

**Skim Pit Closure Report  
for the  
Wright DE No. 1 Lease Site  
Washington County, Colorado  
COGCC Remediation #s 8747 and 9064**

**Prepared for:**

Mr. Terry Pape  
HRM Resources, LLC  
410 17<sup>th</sup> Street, Suite 1100  
Denver, CO 80202



**Nicholson GeoSolutions, LLC**  
3433 East Lake Drive  
Centennial, CO 80121

**October 2015**

## 1.0 INTRODUCTION

Nicholson GeoSolutions LLC was retained by HRM Resources, LLC to perform skim pit closure at the Wright DE No. 1 Lease, an active oil well site located in the SE $\frac{1}{4}$  SW $\frac{1}{4}$  Section 22, T2S, R53W, Washington County, Colorado. Remediation activities were conducted in accordance with the Colorado Oil and Gas Conservation Commission (COGCC) Series 900 Rules.

Form 27 Remediation Work Plans were submitted to the COGCC by the previous operator and HRM. The Form 27s and Conditions of Approval are included in Appendix A of this report.

The site consists of a wellhead, one unlined skim pit, an evaporation pit, a heater-treater, and a tank battery with two 400-bbl storage tanks. The skim pit was closed and associated impacted soil was excavated and transported to the Denver Arapahoe Disposal Landfill operated by Waste Management in Aurora, Colorado for disposal. Closure of the skim pit was performed by Kelly Environmental LLC (Kelly) with oversight from Nicholson GeoSolutions.

This report provides the documentation of activities conducted on November 17<sup>th</sup> and April 24<sup>th</sup>, 2015.

## 2.0 REMEDIATION ACTIVITIES

The following sections discuss the site remediation procedures. Photographs that document the closure of the skim pit and excavation of impacted soils are included in Appendix B.

Impacted soils were excavated and trucked to the Denver Arapahoe Disposal Landfill for disposal. Appendix C contains a summary of the landfill gatehouse tickets. Visual observations were conducted by Nicholson GeoSolutions during excavation and used to evaluate when the approximate limits of the impacted soils had been reached. Confirmation samples were then collected to assess whether compliance with the COGCC Table 910-1 standards had been achieved. Table 1 provides the confirmation sample results for the skim pit excavation. Figure 1 provides the limits of the excavation and the locations of the confirmation samples. The laboratory reports are included in Appendix D.

### 2.1 Skim Pit Closure and Other Remediation Activities

Closure of the unlined skim pit was initiated on November 17<sup>th</sup>, 2014. First, the metal cage covering the pit was removed and dismantled. The scrap metal was transported off-site for recycling. Petroleum-contaminated soil was present beneath and surrounding the skim pit to an approximate maximum depth of 15 feet. Approximately 846 yards of soil was excavated and transported to the landfill for disposal.

Five confirmation samples were collected from the sidewalls and base of the skim pit excavation on November 17<sup>th</sup>, 2014 and analyzed for sodium adsorption ratio (SAR), pH, conductivity, Total Volatile Petroleum Hydrocarbons (TVPH – gasoline range), Total Extractable Petroleum Hydrocarbons (TEPH – diesel and motor oil range), and BTEX compounds (benzene, toluene, ethylbenzene, and xylenes).

All results for confirmation samples WrightDE-C-1 (bottom), WrightDE-C-3 (east wall), and WrightDE-C-5 (north wall) were below the standards except for pH. The combined TPH for samples WrightDE-C-2 (south wall) and WrightDE-C-4 (west wall) exceeded the COGCC standard of 500 mg/kg at 1,150 mg/kg and 1,790 mg/kg respectively.

Additional confirmation samples were collected from the south and west walls on April 24<sup>th</sup>, 2015 in the same general locations as samples WrightDE-C-2 and WrightDE-C-4. All results from resample WrightDE-C-6 (south wall) were below the standards, except for SAR (14). For sample WrightDE-C-7 (west wall), the combined TPH exceeded the COGCC standard at 1,060 mg/kg. SAR also exceeded the standard at 19. This wall cannot be excavated further without undermining the adjacent evaporation pit.

Confirmation samples were not collected from the foundation soil beneath the skim pit berms. These berms were completely removed and the final skim pit excavation extends

beyond the original footprint of the berms in all directions except towards the evaporation pit where the shared wall remains.

**Table 1 Skim Pit Excavation Confirmation Sample Results**

Sample ID, Location, and depth	pH	SAR	SC	BTEX	TVPH – Gasoline (mg/kg)	TEPH – Diesel (mg/kg)	TEPH – Motor Oil (mg/kg)
WrightDE-C-1 (bottom – 15')	<b>9.3</b>	2.7	0.57	All ND	<0.5	<4.0	<4.0
WrightDE-C-2 (south – 8')	<b>9.7</b>	3.9	1.0	All ND	<0.5	<b>670</b>	<b>480</b>
WrightDE-C-3 (east – 8')	8.3	1.4	0.78	All ND	<0.5	220	240
WrightDE-C-4 (west – 8')	8.6	2.8	0.87	All ND	<0.5	<b>830</b>	<b>960</b>
WrightDE-C-5 (north – 8')	<b>9.3</b>	2.0	0.57	All ND	<0.5	<4.0	<4.0
WrightDE-C-6 (south – 7')	8.4	<b>14</b>	1.1	All ND	<0.5	58	89
WrightDE-C-7 (west – 7')	8.1	<b>19</b>	1.6	All ND	<0.5	<b>450</b>	<b>580</b>
Table 910-1 Standard	6-9	<12	<4.0		500 <sup>1</sup>	500 <sup>1</sup>	500 <sup>1</sup>

<sup>1</sup>The standard is 500 mg/kg for the combined TEPH and TVPH results

Bold values exceed standards ND = Not detected

## 2.2 Data Quality Review

A data quality review was conducted using the quality assurance report supplied by the laboratory and standard EPA data validation guidance. All analyses were conducted within the recommended holding times. All method blank results were reported as not detected. All laboratory control sample (LCS), surrogate, laboratory duplicate, and matrix spike/matrix spike duplicate (MS/MSD) recoveries were within the laboratory control limits.

All results are usable for the intended purposes of this remediation.



WRIGHT DE

Wright DE-C-1  
15'

Wright DE-C-2  
8'

Wright DE-C-3  
8'

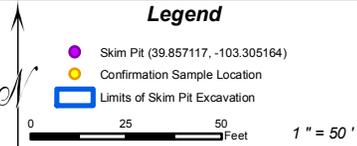
Wright DE-C-4  
8'

Wright DE-C-5  
8'

Wright DE-C-6  
7'

Wright DE-C-7  
7'

GeoSolutions  
NICHOLSON



**HRM Resources, LLC**

Wright DE  
Lease Skim  
Pit Closure

Figure 1  
September  
2015

**APPENDIX A**  
**Form 27**

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



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

FOR OGCC USE ONLY	
OGCC Employee: _____	
Spill Inspection	Complaint NOAV
Tracking No: _____	

**SITE INVESTIGATION AND REMEDIATION WORKPLAN**

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

**CAUSE OF CONDITION BEING INVESTIGATED AND REMEDIATED**

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

OGCC Operator Number: _____	Contact Name and Telephone: _____
Name of Operator: _____	_____
Address: _____	No: _____
City: _____ State: _____ Zip: _____	Fax: _____

API Number: _____	County: _____
Facility Name: _____	Facility Number: _____
Well Name: _____	Well Number: _____
Location: (QtrQtr, Sec, Twp, Rng, Meridian): _____	Latitude: _____ Longitude: _____

**TECHNICAL CONDITIONS**

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

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

Adjacent land use (cultivated, irrigated, dry land farming, industrial, residential, etc.): \_\_\_\_\_

Soil type, if not previously identified on Form 2A or Federal Surface Use Plan: \_\_\_\_\_

Potential receptors (water wells within 1/4 mi, surface waters, etc.): \_\_\_\_\_

\_\_\_\_\_

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

Impacted Media (check):	Extent of Impact:	How Determined:
Soils	_____	_____
Vegetation	_____	_____
Groundwater	_____	_____
Surface Water	_____	_____

**REMEDIALTION WORKPLAN**

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

\_\_\_\_\_

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

\_\_\_\_\_

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

\_\_\_\_\_



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

**REMEDIATION WORKPLAN (Cont.)**

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

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

There are no impacts to groundwater.

