ANALYTICAL REPORT

July 19, 2016

REM 9771
Location ID 312368
Pit Facility ID 119434
Document 2527047

Norris Environmental

Sample Delivery Group:	L846905
Samples Received:	07/14/2016
Project Number:	GREAT BASINS 1&2
Description:	National Fuel Corp Great Basin 1&2
Site:	GB 1&2 PRODUCTION PIT
Report To:	Sean Norris 778 23rd Road Grand Junction, CO 81505

Entire Report Reviewed By:

Shane Gambill
Technical Service Representative

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NFC-GB1&2-N- 6 IN L846905-01 Solid

Collected by: Sean T. Norris | Collected date/time: 07/13/16 10:47 | Received date/time: 07/14/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Semi-Volatile Organic Compounds (GC) by Method 8015	WG888991	5	07/15/16 09:52	07/16/16 03:08	DMG
Volatile Organic Compounds (GC) by Method 8015/8021	WG889492	1	07/16/16 23:07	07/18/16 02:51	BMB

NFC-GB1&2-E- 6 IN L846905-02 Solid

Collected by: Sean T. Norris | Collected date/time: 07/13/16 10:43 | Received date/time: 07/14/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Semi-Volatile Organic Compounds (GC) by Method 8015	WG888991	10	07/15/16 09:52	07/18/16 19:29	KLM
Volatile Organic Compounds (GC) by Method 8015/8021	WG889492	1	07/16/16 23:07	07/18/16 03:12	BMB

NFC-GB1&2-S- 6 IN L846905-03 Solid

Collected by: Sean T. Norris | Collected date/time: 07/13/16 10:54 | Received date/time: 07/14/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Semi-Volatile Organic Compounds (GC) by Method 8015	WG888991	1	07/15/16 09:52	07/15/16 22:40	DMG
Volatile Organic Compounds (GC) by Method 8015/8021	WG889492	1	07/16/16 23:07	07/18/16 03:33	BMB

NFC-GB1&2-W- 6 IN L846905-04 Solid

Collected by: Sean T. Norris | Collected date/time: 07/13/16 10:52 | Received date/time: 07/14/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Semi-Volatile Organic Compounds (GC) by Method 8015	WG888991	1	07/15/16 09:52	07/15/16 22:51	DMG
Volatile Organic Compounds (GC) by Method 8015/8021	WG889492	1	07/16/16 23:07	07/18/16 03:54	BMB

NFC-GB1&2-BTM 6 IN L846905-05 Solid

Collected by: Sean T. Norris | Collected date/time: 07/13/16 10:49 | Received date/time: 07/14/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Semi-Volatile Organic Compounds (GC) by Method 8015	WG888991	10	07/15/16 09:52	07/15/16 23:36	DMG
Volatile Organic Compounds (GC) by Method 8015/8021	WG889492	1	07/16/16 23:07	07/18/16 04:15	BMB

NFC-GB1&2-ETS- 6 IN L846905-06 Solid

Collected by: Sean T. Norris | Collected date/time: 07/13/16 10:37 | Received date/time: 07/14/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Calculated Results	WG888840	1	07/14/16 16:55	07/15/16 16:57	KK
Calculated Results	WG888848	1	07/15/16 10:25	07/16/16 19:14	BRJ
Mercury by Method 7471A	WG888833	1	07/14/16 12:56	07/15/16 08:03	TRB
Metals (ICP) by Method 6010B	WG888840	1	07/14/16 16:55	07/15/16 00:40	LTB
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG889001	5	07/14/16 16:28	07/16/16 07:54	KMP
Semi-Volatile Organic Compounds (GC) by Method 8015	WG888991	20	07/15/16 09:52	07/16/16 17:42	ACM
Volatile Organic Compounds (GC) by Method 8015/8021	WG889492	1	07/16/16 23:07	07/18/16 04:36	BMB
Wet Chemistry by Method 3060A/7196A	WG888129	1	07/14/16 10:13	07/15/16 16:57	KK
Wet Chemistry by Method 9050AMod	WG888870	1	07/14/16 12:45	07/14/16 12:45	AMC

NFC-GB1&2-BG1- 6 IN L846905-07 Solid

Collected by: Sean T. Norris
Collected date/time: 07/13/16 10:57
Received date/time: 07/14/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICP) by Method 6010B	WG888840	1	07/14/16 16:55	07/15/16 00:43	LTB

