1670	1550	93	66-130
129-00-0	Pyrene	1670	1560	94	68-130

CAS No.	Surrogate Recoveries	BSP	Limits
321-60-8	2-Fluorobiphenyl	83%	30-130%
367-12-4	2-Fluorophenol	81%	16-130%
4165-60-0	Nitrobenzene-d5	84%	19-130%
4165-62-2	Phenol-d5	80%	18-130%
1718-51-0	Terphenyl-d14	97%	40-130%
118-79-6	2,4,6-Tribromophenol	90%	17-130%

* = Outside of Control Limits.

Blank Spike Summary

Job Number: D56367R
Account: COCSCOG Olsson Associates - Denver
Project: CM Production-S.J. Warren #1

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP9783-BS	3G19255.D	1	04/23/14	DC	04/23/14	OP9783	E3G954

The QC reported here applies to the following samples:

Method: SW846 8270C

D56367-9R

CAS No.	Compound	Spike ug/kg	BSP ug/kg	BSP %	Limits
83-32-9	Acenaphthene	1670	1310	79	58-130
208-96-8	Acenaphthylene	1670	1330	80	58-130
120-12-7	Anthracene	1670	1520	91	67-130
56-55-3	Benzo(a)anthracene	1670	1480	89	63-130
205-99-2	Benzo(b)fluoranthene	1670	1520	91	42-157
207-08-9	Benzo(k)fluoranthene	1670	1430	86	38-175
191-24-2	Benzo(g,h,i)perylene	1670	1620	97	49-152
50-32-8	Benzo(a)pyrene	1670	1550	93	47-155
218-01-9	Chrysene	1670	1450	87	68-130
53-70-3	Dibenzo(a,h)anthracene	1670	1660	100	48-152
206-44-0	Fluoranthene	1670	1520	91	64-130
86-73-7	Fluorene	1670	1400	84	58-130
193-39-5	Indeno(1,2,3-cd)pyrene	1670	1620	97	45-153
90-12-0	1-Methylnaphthalene	1670	1160	70	55-130
91-57-6	2-Methylnaphthalene	1670	1170	70	54-130
91-20-3	Naphthalene	1670	1140	68	53-130
85-01-8	Phenanthrene	1670	1490	89	66-130
129-00-0	Pyrene	1670	1500	90	68-130

CAS No.	Surrogate Recoveries	BSP	Limits
321-60-8	2-Fluorobiphenyl	77%	30-130%
4165-60-0	Nitrobenzene-d5	73%	19-130%
1718-51-0	Terphenyl-d14	93%	40-130%

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: D56367R
Account: COCSCOG Olsson Associates - Denver
Project: CM Production-S.J. Warren #1

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP9781-MS	3G19262.D	1	04/23/14	DC	04/22/14	OP9781	E3G954
OP9781-MSD	3G19263.D	1	04/23/14	DC	04/22/14	OP9781	E3G954
D56951-5	3G19261.D	1	04/23/14	DC	04/22/14	OP9781	E3G954

The QC reported here applies to the following samples:

Method: SW846 8270C

D56367-6R

CAS No.	Compound	D56951-5 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		1900	1620	85	1900	1760	92	8	36-130/30
208-96-8	Acenaphthylene	ND		1900	1640	86	1900	1780	94	8	10-150/30
120-12-7	Anthracene	23.2	J	1900	1840	96	1900	2010	104	9	50-130/30
56-55-3	Benzo(a)anthracene	93.6		1900	1880	94	1900	1950	98	4	41-130/30
205-99-2	Benzo(b)fluoranthene	133		1900	1850	90	1900	2120	104	14	29-152/30
207-08-9	Benzo(k)fluoranthene	56.4	J	1900	1840	94	1900	1670	85	10	14-175/30
191-24-2	Benzo(g,h,i)perylene	73.5	J	1900	1910	97	1900	1960	99	3	15-164/30
50-32-8	Benzo(a)pyrene	95.6		1900	1930	96	1900	2000	100	4	27-151/30
218-01-9	Chrysene	112		1900	1890	94	1900	1940	96	3	46-130/30
53-70-3	Dibenzo(a,h)anthracene	ND		1900	1930	102	1900	1990	105	3	31-152/30
206-44-0	Fluoranthene	252		1900	2040	94	1900	2140	99	5	53-130/30
86-73-7	Fluorene	ND		1900	1730	91	1900	1850	97	7	24-134/30
193-39-5	Indeno(1,2,3-cd)pyrene	70.1	J	1900	1950	99	1900	2020	102	4	26-153/30
90-12-0	1-Methylnaphthalene	ND		1900	1430	75	1900	1700	89	17	21-130/30
91-57-6	2-Methylnaphthalene	ND		1900	1460	77	1900	1740	91	18	10-148/30
91-20-3	Naphthalene	21.1	J	1900	1410	73	1900	1690	88	18	27-130/30
85-01-8	Phenanthrene	206		1900	1960	92	1900	2090	99	6	38-130/30
129-00-0	Pyrene	198		1900	2050	97	1900	2060	98	0	53-130/30