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

The skim pit area will be regraded and evaporation pit berms rebuilt as necessary.

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

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

Confirmation samples will be collected from the base and sidewalls of the skim pit excavation to confirm that soil with petroleum levels above the Table 910-1 standards have been removed.

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

Disposal at the DADS landfill.

**IMPLEMENTATION SCHEDULE**

Date Site Investigation Began: June 5, 2014 Date Site Investigation Completed: June 5, 2014 Date Remediation Plan Submitted: Oct 27, 2014  
Remediation Start Date: November 1, 2014 Anticipated Completion Date: Nov 30, 2014 Actual Completion Date: \_\_\_\_\_

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

Print Name: David K Nicholson Signed: DK Nicholson

Title: Consultant to Ritchie Exploration Date: Oct 27, 2014

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

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



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

FOR OGCC USE ONLY

MAR 30 2015

OGCC

OGCC Employee:

Spill  Complaint  
 Inspection  NOAV

Tracking No:

**SITE INVESTIGATION AND REMEDIATION WORKPLAN**

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

**CAUSE OF CONDITION BEING INVESTIGATED AND REMEDIATED**

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

OGCC Operator Number: <u>10548</u>	Contact Name and Telephone: <u>Terry Pape</u>
Name of Operator: <u>HRM Resources II, LLC</u>	No: <u>(970) 768-5700</u>
Address: <u>410 17th Street, Suite 1100</u>	Fax: <u>(303) 893-6892</u>
City: <u>Denver</u> State: <u>CO</u> Zip: <u>80202</u>	
API Number: <u>05-121-09291</u> County: <u>Washington</u>	
Facility Name: <u>Wright DE</u> Facility Number: <u>104594</u>	
Well Name: <u>Wright DE</u> Well Number: <u>1</u>	
Location: (QtrQtr, Sec, Twp, Rng, Meridian): <u>SESW Sec. 22, T2S, R53W, 6PM</u> Latitude: _____ Longitude: _____	

**TECHNICAL CONDITIONS**

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

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

Adjacent land use (cultivated, irrigated, dry land farming, industrial, residential, etc.): agricultural - grazing and cultivated

Soil type, if not previously identified on Form 2A or Federal Surface Use Plan: upland soils derived from glacial till

Potential receptors (water wells within 1/4 mi, surface waters, etc.): none

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

Impacted Media (check):	Extent of Impact:	How Determined:
<input checked="" type="checkbox"/> Soils	<u>200 yards</u>	<u>visual inspection</u>
<input type="checkbox"/> Vegetation	_____	_____
<input type="checkbox"/> Groundwater	_____	_____
<input type="checkbox"/> Surface Water	_____	_____

**REMEDATION WORKPLAN**

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

The skim pit was partially excavated in November 2014. Approximately 800 yards of oily soil was transported to the Waste Management Denver-Aurora Disposal Site (DADS) for disposal.

Describe how source is to be removed:

Confirmation samples will be collected to evaluate whether impacted soil remains in the excavation. Remaining impacted soils beneath the skim pit will be excavated and placed in one or more bermed areas on the lease and landfarmed.

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

Any remaining impacted soil will be landfarmed on site. Confirmation samples will be collected from the base and sidewalls of the skim pit excavation to confirm that all soils that exceed the Table 910-1 standards for TPH have been removed. Materials placed in the landfarm will be periodically tilled and sampled to evaluate when the Table 910-1 standards have been achieved. The skim pit excavation will be backfilled with the landfarmed soil and clean fill and the evaporation pit berms rebuilt as necessary.



Tracking Number: 2086936 Name of Operator: HRM Resources II, LLC OGCC Operator No: 10548 Received Date: 3/30/2015 Well Name & No: Wright DE 1 Facility Name & No:

Page 2 REMEDIATION WORKPLAN (Cont.)

OGCC Employee: Robert Young

If groundwater has been impacted, describe proposed monitoring plan (# of wells or sample points, sampling schedule, analytical methods, etc.): Impacts to groundwater have not been identified at the site.

Describe reclamation plan. Discuss existing and new grade recontouring; method and testing of compaction alleviation; and reseeding program, including location of new seed, seed mix and noxious weed prevention. Attach diagram or drawing. Use additional sheet for description if required. It is anticipated that no reclamation will be required. The landfarm will be constructed on areas currently used for production activities. After Table 910-1 standards have been achieved, the landfarmed soil and berms will be used to backfill the excavation. Weeds will be controlled by spraying and mechanical removal as necessary.

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

Is further site investigation required? [X] Y [ ] N If yes, describe:

The landfarm materials will be periodically sampled to evaluate progress in achieving the Table 910-1 standards.

Final disposition of E&P waste (landtreated and disposed onsite, name of licensed disposal facility, recycling, reuse, etc.): Impacted soils and clean fill will be backfilled into the skim pit excavation once the Table 910-1 standards have been achieved with approval from COGCC.

IMPLEMENTATION SCHEDULE

Date Site Investigation Began: Date Site Investigation Completed: Date Remediation Plan Submitted: April 1, 2015 Remediation Start Date: Anticipated Completion Date: November 1, 2015 Actual Completion Date:

I hereby certify that the statements made in this form are, to the best of my knowledge, true, correct, and complete. Print Name: L. Roger Hutson Signed: [Signature] Title: President Date: 3/25/15

OGCC Approved: Robert Young Title: NE EPS II Date: 5/7/2015

\* See Conditions of Approval Correspondence.

## April Prohaska

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**From:** Young - DNR, Rob <rob.young@state.co.us>  
**Sent:** Monday, May 18, 2015 12:46 PM  
**To:** Roger Hutson; aprohaska@hrmres.com; OGCC EnviroScan - DNR; John Axelson - DNR  
**Subject:** Conditionally approved Form 27 - HRM Resources II LLC - Wright DE 1 oil skim pit (Remediation #9064) API 05-121-09291  
**Attachments:** 9064\_Wright DE.pdf

Mr. Hutson,

Please find attached the conditionally approved Form 27 (Remediation #9064) for the Wright DE 1 oil skim pit remediation. The following conditions of approval (COA) have been added to the Form 27:

Remove petroleum hydrocarbon and produced water impacted soils above Table 910-1 allowable concentrations per Rule 905. Document the disposition of soil impacted above Table 910-1 allowable concentrations. Collect a minimum of one (1) discrete confirmation soil sample from the base and a minimum of four (4) discrete soil samples from the sidewalls of the oil skim pit excavation to document that soils at the extent of the excavation meet the allowable concentrations listed in Table 910-1 for BTEX, TPH, EC, pH and SAR. Oil skim pit berm material can be used to backfill the oil skim pit excavation if it meets the Table 910-1 allowable concentrations for TPH. A minimum of three feet of cover material is required if the berm materials are above the Table 910-1 allowable concentrations for pH, EC and SAR. Collect a minimum of three (3) soil samples from the oil skim pit berm footprint to document that the pH, EC and SAR concentrations of the exposed surface soil comply with Table 910-1 allowable concentrations.

Following the removal of impacted materials, submit a report referencing remediation project #9064 to the COGCC northeast EPS, Rob Young, via email. The report should describe the oil skim pit excavation activities, include a soil sample analytical summary table comparing the soil sample analytical results to Table 910-1 allowable concentrations; analytical laboratory reports; excavation figures showing the original and final extents of the oil skim pit with soil sample locations and depths below ground surface; excavation photographs showing the final excavation extents and sample locations and of the land treatment area showing the placement of the impacted soils and stormwater BMPs. The report shall be due to COGCC no later than November 1, 2015.

The on site land treatment area is subject to the following requirements:

Land treatment of oily waste shall be performed in strict accordance with the requirements of COGCC Rule 907.e.(2). Store stockpiled oily waste in a manner to prevent contamination of surrounding soil, stormwater, surface water and groundwater; until such time that the waste is properly treated or disposed in accordance with COGCC Rule 907.e.

The land treatment of soils on the location will be strictly limited to a three year completion timetable. All soils in the land treatment area will be required to be removed by May 31, 2018. An aggressive and diligent effort will be expected with regard to tilling, application of fertilizer, other soil amendments and water to ensure that bioremediation of the impacted soil is fostered and enhanced in order to meet the deadline.