NFC-GB1&2-BG2- 6 IN L846905-08 Solid

Collected by: Sean T. Norris
Collected date/time: 07/13/16 11:01
Received date/time: 07/14/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICP) by Method 6010B	WG888840	1	07/14/16 16:55	07/15/16 00:45	LTB

NFC-GB1&2-BG3- 6 IN L846905-09 Solid

Collected by: Sean T. Norris
Collected date/time: 07/13/16 11:03
Received date/time: 07/14/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICP) by Method 6010B	WG888840	1	07/14/16 16:55	07/15/16 00:48	LTB

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times. All MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Shane Gambill
Technical Service Representative

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	ND	J3 J6	0.000500	1	07/18/2016 02:51	WG889492
Toluene	ND	J3 J6	0.00500	1	07/18/2016 02:51	WG889492
Ethylbenzene	0.00173	J3 J6	0.000500	1	07/18/2016 02:51	WG889492
Total Xylene	0.0122	J3 J6	0.00150	1	07/18/2016 02:51	WG889492
TPH (GC/FID) Low Fraction	1.17	J3 J6	0.100	1	07/18/2016 02:51	WG889492
(S) a,a,a-Trifluorotoluene(FID)	*97.6*		*59.0-128*		*07/18/2016 02:51*	WG889492
(S) a,a,a-Trifluorotoluene(PID)	*101*		*54.0-144*		*07/18/2016 02:51*	WG889492

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
TPH (GC/FID) High Fraction	399		20.0	5	07/16/2016 03:08	WG888991
(S) o-Terphenyl	*130*		*50.0-150*		*07/16/2016 03:08*	WG888991

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	0.000974		0.000500	1	07/18/2016 03:12	WG889492
Toluene	ND		0.00500	1	07/18/2016 03:12	WG889492
Ethylbenzene	0.0115		0.000500	1	07/18/2016 03:12	WG889492
Total Xylene	0.0294		0.00150	1	07/18/2016 03:12	WG889492
TPH (GC/FID) Low Fraction	4.48		0.100	1	07/18/2016 03:12	WG889492
(S) a,a,a-Trifluorotoluene(FID)	*91.3*		*59.0-128*		*07/18/2016 03:12*	WG889492
(S) a,a,a-Trifluorotoluene(PID)	*93.8*		*54.0-144*		*07/18/2016 03:12*	WG889492

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
TPH (GC/FID) High Fraction	3970		40.0	10	07/18/2016 19:29	WG888991
(S) o-Terphenyl	*323*	J1	*50.0-150*		*07/18/2016 19:29*	WG888991

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	ND		0.000500	1	07/18/2016 03:33	WG889492
Toluene	ND		0.00500	1	07/18/2016 03:33	WG889492
Ethylbenzene	ND		0.000500	1	07/18/2016 03:33	WG889492
Total Xylene	ND		0.00150	1	07/18/2016 03:33	WG889492
TPH (GC/FID) Low Fraction	ND		0.100	1	07/18/2016 03:33	WG889492
(S) a,a,a-Trifluorotoluene(FID)	*98.2*		*59.0-128*		*07/18/2016 03:33*	WG889492
(S) a,a,a-Trifluorotoluene(PID)	*101*		*54.0-144*		*07/18/2016 03:33*	WG889492

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
TPH (GC/FID) High Fraction	109		4.00	1	07/15/2016 22:40	WG888991
(S) o-Terphenyl	*80.8*		*50.0-150*		*07/15/2016 22:40*	WG888991

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	ND		0.000500	1	07/18/2016 03:54	WG889492
Toluene	ND		0.00500	1	07/18/2016 03:54	WG889492
Ethylbenzene	ND		0.000500	1	07/18/2016 03:54	WG889492
Total Xylene	ND		0.00150	1	07/18/2016 03:54	WG889492
TPH (GC/FID) Low Fraction	ND		0.100	1	07/18/2016 03:54	WG889492
(S) a,a,a-Trifluorotoluene(FID)	*97.6*		*59.0-128*		*07/18/2016 03:54*	WG889492
(S) a,a,a-Trifluorotoluene(PID)	*100*		*54.0-144*		*07/18/2016 03:54*	WG889492

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
TPH (GC/FID) High Fraction	178		4.00	1	07/15/2016 22:51	WG888991
(S) o-Terphenyl	*71.5*		*50.0-150*		*07/15/2016 22:51*	WG888991

