



**Nicholson GeoSolutions LLC**

3433 East Lake Drive  
Centennial, CO 80121

November 23, 2015

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

**Subject: Barfknecht No. 1 Landfarm Sampling Results  
COGCC Remediation #9049**

Dear Terry:

Nicholson GeoSolutions LLC was retained by HRM Resources II LLC (HRM) to conduct soil sampling of the landfarm on the Barfknecht No. 1 lease, Washington County, Colorado. Sampling of the landfarm was conducted at the required rate of approximately one sample per 100 yards of material on October 18<sup>th</sup>, 2015. These samples provide the baseline concentrations for further progress sampling which will be conducted in May, 2016. The May 2016 progress samples will be collected from the same locations and used to establish the rate of biodegradation.

GPS mapping showed that the landfarm covers about 0.06 acres and contains an estimated 170 yards of material. A total of 3 discrete soil samples were collected at depths of approximately 12-16 inches. The extent of the landfarm cell and the locations of the samples are shown on Figure 1.

All samples were analyzed for Total Volatile Petroleum Hydrocarbons (TVPH – gasoline range), Total Extractable Petroleum Hydrocarbons (TEPH – diesel and motor oil range), and BTEX (benzene, toluene, ethylbenzene, and xylenes) to evaluate compliance with the COGCC Table 910-1 standards and further treatment needs.

Table 1 provides a summary of the analytical results for the samples. The laboratory report is contained in Appendix A. The combined TPH exceeded the standard of 500 mg/kg for all three samples and ranged from 834.6 mg/kg to 18,545.2 mg/kg.

Based on these results, continued treatment of this landfarm is required.