Prior to using treated material for backfill, submit soil sampling and analytical results verifying that the treated material complies with all contaminants of concern in soil listed on Table 910-1 for COGCC approval. If the backfill material will be covered with at least 3-feet clean cover, analysis of the inorganics (EC, pH, SAR) in soil is not required. For progress and confirmation sampling, collect a minimum of one (1) discrete soil sample from each 100 cubic yards of treated soil. At a minimum, collect soil samples

from the treatment area twice per year to establish the rate of biodegradation. The soil samples shall be collected consistently from the same locations during each sampling event.

Prepare and submit a land treatment progress report twice per year consisting of one sampling event in the late spring (May) and one sampling event in the early fall (October). The reporting deadlines for the sampling events will be June 30 and November 30, respectively. Once the representative soil samples indicate that the soils meet the Table 910-1 allowable concentrations for BTEX, TPH, SAR, EC and pH, the soils can be used to backfill the oil skim pit excavation. If the soils will be under a minimum of three feet of clean cover material, pH, EC and SAR do not have to meet Table 910-1 concentrations. Following the removal of the treated soils, after 3 years or adequate remediation has been achieved, a minimum of four (4) discrete soil samples shall be collected from the footprint of the land treatment area to confirm that the remaining soils comply with the Table 910-1 allowable concentrations for pH, EC, SAR, BTEX and TPH.

Please reference Remediation #9064 on all correspondence regarding this project.

Thank you,

Robert J. Young  
Environmental Protection Specialist



P 303.252.0126 | C 720.471.1304 | F 303.252.0472  
1120 Lincoln Street, Suite 801, Denver, CO 80203 [rob.young@state.co.us](mailto:rob.young@state.co.us) | [www.colorado.gov/cogcc](http://www.colorado.gov/cogcc)

Cc: Rem #9064 - Conditions of Approval Correspondence

**APPENDIX B**  
**Photographs**



**Skim pit prior to cleanup**



**Excavation of skim pit materials**



**Skim pit after removal of metal cage**



**Partially excavated skim pit**



**Excavation of skim pit west wall**



**West wall after excavation**



**Excavation of skim pit bottom**



**Excavation of skim pit east wall**



**Skim pit excavation in April 2015**

**APPENDIX C**  
**Landfill Gatehouse Tickets**

Date	Profile #	Manifest #	Ticket #	Material	Facility	Tons / Tonnes	Material Quantity	Material Unit
11/19/2014	116678CO	116284	2269879	E&P EXEMPT HYDROCARBON BEARING SOIL~KELLY ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO	Colorado Landfills - Denver Arapahoe Disposal (DADS)	0.00	18.00	CYD
11/19/2014	116678CO	116264	2269804	E&P EXEMPT HYDROCARBON BEARING SOIL~KELLY ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO	Colorado Landfills - Denver Arapahoe Disposal (DADS)	0.00	18.00	CYD
11/19/2014	116678CO	116262	2269802	E&P EXEMPT HYDROCARBON BEARING SOIL~KELLY ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO	Colorado Landfills - Denver Arapahoe Disposal (DADS)	0.00	18.00	CYD
11/19/2014	116678CO	116263	2269799	E&P EXEMPT HYDROCARBON BEARING SOIL~KELLY ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO	Colorado Landfills - Denver Arapahoe Disposal (DADS)	0.00	18.00	CYD
11/19/2014	116678CO	116258	2269639	E&P EXEMPT HYDROCARBON BEARING SOIL~KELLY ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO	Colorado Landfills - Denver Arapahoe Disposal (DADS)	0.00	18.00	CYD
11/19/2014	116678CO	116259	2269637	E&P EXEMPT HYDROCARBON BEARING SOIL~KELLY ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO	Colorado Landfills - Denver Arapahoe Disposal (DADS)	0.00	18.00	CYD
11/19/2014	116678CO	116256	2269635	E&P EXEMPT HYDROCARBON BEARING SOIL~KELLY	Colorado Landfills - Denver Arapahoe	0.00	18.00	CYD

Date	Profile #	Manifest #	Ticket #	Material	Facility	Tons / Tonnes	Material Quantity	Material Unit
11/19/2014	116678CO	116255	2269632	ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO E&P EXEMPT HYDROCARBON BEARING SOIL~KELLY ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO	Disposal (DADS)  Colorado Landfills - Denver Arapahoe Disposal (DADS)	0.00	18.00	CYD
11/19/2014	116678CO	116257	2269630	ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO E&P EXEMPT HYDROCARBON BEARING SOIL~KELLY ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO	Disposal (DADS)  Colorado Landfills - Denver Arapahoe Disposal (DADS)	0.00	18.00	CYD
11/19/2014	116678CO	116253	2269628	ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO E&P EXEMPT HYDROCARBON BEARING SOIL~KELLY ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO	Disposal (DADS)  Colorado Landfills - Denver Arapahoe Disposal (DADS)	0.00	18.00	CYD
11/19/2014	116678CO	116252	2269622	ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO E&P EXEMPT HYDROCARBON BEARING SOIL~KELLY ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO	Disposal (DADS)  Colorado Landfills - Denver Arapahoe Disposal (DADS)	0.00	18.00	CYD
11/19/2014	116678CO	116251	2269620	ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO E&P EXEMPT HYDROCARBON BEARING SOIL~KELLY ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO	Disposal (DADS)  Colorado Landfills - Denver Arapahoe Disposal (DADS)	0.00	18.00	CYD
11/19/2014	116678CO	116261	2269535	ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO E&P EXEMPT HYDROCARBON BEARING SOIL~KELLY ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO	Disposal (DADS)  Colorado Landfills - Denver Arapahoe Disposal (DADS)	0.00	18.00	CYD

Date	Profile #	Manifest #	Ticket #	Material	Facility	Tons / Tonnes	Material Quantity	Material Unit
11/19/2014	116678CO	116260	2269521	E&P EXEMPT HYDROCARBON BEARING SOIL~KELLY ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO	Colorado Landfills - Denver Arapahoe Disposal (DADS)	0.00	18.00	CYD
11/19/2014	116678CO	116254	2269488	E&P EXEMPT HYDROCARBON BEARING SOIL~KELLY ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO	Colorado Landfills - Denver Arapahoe Disposal (DADS)	0.00	18.00	CYD
11/18/2014	116678CO	116250	2269285	E&P EXEMPT HYDROCARBON BEARING SOIL~KELLY ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO	Colorado Landfills - Denver Arapahoe Disposal (DADS)	0.00	18.00	CYD
11/18/2014	116678CO	116249	2269282	E&P EXEMPT HYDROCARBON BEARING SOIL~KELLY ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO	Colorado Landfills - Denver Arapahoe Disposal (DADS)	0.00	18.00	CYD
11/18/2014	116678CO	116248	2269238	E&P EXEMPT HYDROCARBON BEARING SOIL~KELLY ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO	Colorado Landfills - Denver Arapahoe Disposal (DADS)	0.00	18.00	CYD
11/18/2014	116678CO	116246	2269222	E&P EXEMPT HYDROCARBON BEARING SOIL~KELLY ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO	Colorado Landfills - Denver Arapahoe Disposal (DADS)	0.00	18.00	CYD
11/18/2014	116678CO	116247	2269207	E&P EXEMPT HYDROCARBON BEARING SOIL~KELLY	Colorado Landfills - Denver Arapahoe	0.00	18.00	CYD

Date	Profile #	Manifest #	Ticket #	Material	Facility	Tons / Tonnes	Material Quantity	Material Unit
11/18/2014	116678CO	116245	2269041	ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO E&P EXEMPT HYDROCARBON BEARING SOIL~KELLY ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO	Disposal (DADS)  Colorado Landfills - Denver Arapahoe Disposal (DADS)	0.00	18.00	CYD
11/18/2014	116678CO	116243	2269037	ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO E&P EXEMPT HYDROCARBON BEARING SOIL~KELLY ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO	Disposal (DADS)  Colorado Landfills - Denver Arapahoe Disposal (DADS)	0.00	18.00	CYD
11/18/2014	116678CO	116244	2269033	ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO E&P EXEMPT HYDROCARBON BEARING SOIL~KELLY ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO	Disposal (DADS)  Colorado Landfills - Denver Arapahoe Disposal (DADS)	0.00	18.00	CYD
11/18/2014	116678CO	116241	2268982	ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO E&P EXEMPT HYDROCARBON BEARING SOIL~KELLY ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO	Disposal (DADS)  Colorado Landfills - Denver Arapahoe Disposal (DADS)	0.00	18.00	CYD
11/18/2014	116678CO	116242	2268976	ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO E&P EXEMPT HYDROCARBON BEARING SOIL~KELLY ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO	Disposal (DADS)  Colorado Landfills - Denver Arapahoe Disposal (DADS)	0.00	18.00	CYD
11/18/2014	116678CO	116240	2268930	ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO E&P EXEMPT HYDROCARBON BEARING SOIL~KELLY ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO	Disposal (DADS)  Colorado Landfills - Denver Arapahoe Disposal (DADS)	0.00	18.00	CYD