CAS No.	Surrogate Recoveries	MS	MSD	D56951-5	Limits
321-60-8	2-Fluorobiphenyl	82%	91%	89%	30-130%
367-12-4	2-Fluorophenol	67%	80%	85%	16-130%
4165-60-0	Nitrobenzene-d5	77%	91%	93%	19-130%
4165-62-2	Phenol-d5	69%	83%	92%	18-130%
1718-51-0	Terphenyl-d14	98%	99%	86%	40-130%
118-79-6	2,4,6-Tribromophenol	90%	93%	84%	17-130%

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: D56367R
Account: COCSCOG Olsson Associates - Denver
Project: CM Production-S.J. Warren #1

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP9783-MS	3G19257.D	1	04/23/14	DC	04/23/14	OP9783	E3G954
OP9783-MSD	3G19258.D	1	04/23/14	DC	04/23/14	OP9783	E3G954
D57077-1	3G19256.D	1	04/23/14	DC	04/23/14	OP9783	E3G954

The QC reported here applies to the following samples:

Method: SW846 8270C

D56367-9R

CAS No.	Compound	D57077-1 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	1690	1450	86	1690	1580	93	9	36-130/30
208-96-8	Acenaphthylene	ND	1690	1470	87	1690	1580	93	7	10-150/30
120-12-7	Anthracene	ND	1690	1590	94	1690	1650	97	4	50-130/30
56-55-3	Benzo(a)anthracene	ND	1690	1570	93	1690	1570	93	0	41-130/30
205-99-2	Benzo(b)fluoranthene	ND	1690	1540	91	1690	1560	92	1	29-152/30
207-08-9	Benzo(k)fluoranthene	ND	1690	1490	88	1690	1490	88	0	14-175/30
191-24-2	Benzo(g,h,i)perylene	ND	1690	1650	98	1690	1660	98	1	15-164/30
50-32-8	Benzo(a)pyrene	ND	1690	1570	93	1690	1600	95	2	27-151/30
218-01-9	Chrysene	ND	1690	1530	91	1690	1560	92	2	46-130/30
53-70-3	Dibenzo(a,h)anthracene	ND	1690	1690	100	1690	1690	100	0	31-152/30
206-44-0	Fluoranthene	ND	1690	1570	93	1690	1600	95	2	53-130/30
86-73-7	Fluorene	ND	1690	1500	89	1690	1610	95	7	24-134/30
193-39-5	Indeno(1,2,3-cd)pyrene	ND	1690	1680	99	1690	1640	97	2	26-153/30
90-12-0	1-Methylnaphthalene	ND	1690	1320	78	1690	1540	91	15	21-130/30
91-57-6	2-Methylnaphthalene	ND	1690	1360	80	1690	1570	93	14	10-148/30
91-20-3	Naphthalene	ND	1690	1320	78	1690	1570	93	17	27-130/30
85-01-8	Phenanthrene	ND	1690	1570	93	1690	1630	96	4	38-130/30
129-00-0	Pyrene	ND	1690	1560	92	1690	1600	95	3	53-130/30

CAS No.	Surrogate Recoveries	MS	MSD	D57077-1	Limits
321-60-8	2-Fluorobiphenyl	83%	82%	70%	30-130%
4165-60-0	Nitrobenzene-d5	84%	84%	68%	19-130%
1718-51-0	Terphenyl-d14	94%	81%	84%	40-130%

* = Outside of Control Limits.