Nicholson GeoSolutions LLC



David K. Nicholson, P.G.  
Principal Geologist

**Table 1      Barfknecht No. 1 Landfarm Sample Results – October 18, 2015**

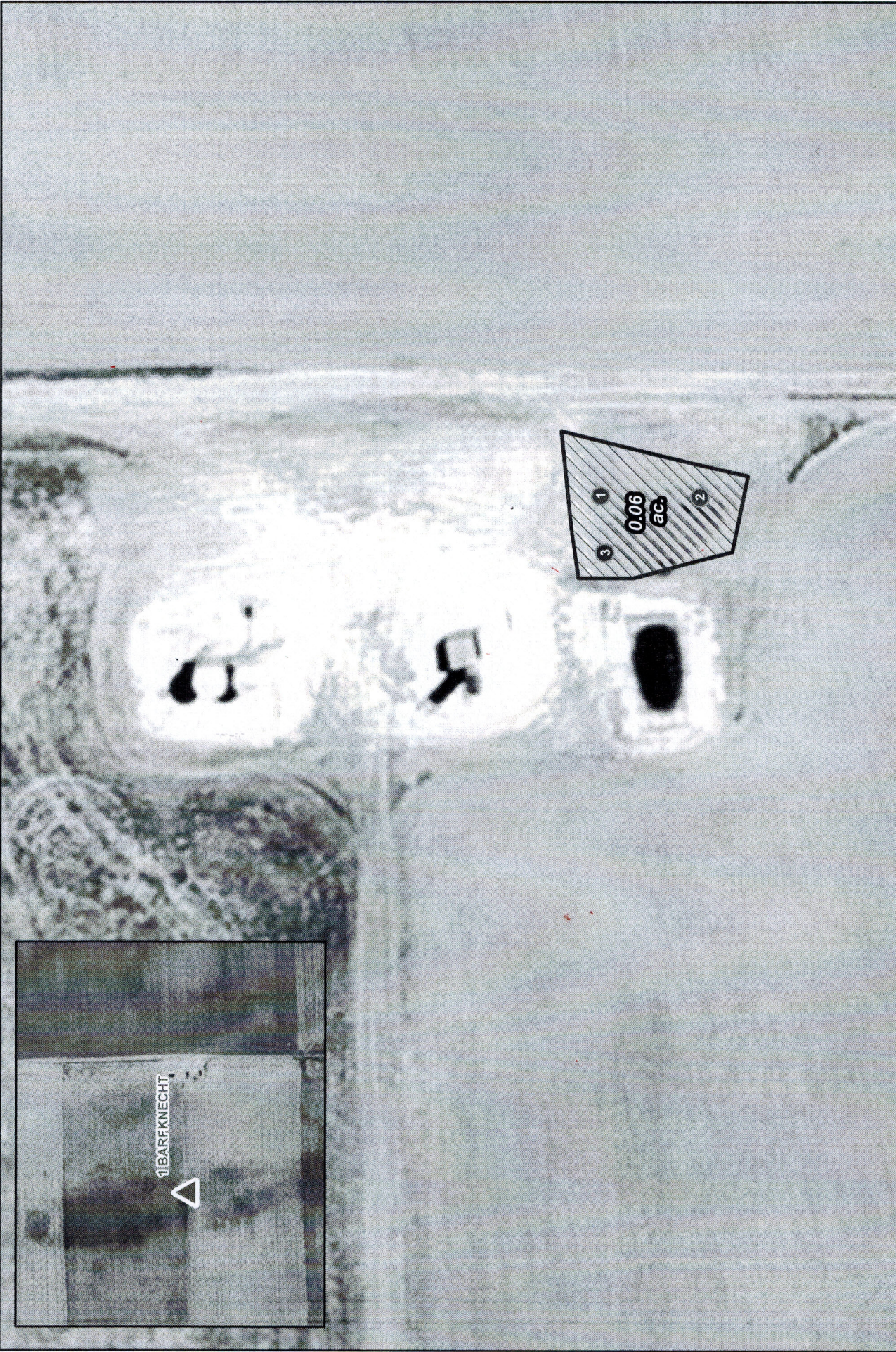
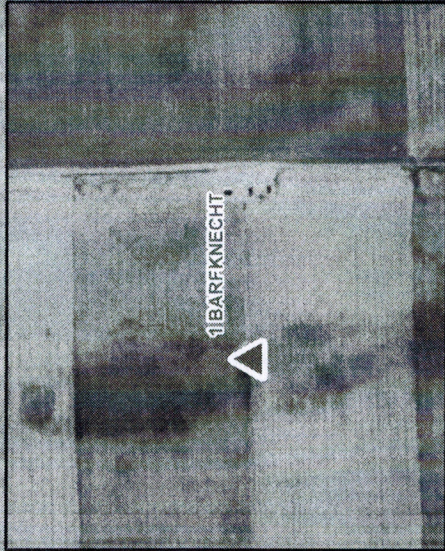
	<b>Table 910-1 Standards</b>	<b>Barfknecht LF-1</b>	<b>Barfknecht LF-2</b>	<b>Barfknecht LF-3</b>
TVPH – gasoline range	500 <sup>1</sup>	<b>265 J</b>	<b>45.2 J</b>	<b>25.6 J</b>
TEPH – diesel/motor oil range	500 <sup>1</sup>	<b>5,250</b>	<b>18,500</b>	<b>809</b>
benzene	0.17	0.0310 J	0.0154 J	0.0437 J
toluene	85	1.82 J	0.396 J	0.411 J
ethylbenzene	100	0.403 J	0.0704 J	0.0255 J
xylenes	175	2.66 J	0.452 J	0.220 J

<sup>1</sup>The standard is 500 for the combined total of TVPH and TEPH      All units in mg/kg

J = estimated concentration    UJ = estimated detection limit

Values in bold type exceed standards





HRM Resources, LLC

Barfknecht No. 1  
Landfarm  
Sampling

Figure 1  
November  
2015

Legend

Landfarm Sample

Landfarm Cell (0.06 ac)

GeoSolutions  
NICHOLSON

0 25 50 feet  
1" = 50'