Date	Profile #	Manifest #	Ticket #	Material	Facility	Tons / Tonnes	Material Quantity	Material Unit
11/18/2014	116678CO	116239	2268916	E&P EXEMPT HYDROCARBON BEARING SOIL~KELLY ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO	Colorado Landfills - Denver Arapahoe Disposal (DADS)	0.00	18.00	CYD
11/18/2014	116678CO	116238	2268914	E&P EXEMPT HYDROCARBON BEARING SOIL~KELLY ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO	Colorado Landfills - Denver Arapahoe Disposal (DADS)	0.00	18.00	CYD
11/18/2014	116678CO	116236	2268836	E&P EXEMPT HYDROCARBON BEARING SOIL~KELLY ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO	Colorado Landfills - Denver Arapahoe Disposal (DADS)	0.00	18.00	CYD
11/18/2014	116678CO	116237	2268787	E&P EXEMPT HYDROCARBON BEARING SOIL~KELLY ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO	Colorado Landfills - Denver Arapahoe Disposal (DADS)	0.00	18.00	CYD
11/18/2014	116678CO	116235	2268732	E&P EXEMPT HYDROCARBON BEARING SOIL~KELLY ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO	Colorado Landfills - Denver Arapahoe Disposal (DADS)	0.00	18.00	CYD
11/18/2014	116678CO	116234	2268692	E&P EXEMPT HYDROCARBON BEARING SOIL~KELLY ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO	Colorado Landfills - Denver Arapahoe Disposal (DADS)	0.00	18.00	CYD
11/18/2014	116678CO	116233	2268666	E&P EXEMPT HYDROCARBON BEARING SOIL~KELLY	Colorado Landfills - Denver Arapahoe	0.00	18.00	CYD

Date	Profile #	Manifest #	Ticket #	Material	Facility	Tons / Tonnes	Material Quantity	Material Unit
11/18/2014	116678CO	116232	2268631	ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO E&P EXEMPT HYDROCARBON BEARING SOIL~KELLY ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO	Disposal (DADS) Colorado Landfills - Denver Arapahoe Disposal (DADS)	0.00	18.00	CYD
11/18/2014	116678CO	116231	2268624	ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO E&P EXEMPT HYDROCARBON BEARING SOIL~KELLY ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO	Disposal (DADS) Colorado Landfills - Denver Arapahoe Disposal (DADS)	0.00	18.00	CYD
11/18/2014	116678CO	116230	2268620	ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO E&P EXEMPT HYDROCARBON BEARING SOIL~KELLY ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO	Disposal (DADS) Colorado Landfills - Denver Arapahoe Disposal (DADS)	0.00	18.00	CYD
11/17/2014	116678CO	116229	2268468	ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO E&P EXEMPT HYDROCARBON BEARING SOIL~KELLY ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO	Disposal (DADS) Colorado Landfills - Denver Arapahoe Disposal (DADS)	0.00	18.00	CYD
11/17/2014	116678CO	116228	2268447	ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO E&P EXEMPT HYDROCARBON BEARING SOIL~KELLY ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO	Disposal (DADS) Colorado Landfills - Denver Arapahoe Disposal (DADS)	0.00	18.00	CYD
11/17/2014	116678CO	116226	2268437	ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO E&P EXEMPT HYDROCARBON BEARING SOIL~KELLY ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO	Disposal (DADS) Colorado Landfills - Denver Arapahoe Disposal (DADS)	0.00	18.00	CYD

Date	Profile #	Manifest #	Ticket #	Material	Facility	Tons / Tonnes	Material Quantity	Material Unit
11/17/2014	116678CO	116227	2268424	E&P EXEMPT HYDROCARBON BEARING SOIL~KELLY ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO	Colorado Landfills - Denver Arapahoe Disposal (DADS)	0.00	18.00	CYD
11/17/2014	116678CO	116225	2268637	E&P EXEMPT HYDROCARBON BEARING SOIL~KELLY ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO	Colorado Landfills - Denver Arapahoe Disposal (DADS)	0.00	18.00	CYD
11/17/2014	116678CO	116224	2268166	E&P EXEMPT HYDROCARBON BEARING SOIL~KELLY ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO	Colorado Landfills - Denver Arapahoe Disposal (DADS)	0.00	18.00	CYD
11/17/2014	116678CO	1116223	2268164	E&P EXEMPT HYDROCARBON BEARING SOIL~KELLY ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO	Colorado Landfills - Denver Arapahoe Disposal (DADS)	0.00	18.00	CYD
11/17/2014	116678CO	116222	2268141	E&P EXEMPT HYDROCARBON BEARING SOIL~KELLY ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO	Colorado Landfills - Denver Arapahoe Disposal (DADS)	0.00	18.00	CYD
11/17/2014	116678CO	105594	2267920	E&P EXEMPT HYDROCARBON BEARING SOIL~KELLY ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO	Colorado Landfills - Denver Arapahoe Disposal (DADS)	0.00	18.00	CYD
11/17/2014	116678CO	105593	2267910	E&P EXEMPT HYDROCARBON BEARING SOIL~KELLY	Colorado Landfills - Denver Arapahoe	0.00	18.00	CYD

Date	Profile #	Manifest #	Ticket #	Material	Facility	Tons / Tonnes	Material Quantity	Material Unit
11/17/2014	116678CO	105592	2267901	ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO E&P EXEMPT HYDROCARBON BEARING SOIL~KELLY ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO	Disposal (DADS) Arapahoe Denver Disposal (DADS)	0.00	18.00	CYD
11/17/2014	116678CO	105591	2267900	ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO E&P EXEMPT HYDROCARBON BEARING SOIL~KELLY ENVIRONMENTAL LLC~RITCHIE EXPLORATION INC~116678CO	Disposal (DADS) Arapahoe Denver Disposal (DADS)	0.00	18.00	CYD

**APPENDIX D**  
**Laboratory Reports**



12065 Lebanon Rd.  
Mt. Juliet, TN 37122  
(615) 758-5858  
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Tax I.D. 62-0814289

Est. 1970

Dave Nicholson  
Ritchie Exploration, Inc.- Wichita, KS  
8100 E. 22th St. North  
Wichita, KS 67226

## Report Summary

Monday November 24, 2014

Report Number: L734322

Samples Received: 11/19/14

Client Project:

Description:

The analytical results in this report are based upon information supplied by you, the client, and are for your exclusive use. If you have any questions regarding this data package, please do not hesitate to call.

Entire Report Reviewed By:

Mark W. Beasley , ESC Representative

### Laboratory Certification Numbers

A2LA - 1461-01, AIHA - 100789, AL - 40660, CA - 01157CA, CT - PH-0197,  
FL - E87487, GA - 923, IN - C-TN-01, KY - 90010, KYUST - 0016,  
NC - ENV375/DW21704/BIO041, ND - R-140. NJ - TN002, NJ NELAP - TN002,  
SC - 84004, TN - 2006, VA - 460132, WV - 233, AZ - 0612,  
MN - 047-999-395, NY - 11742, WI - 998093910, NV - TN000032011-1,  
TX - T104704245-11-3, OK - 9915, PA - 68-02979, IA Lab #364, EPA - TN002

Accreditation is only applicable to the test methods specified on each scope of accreditation held by ESC Lab Sciences.