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Benzene	0.00191		0.000500	1	07/18/2016 04:15	WG889492
Toluene	ND		0.00500	1	07/18/2016 04:15	WG889492
Ethylbenzene	0.00146		0.000500	1	07/18/2016 04:15	WG889492
Total Xylene	0.0558		0.00150	1	07/18/2016 04:15	WG889492
TPH (GC/FID) Low Fraction	2.73		0.100	1	07/18/2016 04:15	WG889492
(S) a,a,a-Trifluorotoluene(FID)	*97.2*		*59.0-128*		*07/18/2016 04:15*	WG889492
(S) a,a,a-Trifluorotoluene(PID)	*101*		*54.0-144*		*07/18/2016 04:15*	WG889492

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
TPH (GC/FID) High Fraction	2130		40.0	10	07/15/2016 23:36	WG888991
(S) o-Terphenyl	*75.8*		*50.0-150*		*07/15/2016 23:36*	WG888991

Calculated Results

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Sodium Adsorption Ratio	5.58		1	07/16/2016 19:14	WG888848

Calculated Results

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Chromium,Trivalent	10.5		2.00	1	07/15/2016 16:57	WG888840

Wet Chemistry by Method 3060A/7196A

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Chromium,Hexavalent	ND		2.00	1	07/15/2016 16:57	WG888129

Wet Chemistry by Method 9050AMod

Analyte	Result umhos/cm	Qualifier	Dilution	Analysis date / time	Batch
Specific Conductance	404		1	07/14/2016 12:45	WG888870

Mercury by Method 7471A

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Mercury	0.0640		0.0200	1	07/15/2016 08:03	WG888833

Metals (ICP) by Method 6010B

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Arsenic	5.91		2.00	1	07/15/2016 00:40	WG888840
Barium	526		0.500	1	07/15/2016 00:40	WG888840
Cadmium	ND		0.500	1	07/15/2016 00:40	WG888840
Chromium	10.5		1.00	1	07/15/2016 00:40	WG888840
Copper	33.3		2.00	1	07/15/2016 00:40	WG888840
Lead	54.6		0.500	1	07/15/2016 00:40	WG888840
Nickel	15.5		2.00	1	07/15/2016 00:40	WG888840
Selenium	ND		2.00	1	07/15/2016 00:40	WG888840
Silver	ND		1.00	1	07/15/2016 00:40	WG888840
Zinc	93.9		5.00	1	07/15/2016 00:40	WG888840

Volatile Organic Compounds (GC) by Method 8015/8021

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	0.00956		0.000500	1	07/18/2016 04:36	WG889492
Toluene	ND		0.00500	1	07/18/2016 04:36	WG889492
Ethylbenzene	0.00587		0.000500	1	07/18/2016 04:36	WG889492
Total Xylene	0.0712		0.00150	1	07/18/2016 04:36	WG889492
TPH (GC/FID) Low Fraction	2.54		0.100	1	07/18/2016 04:36	WG889492
(S) a,a,a-Trifluorotoluene(FID)	*88.5*		*59.0-128*		*07/18/2016 04:36*	WG889492
(S) a,a,a-Trifluorotoluene(PID)	*98.3*		*54.0-144*		*07/18/2016 04:36*	WG889492

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
TPH (GC/FID) High Fraction	4850		80.0	20	07/16/2016 17:42	WG888991
(S) o-Terphenyl	*0.000*	J7	*50.0-150*		*07/16/2016 17:42*	WG888991

Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Anthracene	0.170		0.0300	5	07/16/2016 07:54	WG889001
Acenaphthene	0.108		0.0300	5	07/16/2016 07:54	WG889001
Acenaphthylene	0.0312		0.0300	5	07/16/2016 07:54	WG889001
Benzo(a)anthracene	ND		0.0300	5	07/16/2016 07:54	WG889001
Benzo(a)pyrene	ND		0.0300	5	07/16/2016 07:54	WG889001
Benzo(b)fluoranthene	ND		0.0300	5	07/16/2016 07:54	WG889001
Benzo(g,h,i)perylene	ND		0.0300	5	07/16/2016 07:54	WG889001
Benzo(k)fluoranthene	ND		0.0300	5	07/16/2016 07:54	WG889001
Chrysene	0.0591		0.0300	5	07/16/2016 07:54	WG889001
Dibenz(a,h)anthracene	ND		0.0300	5	07/16/2016 07:54	WG889001
Fluoranthene	ND	J3	0.0300	5	07/16/2016 07:54	WG889001
Fluorene	0.346		0.0300	5	07/16/2016 07:54	WG889001
Indeno(1,2,3-cd)pyrene	ND		0.0300	5	07/16/2016 07:54	WG889001
Naphthalene	0.367		0.100	5	07/16/2016 07:54	WG889001
Phenanthrene	0.607		0.0300	5	07/16/2016 07:54	WG889001
Pyrene	0.100	J4	0.0300	5	07/16/2016 07:54	WG889001
1-Methylnaphthalene	0.950		0.100	5	07/16/2016 07:54	WG889001
2-Methylnaphthalene	1.07		0.100	5	07/16/2016 07:54	WG889001
2-Chloronaphthalene	ND		0.100	5	07/16/2016 07:54	WG889001
(S) p-Terphenyl-d14	*82.3*		*32.2-131*		*07/16/2016 07:54*	WG889001
(S) Nitrobenzene-d5	*101*		*22.1-146*		*07/16/2016 07:54*	WG889001
(S) 2-Fluorobiphenyl	*84.3*		*40.6-122*		*07/16/2016 07:54*	WG889001

Sample Narrative:

8270C-SIM L846905-06 WG889001: Dilution due to matrix

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Arsenic	5.87		2.00	1	07/15/2016 00:43	WG888840

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Arsenic	6.11		2.00	1	07/15/2016 00:45	WG888840

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Arsenic	5.97		2.00	1	07/15/2016 00:48	WG888840

Method Blank (MB)

(MB) R3150105-1 07/15/16 16:25

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Chromium,Hexavalent	U		0.640	2.00

L846437-01 Original Sample (OS) • Duplicate (DUP)

(OS) L846437-01 07/15/16 16:38 • (DUP) R3150105-4 07/15/16 16:38

Analyte	Original Result mg/kg	DUP Result mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chromium,Hexavalent	ND	ND	1	0.000		20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3150105-2 07/15/16 16:26 • (LCSD) R3150105-3 07/15/16 16:26

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Chromium,Hexavalent	56.9	49.4	49.4	87.0	87.0	80.0-120			0.000	20

L846437-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L846437-01 07/15/16 16:38 • (MS) R3150105-5 07/15/16 16:38 • (MSD) R3150105-6 07/15/16 16:40

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Chromium,Hexavalent	20.0	ND	13.2	13.7	66.0	68.0	1	75.0-125	J6	J6	4.00	20

Method Blank (MB)

(MB) WG888870-8 07/14/16 12:45

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	umhos/cm		umhos/cm	umhos/cm
Specific Conductance	2.00			

L846898-06 Original Sample (OS) • Duplicate (DUP)

(OS) L846898-06 07/14/16 12:45 • (DUP) WG888870-5 07/14/16 12:45

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	umhos/cm	umhos/cm		%		%
Specific Conductance	318	319	1	0.314		20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) WG888870-6 07/14/16 12:45 • (LCSD) WG888870-7 07/14/16 12:45

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	umhos/cm	umhos/cm	umhos/cm	%	%	%			%	%
Specific Conductance	653	666	664	102	102	90.0-110			0.301	20

Method Blank (MB)

(MB) R3149951-1 07/15/16 07:39

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Mercury	U		0.0028	0.0200

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3149951-2 07/15/16 07:42 • (LCSD) R3149951-3 07/15/16 07:45

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Mercury	0.300	0.267	0.262	89	87	80-120			2	20

L846898-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L846898-06 07/15/16 07:48 • (MS) R3149951-4 07/15/16 07:51 • (MSD) R3149951-5 07/15/16 07:54

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Mercury	0.300	ND	0.280	0.266	91	86	1	75-125			5	20

Method Blank (MB)

(MB) R3149852-1 07/14/16 23:59

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Arsenic	U		0.65	2.00
Barium	U		0.17	0.500
Cadmium	U		0.07	0.500
Chromium	U		0.14	1.00
Copper	U		0.53	2.00
Lead	0.233	J	0.19	0.500
Nickel	U		0.49	2.00
Selenium	U		0.74	2.00
Silver	U		0.28	1.00
Zinc	0.957	J	0.59	5.00