**APPENDIX A**  
**Laboratory Report**



12065 Lebanon Rd.  
Mt. Juliet, TN 37122  
(615) 758-5858  
1-800-767-5859  
Fax (615) 758-5859

Tax I.D. 62-0814289

Est. 1970

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

## Report Summary

Tuesday October 27, 2015

Report Number: L795508

Samples Received: 10/20/15

Client Project:

Description: HRM Landfarm Sampling

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 - 1461-01,1461-02, 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  
HRM Resources, LLC - Denver, CO  
410 17th Street, Suite 1100  
Denver, CO 80202

October 27, 2015

Date Received : October 20, 2015  
Description : HRM Landfarm Sampling

Sample ID : BARFKNECHT-LF-1

Collected By : DK Nicholson  
Collection Date : 10/18/15 10:00

ESC Sample # : L795508-01

Site ID :

Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Benzene	0.0310	0.0125	mg/kg	8021	10/25/15	25
Toluene	1.82	0.125	mg/kg	8021	10/25/15	25
Ethylbenzene	0.403	0.0125	mg/kg	8021	10/25/15	25
Total Xylene	2.66	0.0375	mg/kg	8021	10/25/15	25
TPH (GC/FID) Low Fraction	265.	2.50	mg/kg	8015	10/25/15	25
Surrogate Recovery-%						
a,a,a-Trifluorotoluene(FID)	94.3		% Rec.	8015	10/25/15	1
a,a,a-Trifluorotoluene(PID)	99.3		% Rec.	8021	10/25/15	1
Diesel and Oil Ranges						
C10-C28 Diesel Range	3690	400.	mg/kg	8015	10/27/15	100
C28-C40 Oil Range	1560	400.	mg/kg	8015	10/27/15	100
Surrogate Recovery						
o-Terphenyl	0.00		% Rec.	8015	10/27/15	100

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: 10/27/15 17:03 Printed: 10/27/15 17:04



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HRM Resources, LLC - Denver, CO  
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October 27, 2015

Date Received : October 20, 2015  
Description : HRM Landfarm Sampling

Sample ID : BARFKNECHT-LF-2

Collected By : DK Nicholson  
Collection Date : 10/18/15 10:05

ESC Sample # : L795508-02

Site ID :

Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Benzene	0.0154	0.00250	mg/kg	8021	10/25/15	5
Toluene	0.396	0.0250	mg/kg	8021	10/25/15	5
Ethylbenzene	0.0704	0.00250	mg/kg	8021	10/25/15	5
Total Xylene	0.452	0.00750	mg/kg	8021	10/25/15	5
TPH (GC/FID) Low Fraction	45.2	0.500	mg/kg	8015	10/25/15	5
Surrogate Recovery-%						
a,a,a-Trifluorotoluene(FID)	85.2		% Rec.	8015	10/25/15	1
a,a,a-Trifluorotoluene(PID)	93.1		% Rec.	8021	10/25/15	1
Diesel and Oil Ranges						
C10-C28 Diesel Range	12400	800.	mg/kg	8015	10/27/15	200
C28-C40 Oil Range	6100	800.	mg/kg	8015	10/27/15	200
Surrogate Recovery						
o-Terphenyl	0.00		% Rec.	8015	10/27/15	200

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit(PQL)

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October 27, 2015

Date Received : October 20, 2015  
Description : HRM Landfarm Sampling  
Sample ID : BARFKNECHT-LF-3  
Collected By : DK Nicholson  
Collection Date : 10/18/15 10:10

ESC Sample # : L795508-03

Site ID :

Project # :