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REPORT OF ANALYSIS

Dave Nicholson  
 Ritchie Exploration, Inc.- Wichita,  
 8100 E. 22th St. North  
 Wichita, KS 67226

November 24, 2014

Date Received : November 19, 2014  
 Description :  
 Sample ID : WRIGHT DE-C-1  
 Collected By :  
 Collection Date : 11/17/14 13:30

ESC Sample # : L734322-01  
 Site ID :  
 Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
pH	9.3		su	9045D	11/20/14	1
Sodium Adsorption Ratio	2.7			Calc.	11/23/14	1
Specific Conductance	570		umhos/cm	9050AMod	11/20/14	1
Benzene	BDL	0.0025	mg/kg	8021	11/22/14	5
Toluene	BDL	0.025	mg/kg	8021	11/22/14	5
Ethylbenzene	BDL	0.0025	mg/kg	8021	11/22/14	5
Total Xylene	BDL	0.0075	mg/kg	8021	11/22/14	5
TPH (GC/FID) Low Fraction	BDL	0.50	mg/kg	8015	11/22/14	5
Surrogate Recovery-%						
a,a,a-Trifluorotoluene(FID)	94.1		% Rec.	8015	11/22/14	5
a,a,a-Trifluorotoluene(PID)	101.		% Rec.	8021	11/22/14	5
Diesel and Oil Ranges						
C10-C28 Diesel Range	BDL	4.0	mg/kg	8015	11/21/14	1
C28-C40 Oil Range	BDL	4.0	mg/kg	8015	11/21/14	1
Surrogate Recovery						
o-Terphenyl	66.3		% Rec.	8015	11/21/14	1

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit(PQL)

Note:

The reported analytical results relate only to the sample submitted.

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Reported: 11/24/14 12:16 Printed: 11/24/14 12:16  
 L734322-01 (PH) - 9.3@21.5c



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REPORT OF ANALYSIS

Dave Nicholson  
 Ritchie Exploration, Inc.- Wichita,  
 8100 E. 22th St. North  
 Wichita, KS 67226

November 24, 2014

Date Received : November 19, 2014  
 Description :  
 Sample ID : WRIGHT DE-C-2  
 Collected By :  
 Collection Date : 11/17/14 13:50

ESC Sample # : L734322-02  
 Site ID :  
 Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
pH	9.7		su	9045D	11/20/14	1
Sodium Adsorption Ratio	3.9			Calc.	11/23/14	1
Specific Conductance	1000		umhos/cm	9050AMod	11/20/14	1
Benzene	BDL	0.0025	mg/kg	8021	11/22/14	5
Toluene	BDL	0.025	mg/kg	8021	11/22/14	5
Ethylbenzene	BDL	0.0025	mg/kg	8021	11/22/14	5
Total Xylene	BDL	0.0075	mg/kg	8021	11/22/14	5
TPH (GC/FID) Low Fraction	BDL	0.50	mg/kg	8015	11/22/14	5
Surrogate Recovery-%						
a,a,a-Trifluorotoluene(FID)	93.8		% Rec.	8015	11/22/14	5
a,a,a-Trifluorotoluene(PID)	101.		% Rec.	8021	11/22/14	5
Diesel and Oil Ranges						
C10-C28 Diesel Range	670	20.	mg/kg	8015	11/21/14	5
C28-C40 Oil Range	480	20.	mg/kg	8015	11/21/14	5
Surrogate Recovery						
o-Terphenyl	63.0		% Rec.	8015	11/21/14	5

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit(PQL)

Note:

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Reported: 11/24/14 12:16 Printed: 11/24/14 12:16  
 L734322-02 (DRORLA) - Dilution due to matrix  
 L734322-02 (PH) - 9.7@21.2c



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REPORT OF ANALYSIS

Dave Nicholson  
 Ritchie Exploration, Inc.- Wichita,  
 8100 E. 22th St. North  
 Wichita, KS 67226

November 24, 2014

Date Received : November 19, 2014  
 Description :  
 Sample ID : WRIGHT DE-C-3  
 Collected By :  
 Collection Date : 11/17/14 13:55

ESC Sample # : L734322-03  
 Site ID :  
 Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
pH	8.3		su	9045D	11/20/14	1
Sodium Adsorption Ratio	1.4			Calc.	11/23/14	1
Specific Conductance	780		umhos/cm	9050AMod	11/20/14	1
Benzene	BDL	0.0025	mg/kg	8021	11/22/14	5
Toluene	BDL	0.025	mg/kg	8021	11/22/14	5
Ethylbenzene	BDL	0.0025	mg/kg	8021	11/22/14	5
Total Xylene	BDL	0.0075	mg/kg	8021	11/22/14	5
TPH (GC/FID) Low Fraction	BDL	0.50	mg/kg	8015	11/22/14	5
Surrogate Recovery-%						
a,a,a-Trifluorotoluene(FID)	94.1		% Rec.	8015	11/22/14	5
a,a,a-Trifluorotoluene(PID)	101.		% Rec.	8021	11/22/14	5
Diesel and Oil Ranges						
C10-C28 Diesel Range	220	200	mg/kg	8015	11/21/14	50
C28-C40 Oil Range	240	200	mg/kg	8015	11/21/14	50
Surrogate Recovery						
o-Terphenyl	60.2		% Rec.	8015	11/21/14	50

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit(PQL)

Note:

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Reported: 11/24/14 12:16 Printed: 11/24/14 12:16

L734322-03 (DRORLA) - Dilution due to matrix

L734322-03 (PH) - 8.3@21.3c



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REPORT OF ANALYSIS

Dave Nicholson  
 Ritchie Exploration, Inc.- Wichita,  
 8100 E. 22th St. North  
 Wichita, KS 67226

November 24, 2014

Date Received : November 19, 2014  
 Description :  
 Sample ID : WRIGHT DE-C-4  
 Collected By :  
 Collection Date : 11/17/14 14:00

ESC Sample # : L734322-04

Site ID :

Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
pH	8.6		su	9045D	11/20/14	1
Sodium Adsorption Ratio	2.8			Calc.	11/23/14	1
Specific Conductance	870		umhos/cm	9050AMod	11/20/14	1
Benzene	BDL	0.0025	mg/kg	8021	11/22/14	5
Toluene	BDL	0.025	mg/kg	8021	11/22/14	5
Ethylbenzene	BDL	0.0025	mg/kg	8021	11/22/14	5
Total Xylene	BDL	0.0075	mg/kg	8021	11/22/14	5
TPH (GC/FID) Low Fraction	BDL	0.50	mg/kg	8015	11/22/14	5
Surrogate Recovery-%						
a,a,a-Trifluorotoluene(FID)	93.6		% Rec.	8015	11/22/14	5
a,a,a-Trifluorotoluene(PID)	101.		% Rec.	8021	11/22/14	5
Diesel and Oil Ranges						
C10-C28 Diesel Range	830	200	mg/kg	8015	11/21/14	50
C28-C40 Oil Range	960	200	mg/kg	8015	11/21/14	50
Surrogate Recovery						
o-Terphenyl	0.00		% Rec.	8015	11/21/14	50

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit(PQL)

Note:

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Reported: 11/24/14 12:16 Printed: 11/24/14 12:16  
 L734322-04 (PH) - 8.6@21.5c



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REPORT OF ANALYSIS

Dave Nicholson  
 Ritchie Exploration, Inc.- Wichita,  
 8100 E. 22th St. North  
 Wichita, KS 67226

November 24, 2014

Date Received : November 19, 2014  
 Description :  
 Sample ID : WRIGHT DE-C-5  
 Collected By :  
 Collection Date : 11/17/14 14:10

ESC Sample # : L734322-05  
 Site ID :  
 Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
pH	9.3		su	9045D	11/20/14	1
Sodium Adsorption Ratio	2.0			Calc.	11/23/14	1
Specific Conductance	570		umhos/cm	9050AMod	11/20/14	1
Benzene	BDL	0.0025	mg/kg	8021	11/22/14	5
Toluene	BDL	0.025	mg/kg	8021	11/22/14	5
Ethylbenzene	BDL	0.0025	mg/kg	8021	11/22/14	5
Total Xylene	BDL	0.0075	mg/kg	8021	11/22/14	5
TPH (GC/FID) Low Fraction	BDL	0.50	mg/kg	8015	11/22/14	5
Surrogate Recovery-%						
a,a,a-Trifluorotoluene(FID)	93.8		% Rec.	8015	11/22/14	5
a,a,a-Trifluorotoluene(PID)	101.		% Rec.	8021	11/22/14	5
Diesel and Oil Ranges						
C10-C28 Diesel Range	BDL	4.0	mg/kg	8015	11/21/14	1
C28-C40 Oil Range	BDL	4.0	mg/kg	8015	11/21/14	1
Surrogate Recovery						
o-Terphenyl	67.3		% Rec.	8015	11/21/14	1

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit(PQL)

Note:

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Reported: 11/24/14 12:16 Printed: 11/24/14 12:16  
 L734322-05 (PH) - 9.3@21.3c

Attachment A  
List of Analytes with QC Qualifiers

Sample Number	Work Group	Sample Type	Analyte	Run ID	Qualifier
L734322-03	WG755517	SAMP	o-Terphenyl	R3005926	J7
L734322-04	WG755517	SAMP	o-Terphenyl	R3005945	J7

Attachment B  
Explanation of QC Qualifier Codes

Qualifier	Meaning
J7	Surrogate recovery cannot be used for control limit evaluation due to dilution.