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3149852-2 07/15/16 00:02 • (LCSD) R3149852-3 07/15/16 00:04

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Arsenic	100	97.6	99.7	98	100	80-120			2	20
Barium	100	100	102	100	102	80-120			2	20
Cadmium	100	101	103	101	103	80-120			2	20
Chromium	100	100	102	100	102	80-120			2	20
Copper	100	98.7	101	99	101	80-120			2	20
Lead	100	104	106	104	106	80-120			2	20
Nickel	100	99.1	101	99	101	80-120			2	20
Selenium	100	98.4	101	98	101	80-120			3	20
Silver	100	100	102	100	102	80-120			2	20
Zinc	100	102	103	102	103	80-120			1	20

L846919-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L846919-06 07/15/16 00:07 • (MS) R3149852-6 07/15/16 00:16 • (MSD) R3149852-7 07/15/16 00:19

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Arsenic	129	6.21	144	146	106	108	1	75-125			1	20
Barium	129	136	267	276	101	108	1	75-125			3	20
Cadmium	129	0.309	142	143	110	110	1	75-125			1	20
Chromium	129	9.91	132	134	95	96	1	75-125			2	20
Copper	129	11.6	153	152	109	108	1	75-125			1	20
Lead	129	10.7	150	152	108	109	1	75-125			2	20

L846919-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L846919-06 07/15/16 00:07 • (MS) R3149852-6 07/15/16 00:16 • (MSD) R3149852-7 07/15/16 00:19

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Nickel	129	8.84	143	144	104	105	1	75-125			1	20
Selenium	129	U	140	144	108	111	1	75-125			3	20
Silver	129	U	148	148	114	114	1	75-125			0	20
Zinc	129	43.6	173	173	100	100	1	75-125			0	20

Method Blank (MB)

(MB) R3150475-5 07/17/16 23:00

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Benzene	U		0.000120	0.000500
Toluene	U		0.000150	0.00500
Ethylbenzene	U		0.000110	0.000500
Total Xylene	U		0.000460	0.00150
TPH (GC/FID) Low Fraction	U		0.0217	0.100
(S) a,a,a-Trifluorotoluene(FID)	*99.1*			*59.0-128*
(S) a,a,a-Trifluorotoluene(PID)	*102*			*54.0-144*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3150475-1 07/17/16 21:16 • (LCSD) R3150475-2 07/17/16 21:37

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	0.0500	0.0457	0.0467	91.4	93.4	70.0-130			2.23	20
Toluene	0.0500	0.0500	0.0508	100	102	70.0-130			1.43	20
Ethylbenzene	0.0500	0.0506	0.0513	101	103	70.0-130			1.43	20
Total Xylene	0.150	0.157	0.159	104	106	70.0-130			1.17	20
(S) a,a,a-Trifluorotoluene(FID)				*99.1*	*99.0*	*59.0-128*				
(S) a,a,a-Trifluorotoluene(PID)				*103*	*103*	*54.0-144*				

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3150475-3 07/17/16 21:58 • (LCSD) R3150475-4 07/17/16 22:19

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	5.82	6.04	106	110	63.5-137			3.76	20
(S) a,a,a-Trifluorotoluene(FID)				*101*	*100*	*59.0-128*				
(S) a,a,a-Trifluorotoluene(PID)				*105*	*105*	*54.0-144*				

L846905-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L846905-01 07/18/16 02:51 • (MS) R3150475-6 07/17/16 23:42 • (MSD) R3150475-7 07/18/16 00:03

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Benzene	0.0500	ND	0.0264	0.0163	52.9	32.7	1	49.7-127		J3 J6	47.1	23.5
Toluene	0.0500	ND	0.0267	0.0153	52.2	29.4	1	49.8-132		J3 J6	54.3	23.5
Ethylbenzene	0.0500	0.00173	0.0243	0.0133	45.1	23.1	1	40.8-141		J3 J6	58.6	23.8
Total Xylene	0.150	0.0122	0.0760	0.0425	42.5	20.2	1	41.2-140	J6	J3 J6	56.6	23.7
(S) a,a,a-Trifluorotoluene(FID)					*97.1*	*97.7*		*59.0-128*				

L846905-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L846905-01 07/18/16 02:51 • (MS) R3150475-6 07/17/16 23:42 • (MSD) R3150475-7 07/18/16 00:03