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Benzene	0.0437	0.0125	mg/kg	8021	10/27/15	25
Toluene	0.411	0.125	mg/kg	8021	10/27/15	25
Ethylbenzene	0.0255	0.0125	mg/kg	8021	10/27/15	25
Total Xylene	0.220	0.0375	mg/kg	8021	10/27/15	25
TPH (GC/FID) Low Fraction	25.6	2.50	mg/kg	8015	10/27/15	25
Surrogate Recovery-%						
a,a,a-Trifluorotoluene(FID)	92.6		% Rec.	8015	10/27/15	1
a,a,a-Trifluorotoluene(PID)	100.		% Rec.	8021	10/27/15	1
Diesel and Oil Ranges						
C10-C28 Diesel Range	457.	40.0	mg/kg	8015	10/27/15	10
C28-C40 Oil Range	352.	40.0	mg/kg	8015	10/27/15	10
Surrogate Recovery						
o-Terphenyl	57.9		% Rec.	8015	10/27/15	10

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit(PQL)

Note:

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Attachment A  
List of Analytes with QC Qualifiers

Sample Number	Work Group	Sample Type	Analyte	Run ID	Qualifier
L795508-01	WG824318	SAMP	o-Terphenyl	R3088199	J7
L795508-02	WG824318	SAMP	o-Terphenyl	R3088199	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.



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Analyte	Result	Laboratory Blank		Limit	Batch	Date Analyzed
		Units	% Rec			
C10-C28 Diesel Range	< 4	mg/kg			WG824318	10/26/15 12:47
C28-C40 Oil Range	< 4	mg/kg			WG824318	10/26/15 12:47
o-Terphenyl		% Rec.	95.90	50-150	WG824318	10/26/15 12:47
Benzene	< .0005	mg/kg			WG823613	10/25/15 13:30
Ethylbenzene	< .0005	mg/kg			WG823613	10/25/15 13:30
Toluene	< .005	mg/kg			WG823613	10/25/15 13:30
TPH (GC/FID) Low Fraction	< .1	mg/kg			WG823613	10/25/15 13:30
Total Xylene	< .0015	mg/kg			WG823613	10/25/15 13:30
a,a,a-Trifluorotoluene(FID)		% Rec.	97.80	59-128	WG823613	10/25/15 13:30
a,a,a-Trifluorotoluene(PID)		% Rec.	100.0	54-144	WG823613	10/25/15 13:30
Benzene	< .0005	mg/kg			WG824664	10/27/15 07:30
Ethylbenzene	< .0005	mg/kg			WG824664	10/27/15 07:30
Toluene	< .005	mg/kg			WG824664	10/27/15 07:30
TPH (GC/FID) Low Fraction	< .1	mg/kg			WG824664	10/27/15 07:30
Total Xylene	< .0015	mg/kg			WG824664	10/27/15 07:30
a,a,a-Trifluorotoluene(FID)		% Rec.	98.50	59-128	WG824664	10/27/15 07:30
a,a,a-Trifluorotoluene(PID)		% Rec.	100.0	54-144	WG824664	10/27/15 07:30

Analyte	Units	Laboratory Control Sample		% Rec	Limit	Batch
		Known Val	Result			
C10-C28 Diesel Range	mg/kg	60	52.3	87.1	50-100	WG824318
o-Terphenyl				92.80	50-150	WG824318
Benzene	mg/kg	.05	0.0444	88.8	70-130	WG823613
Ethylbenzene	mg/kg	.05	0.0479	95.8	70-130	WG823613
Toluene	mg/kg	.05	0.0473	94.6	70-130	WG823613
Total Xylene	mg/kg	.15	0.150	99.9	70-130	WG823613
a,a,a-Trifluorotoluene(FID)				97.90	59-128	WG823613
a,a,a-Trifluorotoluene(PID)				102.0	54-144	WG823613
TPH (GC/FID) Low Fraction	mg/kg	5.5	6.29	114.	63.5-137	WG823613
a,a,a-Trifluorotoluene(FID)				102.0	59-128	WG823613
a,a,a-Trifluorotoluene(PID)				105.0	54-144	WG823613
Benzene	mg/kg	.05	0.0432	86.5	70-130	WG824664
Ethylbenzene	mg/kg	.05	0.0472	94.4	70-130	WG824664
Toluene	mg/kg	.05	0.0464	92.7	70-130	WG824664
Total Xylene	mg/kg	.15	0.148	98.8	70-130	WG824664
a,a,a-Trifluorotoluene(FID)				97.80	59-128	WG824664
a,a,a-Trifluorotoluene(PID)				101.0	54-144	WG824664
TPH (GC/FID) Low Fraction	mg/kg	5.5	6.05	110.	63.5-137	WG824664
a,a,a-Trifluorotoluene(FID)				99.00	59-128	WG824664
a,a,a-Trifluorotoluene(PID)				104.0	54-144	WG824664