Qualifier Report Information

ESC utilizes sample and result qualifiers as set forth by the EPA Contract Laboratory Program and as required by most certifying bodies including NELAC. In addition to the EPA qualifiers adopted by ESC, we have implemented ESC qualifiers to provide more information pertaining to our analytical results. Each qualifier is designated in the qualifier explanation as either EPA or ESC. Data qualifiers are intended to provide the ESC client with more detailed information concerning the potential bias of reported data. Because of the wide range of constituents and variety of matrices incorporated by most EPA methods, it is common for some compounds to fall outside of established ranges. These exceptions are evaluated and all reported data is valid and useable "unless qualified as 'R' (Rejected)."

Definitions

- Accuracy - The relationship of the observed value of a known sample to the true value of a known sample. Represented by percent recovery and relevant to samples such as: control samples, matrix spike recoveries, surrogate recoveries, etc.
- Precision - The agreement between a set of samples or between duplicate samples. Relates to how close together the results are and is represented by Relative Percent Difference.
- Surrogate - Organic compounds that are similar in chemical composition, extraction, and chromatography to analytes of interest. The surrogates are used to determine the probable response of the group of analytes that are chemically related to the surrogate compound. Surrogates are added to the sample and carried through all stages of preparation and analyses.
- TIC - Tentatively Identified Compound: Compounds detected in samples that are not target compounds, internal standards, system monitoring compounds, or surrogates.

Summary of Remarks For Samples Printed  
11/24/14 at 12:16:47

TSR Signing Reports: 134  
R4 - Rush: Three Day

Sample: L734322-01 Account: RITEXPWKS Received: 11/19/14 09:00 Due Date: 11/24/14 00:00 RPT Date: 11/24/14 12:16

Sample: L734322-02 Account: RITEXPWKS Received: 11/19/14 09:00 Due Date: 11/24/14 00:00 RPT Date: 11/24/14 12:16

Sample: L734322-03 Account: RITEXPWKS Received: 11/19/14 09:00 Due Date: 11/24/14 00:00 RPT Date: 11/24/14 12:16

Sample: L734322-04 Account: RITEXPWKS Received: 11/19/14 09:00 Due Date: 11/24/14 00:00 RPT Date: 11/24/14 12:16

Sample: L734322-05 Account: RITEXPWKS Received: 11/19/14 09:00 Due Date: 11/24/14 00:00 RPT Date: 11/24/14 12:16



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Ritchie Exploration, Inc.- Wichita, KS  
 Dave Nicholson  
 8100 E. 22th St. North

Wichita, KS 67226

Quality Assurance Report  
 Level II

L734322

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November 24, 2014

Analyte	Result	Laboratory Blank		Limit	Batch	Date Analyzed
		Units	% Rec			
Specific Conductance	1.70	umhos/cm			WG755535	11/20/14 15:27
C10-C28 Diesel Range	< 4	mg/kg			WG755517	11/20/14 21:34
C28-C40 Oil Range	< 4	mg/kg			WG755517	11/20/14 21:34
o-Terphenyl		% Rec.	78.10	50-150	WG755517	11/20/14 21:34
Benzene	< .0005	mg/kg			WG756179	11/22/14 19:49
Ethylbenzene	< .0005	mg/kg			WG756179	11/22/14 19:49
Toluene	< .005	mg/kg			WG756179	11/22/14 19:49
TPH (GC/FID) Low Fraction	< .1	mg/kg			WG756179	11/22/14 19:49
Total Xylene	< .0015	mg/kg			WG756179	11/22/14 19:49
a,a,a-Trifluorotoluene(FID)		% Rec.	94.50	59-128	WG756179	11/22/14 19:49
a,a,a-Trifluorotoluene(PID)		% Rec.	102.0	54-144	WG756179	11/22/14 19:49

Analyte	Units	Result	Duplicate		RPD	Limit	Ref Samp	Batch
			Duplicate	RPD				
pH	su	9.10	9.10	0.329	1		L733849-01	WG755563
pH	su	7.90	7.90	0.127	1		L734429-05	WG755563
Specific Conductance	umhos/cm	120.	120.	1.65	20		L733863-01	WG755535
Specific Conductance	umhos/cm	570.	570.	0.175	20		L734322-05	WG755535

Analyte	Units	Laboratory Control Sample		% Rec	Limit	Batch
		Known Val	Result			
pH	su	5.9	5.90	100.	98.3-101.7	WG755563
Specific Conductance	umhos/cm	759	780.	103.	85-115	WG755535
Benzene	mg/kg	.05	0.0486	97.1	70-130	WG756179
Ethylbenzene	mg/kg	.05	0.0468	93.6	70-130	WG756179
Toluene	mg/kg	.05	0.0477	95.4	70-130	WG756179
Total Xylene	mg/kg	.15	0.141	93.8	70-130	WG756179
a,a,a-Trifluorotoluene(FID)				94.00	59-128	WG756179
a,a,a-Trifluorotoluene(PID)				101.0	54-144	WG756179
TPH (GC/FID) Low Fraction	mg/kg	5.5	5.00	91.0	63.5-137	WG756179
a,a,a-Trifluorotoluene(FID)				102.0	59-128	WG756179
a,a,a-Trifluorotoluene(PID)				112.0	54-144	WG756179

Analyte	Units	Laboratory Control Sample Duplicate			Limit	RPD	Limit	Batch
		Result	Ref	%Rec				
pH	su	5.90	5.90	100.	98.3-101.7	0.0	20	WG755563
Specific Conductance	umhos/	780.	780.	103.	85-115	0.0	20	WG755535
Benzene	mg/kg	0.0472	0.0486	94.0	70-130	2.81	20	WG756179
Ethylbenzene	mg/kg	0.0459	0.0468	92.0	70-130	2.01	20	WG756179
Toluene	mg/kg	0.0462	0.0477	92.0	70-130	3.24	20	WG756179
Total Xylene	mg/kg	0.138	0.141	92.0	70-130	1.66	20	WG756179
a,a,a-Trifluorotoluene(FID)				94.10	59-128			WG756179

\* Performance of this Analyte is outside of established criteria.

For additional information, please see Attachment A 'List of Analytes with QC Qualifiers.'