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
(S) a,a,a-Trifluorotoluene(PID)					*101*	*101*		*54.0-144*				

L846905-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L846905-01 07/18/16 02:51 • (MS) R3150475-8 07/18/16 00:24 • (MSD) R3150475-9 07/18/16 00:45

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	1.17	1.92	2.93	13.5	31.8	1	28.5-138	J6	J3	41.6	23.6
(S) a,a,a-Trifluorotoluene(FID)					*96.8*	*96.3*		*59.0-128*				
(S) a,a,a-Trifluorotoluene(PID)					*103*	*103*		*54.0-144*				

Method Blank (MB)

(MB) R3150173-1 07/15/16 15:46

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
TPH (GC/FID) High Fraction	1.13	J	0.769	4.00
(S) o-Terphenyl	*70.6*			*50.0-150*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3150173-2 07/15/16 15:58 • (LCSD) R3150173-3 07/15/16 16:09

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) High Fraction	60.0	39.2	34.0	65.4	56.7	50.0-150			14.2	20
(S) o-Terphenyl				*78.8*	*66.2*	*50.0-150*				

L846921-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L846921-02 07/15/16 22:06 • (MS) R3150173-4 07/15/16 22:17 • (MSD) R3150173-5 07/15/16 22:28

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) High Fraction	60.0	4.78	43.1	46.8	63.9	70.1	1	50.0-150			8.27	20
(S) o-Terphenyl					*76.6*	*79.6*		*50.0-150*				

Method Blank (MB)

(MB) R3150279-3 07/16/16 01:12

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Anthracene	U		0.000600	0.00600
Acenaphthene	U		0.000600	0.00600
Acenaphthylene	U		0.000600	0.00600
Benzo(a)anthracene	U		0.000600	0.00600
Benzo(a)pyrene	U		0.000600	0.00600
Benzo(b)fluoranthene	U		0.000600	0.00600
Benzo(g,h,i)perylene	U		0.000600	0.00600
Benzo(k)fluoranthene	U		0.000600	0.00600
Chrysene	U		0.000600	0.00600
Dibenz(a,h)anthracene	U		0.000600	0.00600
Fluoranthene	U		0.000600	0.00600
Fluorene	U		0.000600	0.00600
Indeno(1,2,3-cd)pyrene	U		0.000600	0.00600
Naphthalene	U		0.00200	0.0200
Phenanthrene	U		0.000600	0.00600
Pyrene	U		0.000600	0.00600
1-Methylnaphthalene	U		0.00200	0.0200
2-Methylnaphthalene	U		0.00200	0.0200
2-Chloronaphthalene	U		0.00200	0.0200
(S) p-Terphenyl-d14	*98.5*			*32.2-131*
(S) Nitrobenzene-d5	*98.4*			*22.1-146*
(S) 2-Fluorobiphenyl	*95.9*			*40.6-122*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3150279-1 07/16/16 00:30 • (LCSD) R3150279-2 07/16/16 00:51

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Anthracene	0.0800	0.0836	0.0887	105	111	50.3-130			5.86	20
Acenaphthene	0.0800	0.0854	0.0856	107	107	52.4-120			0.310	20
Acenaphthylene	0.0800	0.0846	0.0856	106	107	49.6-120			1.13	20
Benzo(a)anthracene	0.0800	0.0902	0.0906	113	113	46.7-125			0.460	20
Benzo(a)pyrene	0.0800	0.0870	0.0902	109	113	42.3-119			3.57	20
Benzo(b)fluoranthene	0.0800	0.0959	0.0929	120	116	43.6-124			3.14	20
Benzo(g,h,i)perylene	0.0800	0.0887	0.0902	111	113	45.1-132			1.69	20
Benzo(k)fluoranthene	0.0800	0.0827	0.0883	103	110	46.1-131			6.47	20
Chrysene	0.0800	0.0860	0.0875	107	109	49.5-131			1.74	20
Dibenz(a,h)anthracene	0.0800	0.0884	0.0893	111	112	44.8-133			1.03	20
Fluoranthene	0.0800	0.0832	0.102	104	128	49.3-128		J3	20.5	20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3150279-1 07/16/16 00:30 • (LCSD) R3150279-2 07/16/16 00:51