Analyte	Units	Laboratory Control Sample Duplicate			Limit	RPD	Limit	Batch
		Result	Ref	%Rec				
C10-C28 Diesel Range	mg/kg	55.9	52.3	93.0	50-100	6.78	20	WG824318
o-Terphenyl				99.70	50-150			WG824318
Benzene	mg/kg	0.0455	0.0444	91.0	70-130	2.53	20	WG823613
Ethylbenzene	mg/kg	0.0489	0.0479	98.0	70-130	2.15	20	WG823613

\* 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				
Toluene	mg/kg	0.0484	0.0473	97.0	70-130	2.24	20	WG823613
Total Xylene	mg/kg	0.153	0.150	102.	70-130	1.74	20	WG823613
a,a,a-Trifluorotoluene(FID)				97.80	59-128			WG823613
a,a,a-Trifluorotoluene(PID)				101.0	54-144			WG823613
TPH (GC/FID) Low Fraction	mg/kg	6.48	6.29	118.	63.5-137	2.95	20	WG823613
a,a,a-Trifluorotoluene(FID)				101.0	59-128			WG823613
a,a,a-Trifluorotoluene(PID)				104.0	54-144			WG823613
Benzene	mg/kg	0.0427	0.0432	85.0	70-130	1.23	20	WG824664
Ethylbenzene	mg/kg	0.0463	0.0472	93.0	70-130	1.89	20	WG824664
Toluene	mg/kg	0.0452	0.0464	90.0	70-130	2.65	20	WG824664
Total Xylene	mg/kg	0.145	0.148	97.0	70-130	2.12	20	WG824664
a,a,a-Trifluorotoluene(FID)				98.10	59-128			WG824664
a,a,a-Trifluorotoluene(PID)				101.0	54-144			WG824664
TPH (GC/FID) Low Fraction	mg/kg	6.07	6.05	110.	63.5-137	0.260	20	WG824664
a,a,a-Trifluorotoluene(FID)				100.0	59-128			WG824664
a,a,a-Trifluorotoluene(PID)				104.0	54-144			WG824664

Analyte	Units	Matrix Spike				Limit	Ref Samp	Batch
		MS Res	Ref Res	TV	% Rec			
C10-C28 Diesel Range	mg/kg	52.1	0.0498	60	86.7	50-100	L796508-01	WG824318
o-Terphenyl					88.70	50-150		WG824318
Benzene	mg/kg	0.121	0.00102	.05	48.1*	49.7-127	L795511-03	WG823613
Ethylbenzene	mg/kg	0.0532	0.00	.05	21.3*	40.8-141	L795511-03	WG823613
Toluene	mg/kg	0.0871	0.000336	.05	34.7*	49.8-132	L795511-03	WG823613
Total Xylene	mg/kg	0.164	0.00224	.15	21.5*	41.2-140	L795511-03	WG823613
a,a,a-Trifluorotoluene(FID)					94.00	59-128		WG823613
a,a,a-Trifluorotoluene(PID)					97.10	54-144		WG823613
TPH (GC/FID) Low Fraction	mg/kg	4.09	0.00	5.5	14.9*	28.5-138	L795511-03	WG823613
a,a,a-Trifluorotoluene(FID)					94.80	59-128		WG823613
a,a,a-Trifluorotoluene(PID)					99.20	54-144		WG823613
Benzene	mg/kg	0.175	0.000107	.05	69.9	49.7-127	L795464-01	WG824664
Ethylbenzene	mg/kg	0.135	0.00528	.05	52.1	40.8-141	L795464-01	WG824664
Toluene	mg/kg	0.163	0.00200	.05	64.3	49.8-132	L795464-01	WG824664
Total Xylene	mg/kg	0.507	0.0314	.15	63.4	41.2-140	L795464-01	WG824664
a,a,a-Trifluorotoluene(FID)					88.30	59-128		WG824664
a,a,a-Trifluorotoluene(PID)					89.70	54-144		WG824664
TPH (GC/FID) Low Fraction	mg/kg	14.8	1.65	5.5	47.8	28.5-138	L795464-01	WG824664
a,a,a-Trifluorotoluene(FID)					90.10	59-128		WG824664
a,a,a-Trifluorotoluene(PID)					97.30	54-144		WG824664

Analyte	Units	MSD	Matrix Spike Duplicate		Limit	RPD	Limit	Ref Samp	Batch
			Ref	%Rec					
C10-C28 Diesel Range	mg/kg	51.0	52.1	84.9	50-100	2.08	20	L796508-01	WG824318
o-Terphenyl				85.70	50-150				WG824318
Benzene	mg/kg	0.0880	0.121	34.8*	49.7-127	31.9*	23.5	L795511-03	WG823613
Ethylbenzene	mg/kg	0.0303	0.0532	12.1*	40.8-141	55.0*	23.8	L795511-03	WG823613
Toluene	mg/kg	0.0527	0.0871	21.0*	49.8-132	49.1*	23.5	L795511-03	WG823613
Total Xylene	mg/kg	0.0798	0.164	10.3*	41.2-140	68.9*	23.7	L795511-03	WG823613
a,a,a-Trifluorotoluene(FID)				94.40	59-128				WG823613

\* 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	MSD	Matrix Spike Duplicate		Limit	RPD	Limit	Ref Samp	Batch
			Ref	%Rec					
a,a,a-Trifluorotoluene(PID)				98.20	54-144				
TPH (GC/FID) Low Fraction	mg/kg	5.63	4.09	20.4*	28.5-138	31.7*	23.6	L795511-03	WG823613
a,a,a-Trifluorotoluene(FID)				95.30	59-128				WG823613
a,a,a-Trifluorotoluene(PID)				101.0	54-144				WG823613
Benzene	mg/kg	0.173	0.175	69.1	49.7-127	1.09	23.5	L795464-01	WG824664
Ethylbenzene	mg/kg	0.139	0.135	53.4	40.8-141	2.49	23.8	L795464-01	WG824664
Toluene	mg/kg	0.162	0.163	63.8	49.8-132	0.730	23.5	L795464-01	WG824664
Total Xylene	mg/kg	0.465	0.507	57.8	41.2-140	8.69	23.7	L795464-01	WG824664
a,a,a-Trifluorotoluene(FID)				89.30	59-128				WG824664
a,a,a-Trifluorotoluene(PID)				92.10	54-144				WG824664
TPH (GC/FID) Low Fraction	mg/kg	17.4	14.8	57.2	28.5-138	16.1	23.6	L795464-01	WG824664
a,a,a-Trifluorotoluene(FID)				85.50	59-128				WG824664
a,a,a-Trifluorotoluene(PID)				90.60	54-144				WG824664

Batch number /Run number / Sample number cross reference

WG824318: R3088199: L795508-01 02 03  
WG823613: R3088204: L795508-01 02  
WG824664: R3088255: L795508-03

\* \* Calculations are performed prior to rounding of reported values.  
\* Performance of this Analyte is outside of established criteria.  
For additional information, please see Attachment A 'List of Analytes with QC Qualifiers.'



**YOUR LAB OF CHOICE**

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Est. 1970

October 27, 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.