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 Dave Nicholson  
 8100 E. 22th St. North

Quality Assurance Report  
 Level II

Wichita, KS 67226

November 24, 2014

L734322

Analyte	Units	Laboratory Control Sample Duplicate			Limit	RPD	Limit	Batch
		Result	Ref	%Rec				
a,a,a-Trifluorotoluene(PID)				101.0	54-144			
TPH (GC/FID) Low Fraction	mg/kg	5.07	5.00	92.0	63.5-137	1.31	20	WG756179
a,a,a-Trifluorotoluene(FID)				101.0	59-128			WG756179
a,a,a-Trifluorotoluene(PID)				112.0	54-144			WG756179

Analyte	Units	Matrix Spike				Limit	Ref Samp	Batch
		MS Res	Ref Res	TV	% Rec			
Benzene	mg/kg	0.223	0.000501	.05	89.0	49.7-127	L734322-01	WG756179
Ethylbenzene	mg/kg	0.230	0.000508	.05	92.0	40.8-141	L734322-01	WG756179
Toluene	mg/kg	0.234	0.00109	.05	93.0	49.8-132	L734322-01	WG756179
Total Xylene	mg/kg	0.681	0.00224	.15	90.0	41.2-140	L734322-01	WG756179
a,a,a-Trifluorotoluene(FID)					94.50	59-128		WG756179
a,a,a-Trifluorotoluene(PID)					101.0	54-144		WG756179
TPH (GC/FID) Low Fraction	mg/kg	21.2	0.0	5.5	77.0	28.5-138	L734322-01	WG756179
a,a,a-Trifluorotoluene(FID)					99.00	59-128		WG756179
a,a,a-Trifluorotoluene(PID)					110.0	54-144		WG756179

Analyte	Units	Matrix Spike Duplicate			Limit	RPD	Limit	Ref Samp	Batch
		MSD	Ref	%Rec					
Benzene	mg/kg	0.230	0.223	91.8	49.7-127	3.03	23.5	L734322-01	WG756179
Ethylbenzene	mg/kg	0.236	0.230	94.1	40.8-141	2.54	23.8	L734322-01	WG756179
Toluene	mg/kg	0.237	0.234	94.5	49.8-132	1.47	23.5	L734322-01	WG756179
Total Xylene	mg/kg	0.695	0.681	92.3	41.2-140	1.98	23.7	L734322-01	WG756179
a,a,a-Trifluorotoluene(FID)				94.00	59-128			WG756179	
a,a,a-Trifluorotoluene(PID)				101.0	54-144			WG756179	
TPH (GC/FID) Low Fraction	mg/kg	23.3	21.2	84.8	28.5-138	9.29	23.6	L734322-01	WG756179
a,a,a-Trifluorotoluene(FID)				99.70	59-128			WG756179	
a,a,a-Trifluorotoluene(PID)				111.0	54-144			WG756179	

Batch number /Run number / Sample number cross reference

WG755563: R3005609: L734322-01 02 03 04 05  
 WG755535: R3005656: L734322-01 02 03 04 05  
 WG755517: R3005926 R3005945: L734322-01 02 03 04 05  
 WG756179: R3006071: L734322-01 02 03 04 05  
 WG755505: R3006125: L734322-01 02 03 04 05

\* \* Calculations are performed prior to rounding of reported values.  
 \* Performance of this Analyte is outside of established criteria.  
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Quality Assurance Report  
Level II

L734322

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The data package includes a summary of the analytic results of the quality control samples required by the SW-846 or CWA methods. The quality control samples include a method blank, a laboratory control sample, and the matrix spike/matrix spike duplicate analysis. If a target parameter is outside the method limits, every sample that is effected is flagged with the appropriate qualifier in Appendix B of the analytic report.

Method Blank - an aliquot of reagent water carried through the entire analytic process. The method blank results indicate if any possible contamination exposure during the sample handling, digestion or extraction process, and analysis. Concentrations of target analytes above the reporting limit in the method blank are qualified with the "B" qualifier.

Laboratory Control Sample - is a sample of known concentration that is carried through the digestion/extraction and analysis process. The percent recovery, expressed as a percentage of the theoretical concentration, has statistical control limits indicating that the analytic process is "in control". If a target analyte is outside the control limits for the laboratory control sample or any other control sample, the parameter is flagged with a "J4" qualifier for all effected samples.

Matrix Spike and Matrix Spike Duplicate - is two aliquots of an environmental sample that is spiked with known concentrations of target analytes. The percent recovery of the target analytes also has statistical control limits. If any recoveries that are outside the method control limits, the sample that was selected for matrix spike/matrix spike duplicate analysis is flagged with either a "J5" or a "J6". The relative percent difference (%RPD) between the matrix spike and the matrix spike duplicate recoveries is all calculated. If the RPD is above the method limit, the effected samples are flagged with a "J3" qualifier.



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Dave Nicholson  
HRM Resources, LLC - Denver, CO  
410 17th Street, Suite 1100  
Denver, CO 80202

## Report Summary

Wednesday May 06, 2015

Report Number: L761605

Samples Received: 04/25/15

Client Project:

Description: Wright DE

The analytical results in this report are based upon information supplied by you, the client, and are for your exclusive use. If you have any questions regarding this data package, please do not hesitate to call.

Entire Report Reviewed By:

Pam Langford , ESC Representative

### Laboratory Certification Numbers

A2LA - 1461-01, AIHA - 100789, AL - 40660, CA - 01157CA, CT - PH-0197,  
FL - E87487, GA - 923, IN - C-TN-01, KY - 90010, KYUST - 0016,  
NC - ENV375/DW21704/BIO041, ND - R-140. NJ - TN002, NJ NELAP - TN002,  
SC - 84004, TN - 2006, VA - 460132, WV - 233, AZ - 0612,  
MN - 047-999-395, NY - 11742, WI - 998093910, NV - TN000032011-1,  
TX - T104704245-11-3, OK - 9915, PA - 68-02979, IA Lab #364, EPA - TN002

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REPORT OF ANALYSIS

Dave Nicholson  
 HRM Resources, LLC - Denver, CO  
 410 17th Street, Suite 1100  
 Denver, CO 80202

May 06, 2015

Date Received : April 25, 2015  
 Description : Wright DE  
 Sample ID : WRIGHT DE-C-6 7FT  
 Collected By : DK Nicholson  
 Collection Date : 04/24/15 12:40

ESC Sample # : L761605-01  
 Site ID :  
 Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
pH	8.4	0.10	su	9045D	04/29/15	1
Sodium Adsorption Ratio	14.			Calc.	05/06/15	1
Specific Conductance	1100		umhos/cm	9050AMod	04/29/15	1
Benzene	BDL	0.0025	mg/kg	8021	05/01/15	5
Toluene	BDL	0.025	mg/kg	8021	05/01/15	5
Ethylbenzene	BDL	0.0025	mg/kg	8021	05/01/15	5
Total Xylene	BDL	0.0075	mg/kg	8021	05/01/15	5
TPH (GC/FID) Low Fraction	BDL	0.50	mg/kg	8015	05/01/15	5
Surrogate Recovery-%						
a,a,a-Trifluorotoluene(FID)	97.0		% Rec.	8015	05/01/15	1
a,a,a-Trifluorotoluene(PID)	101.		% Rec.	8021	05/01/15	1
Diesel and Oil Ranges						
C10-C28 Diesel Range	58.	40.	mg/kg	8015	04/28/15	10
C28-C40 Oil Range	89.	40.	mg/kg	8015	04/28/15	10
Surrogate Recovery						
o-Terphenyl	56.1		% Rec.	8015	04/28/15	10

BDL - Below Detection Limit  
 Det. Limit - Practical Quantitation Limit(PQL)  
 Note:

The reported analytical results relate only to the sample submitted.  
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Reported: 05/06/15 09:19 Printed: 05/06/15 09:19  
 L761605-01 (PH) - 8.4 AT 21.1C



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REPORT OF ANALYSIS

Dave Nicholson  
 HRM Resources, LLC - Denver, CO  
 410 17th Street, Suite 1100  
 Denver, CO 80202

May 06, 2015

Date Received : April 25, 2015  
 Description : Wright DE  
 Sample ID : WRIGHT DE-C-7 7FT  
 Collected By : DK Nicholson  
 Collection Date : 04/24/15 12:50

ESC Sample # : L761605-02

Site ID :

Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
pH	8.1	0.10	su	9045D	04/29/15	1
Sodium Adsorption Ratio	19.			Calc.	05/06/15	1
Specific Conductance	1600		umhos/cm	9050AMod	04/30/15	1
Benzene	BDL	0.0025	mg/kg	8021	05/02/15	5
Toluene	BDL	0.025	mg/kg	8021	05/02/15	5
Ethylbenzene	BDL	0.0025	mg/kg	8021	05/02/15	5
Total Xylene	BDL	0.0075	mg/kg	8021	05/02/15	5
TPH (GC/FID) Low Fraction	BDL	0.50	mg/kg	8015	05/02/15	5
Surrogate Recovery-%						
a,a,a-Trifluorotoluene(FID)	97.1		% Rec.	8015	05/02/15	1
a,a,a-Trifluorotoluene(PID)	101.		% Rec.	8021	05/02/15	1
Diesel and Oil Ranges						
C10-C28 Diesel Range	450	40.	mg/kg	8015	04/28/15	10
C28-C40 Oil Range	580	40.	mg/kg	8015	04/28/15	10
Surrogate Recovery						
o-Terphenyl	64.8		% Rec.	8015	04/28/15	10

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit(PQL)

Note:

The reported analytical results relate only to the sample submitted.