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Fluorene	0.0800	0.0810	0.0817	101	102	50.6-121			0.850	20
Indeno(1,2,3-cd)pyrene	0.0800	0.0891	0.0905	111	113	46.1-135			1.64	20
Naphthalene	0.0800	0.0782	0.0791	97.7	98.8	49.6-115			1.09	20
Phenanthrene	0.0800	0.0879	0.0898	110	112	48.8-121			2.07	20
Pyrene	0.0800	0.106	0.108	132	135	44.7-130	J4	J4	2.05	20
1-Methylnaphthalene	0.0800	0.0843	0.0859	105	107	50.6-122			1.81	20
2-Methylnaphthalene	0.0800	0.0834	0.0847	104	106	50.4-120			1.44	20
2-Chloronaphthalene	0.0800	0.0840	0.0846	105	106	53.9-121			0.780	20
(S) p-Terphenyl-d14				*106*	*104*	*32.2-131*				
(S) Nitrobenzene-d5				*112*	*111*	*22.1-146*				
(S) 2-Fluorobiphenyl				*106*	*103*	*40.6-122*				

Abbreviations and Definitions

SDG	Sample Delivery Group.
MDL	Method Detection Limit.
RDL	Reported Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
U	Not detected at the Reporting Limit (or MDL where applicable).
RPD	Relative Percent Difference.
(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
Rec.	Recovery.

Qualifier	Description
J	The identification of the analyte is acceptable; the reported value is an estimate.
J1	Surrogate recovery limits have been exceeded; values are outside upper control limits.
J3	The associated batch QC was outside the established quality control range for precision.
J4	The associated batch QC was outside the established quality control range for accuracy.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.
J7	Surrogate recovery cannot be used for control limit evaluation due to dilution.

ACCREDITATIONS & LOCATIONS

ESC Lab Sciences is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our "one location" design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be **YOUR LAB OF CHOICE.**
* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

State Accreditations

Alabama	40660	Nevada	TN-03-2002-34
Alaska	UST-080	New Hampshire	2975
Arizona	AZ0612	New Jersey–NELAP	TN002
Arkansas	88-0469	New Mexico	TN00003
California	01157CA	New York	11742
Colorado	TN00003	North Carolina	Env375
Conneticut	PH-0197	North Carolina [1]	DW21704
Florida	E87487	North Carolina [2]	41
Georgia	NELAP	North Dakota	R-140
Georgia [1]	923	Ohio–VAP	CL0069
Idaho	TN00003	Oklahoma	9915
Illinois	200008	Oregon	TN200002
Indiana	C-TN-01	Pennsylvania	68-02979
Iowa	364	Rhode Island	221
Kansas	E-10277	South Carolina	84004
Kentucky [1]	90010	South Dakota	n/a
Kentucky [2]	16	Tennessee [1 4]	2006
Louisiana	AI30792	Texas	T 104704245-07-TX
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	6157585858
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	109
Minnesota	047-999-395	Washington	C1915
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA
Nebraska	NE-OS-15-05		

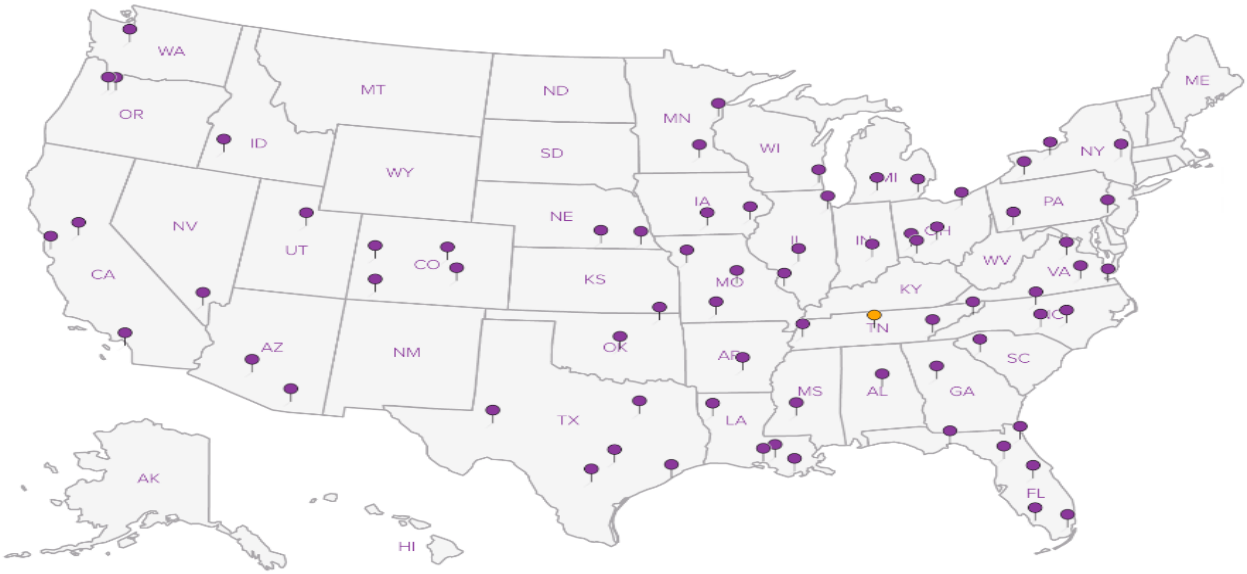
Third Party & Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	S-67674
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [n/a] Accreditation not applicable