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Reported: 05/06/15 09:19 Printed: 05/06/15 09:19  
 L761605-02 (PH) - 8.1 AT 20.2C



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May 06, 2015

Analyte	Result	Laboratory Blank		Limit	Batch	Date Analyzed
		Units	% Rec			
C10-C28 Diesel Range	< 4	mg/kg			WG785377	04/28/15 16:48
C28-C40 Oil Range	< 4	mg/kg			WG785377	04/28/15 16:48
o-Terphenyl		% Rec.	81.20	50-150	WG785377	04/28/15 16:48
Specific Conductance	1.14	umhos/cm			WG785055	04/29/15 16:19
Specific Conductance	0.960	umhos/cm			WG785852	04/30/15 15:36
Benzene	< .0005	mg/kg			WG785984	05/01/15 21:31
Ethylbenzene	< .0005	mg/kg			WG785984	05/01/15 21:31
Toluene	< .005	mg/kg			WG785984	05/01/15 21:31
TPH (GC/FID) Low Fraction	< .1	mg/kg			WG785984	05/01/15 21:31
Total Xylene	< .0015	mg/kg			WG785984	05/01/15 21:31
a,a,a-Trifluorotoluene(FID)		% Rec.	98.00	59-128	WG785984	05/01/15 21:31
a,a,a-Trifluorotoluene(PID)		% Rec.	103.0	54-144	WG785984	05/01/15 21:31

Analyte	Units	Result	Duplicate		RPD	Limit	Ref Samp	Batch
			Duplicate					
pH	su	6.10	6.10		0.164	1	L761592-01	WG785344
pH	su	8.60	8.60		0.116	1	L761839-09	WG785344
Specific Conductance	umhos/cm	45000	45000		0.222	20	L761544-01	WG785055
Specific Conductance	umhos/cm	1100	1100		0.905	20	L761605-01	WG785055
Specific Conductance	umhos/cm	5200	5100		2.33	20	L761624-06	WG785852

Analyte	Units	Laboratory Control Sample		% Rec	Limit	Batch
		Known Val	Result			
C10-C28 Diesel Range	mg/kg	60	38.4	64.0	50-100	WG785377
o-Terphenyl				81.60	50-150	WG785377
pH	su	7.84	7.79	99.4	98.3-101.7	WG785344
Specific Conductance	umhos/cm	534	539.	101.	85-115	WG785055
Specific Conductance	umhos/cm	534	548.	103.	85-115	WG785852
Benzene	mg/kg	.05	0.0451	90.3	70-130	WG785984
Ethylbenzene	mg/kg	.05	0.0467	93.4	70-130	WG785984
Toluene	mg/kg	.05	0.0466	93.3	70-130	WG785984
Total Xylene	mg/kg	.15	0.143	95.1	70-130	WG785984
a,a,a-Trifluorotoluene(PID)				101.0	54-144	WG785984
TPH (GC/FID) Low Fraction	mg/kg	5.5	4.00	72.6	63.5-137	WG785984
a,a,a-Trifluorotoluene(FID)				98.00	59-128	WG785984

\* Performance of this Analyte is outside of established criteria.  
 For additional information, please see Attachment A 'List of Analytes with QC Qualifiers.'



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Analyte	Units	Laboratory Control Sample Duplicate			Limit	RPD	Limit	Batch
		Result	Ref	%Rec				
C10-C28 Diesel Range	mg/kg	38.7	38.4	64.0	50-100	0.790	20	WG785377
o-Terphenyl				83.40	50-150			WG785377
pH	su	7.79	7.79	99.0	98.3-101.7	0.0	20	WG785344
Specific Conductance	umhos/	539.	539.	101.	85-115	0.0	20	WG785055
Specific Conductance	umhos/	546.	548.	102.	85-115	0.366	20	WG785852
Benzene	mg/kg	0.0458	0.0451	92.0	70-130	1.51	20	WG785984
Ethylbenzene	mg/kg	0.0468	0.0467	94.0	70-130	0.150	20	WG785984
Toluene	mg/kg	0.0463	0.0466	93.0	70-130	0.660	20	WG785984
Total Xylene	mg/kg	0.142	0.143	95.0	70-130	0.260	20	WG785984
a,a,a-Trifluorotoluene(PID)				101.0	54-144			WG785984
TPH (GC/FID) Low Fraction	mg/kg	3.99	4.00	73.0	63.5-137	0.0500	20	WG785984
a,a,a-Trifluorotoluene(FID)				98.00	59-128			WG785984

Analyte	Units	Matrix Spike				Limit	Ref Samp	Batch
		MS Res	Ref Res	TV	% Rec			
Benzene	mg/kg	0.203	0.000275	.05	81.0	49.7-127	L761605-01	WG785984
Ethylbenzene	mg/kg	0.175	0.000381	.05	70.0	40.8-141	L761605-01	WG785984
Toluene	mg/kg	0.193	0.00138	.05	76.0	49.8-132	L761605-01	WG785984
Total Xylene	mg/kg	0.525	0.00211	.15	70.0	41.2-140	L761605-01	WG785984
a,a,a-Trifluorotoluene(PID)					99.90	54-144		WG785984
TPH (GC/FID) Low Fraction	mg/kg	13.6	0.100	5.5	49.0	28.5-138	L761605-01	WG785984
a,a,a-Trifluorotoluene(FID)					96.40	59-128		WG785984

Analyte	Units	Matrix Spike Duplicate			Limit	RPD	Limit	Ref Samp	Batch
		MSD	Ref	%Rec					
Benzene	mg/kg	0.198	0.203	79.0	49.7-127	2.44	23.5	L761605-01	WG785984
Ethylbenzene	mg/kg	0.165	0.175	66.0	40.8-141	5.82	23.8	L761605-01	WG785984
Toluene	mg/kg	0.185	0.193	73.6	49.8-132	3.76	23.5	L761605-01	WG785984
Total Xylene	mg/kg	0.496	0.525	65.8	41.2-140	5.80	23.7	L761605-01	WG785984
a,a,a-Trifluorotoluene(PID)					99.70	54-144			WG785984
TPH (GC/FID) Low Fraction	mg/kg	13.8	13.6	49.7	28.5-138	1.09	23.6	L761605-01	WG785984
a,a,a-Trifluorotoluene(FID)					95.60	59-128			WG785984

Batch number /Run number / Sample number cross reference

WG785377: R3033629: L761605-01 02  
 WG785344: R3033845: L761605-01 02  
 WG785055: R3034039: L761605-01  
 WG785852: R3034197: L761605-02  
 WG785984: R3035048: L761605-01 02  
 WG786006: R3035175: L761605-01 02

\* \* Calculations are performed prior to rounding of reported values.  
 \* Performance of this Analyte is outside of established criteria.  
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May 06, 2015

The data package includes a summary of the analytic results of the quality control samples required by the SW-846 or CWA methods. The quality control samples include a method blank, a laboratory control sample, and the matrix spike/matrix spike duplicate analysis. If a target parameter is outside the method limits, every sample that is effected is flagged with the appropriate qualifier in Appendix B of the analytic report.

Method Blank - an aliquot of reagent water carried through the entire analytic process. The method blank results indicate if any possible contamination exposure during the sample handling, digestion or extraction process, and analysis. Concentrations of target analytes above the reporting limit in the method blank are qualified with the "B" qualifier.

Laboratory Control Sample - is a sample of known concentration that is carried through the digestion/extraction and analysis process. The percent recovery, expressed as a percentage of the theoretical concentration, has statistical control limits indicating that the analytic process is "in control". If a target analyte is outside the control limits for the laboratory control sample or any other control sample, the parameter is flagged with a "J4" qualifier for all effected samples.

Matrix Spike and Matrix Spike Duplicate - is two aliquots of an environmental sample that is spiked with known concentrations of target analytes. The percent recovery of the target analytes also has statistical control limits. If any recoveries that are outside the method control limits, the sample that was selected for matrix spike/matrix spike duplicate analysis is flagged with either a "J5" or a "J6". The relative percent difference (%RPD) between the matrix spike and the matrix spike duplicate recoveries is all calculated. If the RPD is above the method limit, the effected samples are flagged with a "J3" qualifier.