Our Locations

ESC Lab Sciences has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. **ESC Lab Sciences performs all testing at our central laboratory.**



Company Name/Address:	Billing Information:
Norris Environmental LLC 778 23 Road Grand Junction, CO 81505	Same
Report to: Sean T. Norris	Email To: sean@norrisenvironmentalllc.com

Chain of Custody Page ___ of ___

ESC L·A·B S·C·I·E·N·C·E·S

YOUR LAB OF CHOICE

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Mount Juliet, TN 37122
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Phone: 800-767-5859
Fax: 615-758-5859

L # 0 846605

L180

Acctnum:
Template:
Prelogin:
TSR:
PB:
Shipped Via:

Project Description: National Fuel Corp Great Basins 1&2 Pit	City/State Collected: Mesa County CO
Phone: 970-241-9974 Fax:	Client Project # Great Basins 1&2
Lab Project #	
Collected by (print): Sean T. Norris	Site/Facility ID # GB 1&2 Production Pit
P.O. #	
Collected by (signature): Immediately Packed on Ice N ___ Y ✔	**Rush?** (Lab MUST Be Notified) ___ Same Day ....200% ___ Next Day ....100% ___ Two Day ....50% ✔ Three Day 25%
Date Results Needed	Email? ___No ✔ Yes FAX? ___No ___Yes

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	BTEX GRO/DRO - 8021/8015	SV8270PAHSIM - 8270SIM	SPCON - 9050AMod	SAR - CALC	RCRA8 Metals + Cu, Ni and Zn - 6010/7470	CR6SS - 3060A/7196	CR3 - CALC	Arsenic			Rem./Contaminant	Sample # (lab only)
NFC-GB1&2-N-	Grab	SS	6"	7/13/2016	10:47	2	X											01
NFC-GB1&2-E-	Grab	SS	6"	7/13/2016	10:43	2	X											02
NFC-GB1&2-S-	Grab	SS	6"	7/13/2016	10:54	2	X											03
NFC-GB1&2-W-	Grab	SS	6"	7/13/2016	10:52	2	X											04
NFC-GB1&2-BTM-	Grab	SS	6"	7/13/2016	10:49	2	X											05
NFC-GB1&2-ETS-	Comp	SS	6"	7/13/2016	10:37	3	X	X	X	X	X	X	X					06
NFC-GB1&2-BG1-	Grab	SS	6"	7/13/2016	10:57	1								X				07
NFC-GB1&2-BG2-	Grab	SS	6"	7/13/2016	11:01	1								X				08
NFC-GB1&2-BG3-	Grab	SS	6"	7/13/2016	11:03	1								X				09

* Matrix: **SS** - Soil **GW** - Groundwater **WW** - WasteWater **DW** - Drinking Water **OT** - Other__________

pH ________ Temp ________

Flow ________ Other ________

4645 0391 4262

Remarks:

Hold #

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	
[signature]	7/13/16	5:10	[signature]	Samples returned via: ☐ UPS ☒ FedEx ☐ Courier ☐ ____
Relinquished by : (Signature) [signature]	Date: 7/13/16	Time: 1800	Received by: (Signature)	Temp: 2.1° °C Bottles Received: 16=4oz
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature) [signature]	Date: 7-14-16 Time: 0900

Condition: (lab use only) ATOll

COC Seal Intact: ___Y ___N ___NA

pH Checked: NCF: