



March 08, 2018

**Olsson Associates**

**Jason Davidson**

**4690 Table Mountain Drive**

**Golden**

**CO 80403**

**Project Name - GWOC Cudney Sandsted TB**

**Project Number - 018-0775**

Attached are your analytical results for GWOC Cudney Sandsted TB received by Origins Laboratory, Inc. March 01, 2018. This project is associated with Origins project number Y803016-01.

The analytical results in the following report were analyzed under the guidelines of EPA Methods. These methods are identified as follows; "SW" are defined in SW-846, "EPA" are defined in 40CFR part 136 and "SM" are defined in the most current revision of Standard Methods For the Examination of Water and Wastewater.

The analytical results apply specifically to the samples and analyses specified per the attached Chain of Custody. As such, this report shall not be reproduced except in full, without the written approval of Origin's laboratory.

Unless otherwise noted, the analytical results for all soil samples are reported on a wet weight basis. All analytical analyses were performed under NELAP guidelines unless noted by a data qualifier.

Any holding time exceedances, deviations from the method specifications or deviations from Origins Laboratory's Standard Operating Procedures are outlined in the case narrative.

Thank you for selecting Origins for your analytical needs. Please contact us with any questions concerning this report, or if we can help with anything at all.

Origins Laboratory, Inc.  
303.433.1322  
o-squad@oelabinc.com



1725 Elk Place, Denver, CO 80211 | Phone: 303.433.1322 | Fax: 303.265.9645

Olsson Associates

4690 Table Mountain Drive

Golden CO 80403

Jason Davidson

Project Number: 018-0775

Project: GWOC Cudney Sandsted TB

## CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
Base-01	Y803016-01	Soil	March 1, 2018 9:50	03/01/2018 13:20
SWNorth-01	Y803016-02	Soil	March 1, 2018 9:55	03/01/2018 13:20
SWSouth-01	Y803016-03	Soil	March 1, 2018 10:00	03/01/2018 13:20
SWEast-01	Y803016-04	Soil	March 1, 2018 10:05	03/01/2018 13:20
SWWest-01	Y803016-05	Soil	March 1, 2018 10:10	03/01/2018 13:20

Origins Laboratory, Inc.



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Jen Pellegrini For Noelle Doyle Mathis, President

Olsson Associates  
4690 Table Mountain Drive  
Golden CO 80403

Jason Davidson  
Project Number: 018-0775  
Project: GWOC Cudney Sandsted TB

Chain of Custody 183616

OLSSON®  
ASSOCIATES

PROJECT NAME: GWOC Cudney Sandsted TB		PROJECT NUMBER: 018-0775	DISPOSAL: By Lab	PAGE: 1 of 1
COMPANY NAME: Olsson Associates		PHONE NUMBER: 303-596-5693	LAB USE ONLY: 28	
ADDRESS: 1525 Raleigh St Suite 400		CITY/STATE/ZIP: Denver, CO 80204	Temperature upon receipt: Yes No N/A	
PROJECT MANAGER: Jason Davidson		PM EMAIL: jason@olssonassociates.com	Custody seals in tact: Yes No N/A	
SAMPLER: Trent Wayne				

  

DIRECT BILL CLIENT? YES: <input type="checkbox"/> NO: <input checked="" type="checkbox"/>		CLIENT COMPANY: GWOC	
SEND COPY OF ANALYTICAL TO CLIENT? YES: <input type="checkbox"/> NO: <input checked="" type="checkbox"/>		CLIENT NAME: CLIENT EMAIL: CLIENT PROJECT #:	

  

Lab ID	Field ID	Matrix	Sample Date	Sample Time	# Bottles
	Base-01	Soil	3/1/18	0950	2
	SWNORTH-01	Soil	3/1/18	0955	2
	SWSEATH-01	Soil	3/1/18	1000	2
	SWEAST-01	Soil	3/1/18	1005	2
	SWWEST-01	Soil	3/1/18	1010	2

  

Notes: How BTEX

  

RELINQUISHED BY	PRINTED NAME	SIGNATURE	DATE	TIME
	Trent Wayne	<i>Trent Wayne</i>	3/1/18	1310
	Jason Guerrero	<i>Jason Guerrero</i>	3/1/18	1320

  

Comments: Call Jason Davidson w/ 40hr rush on methane Dred Geo Results Hold ISO flash until methane results return & Hold BTEX Analysis until Dred Geo is done

Origins Laboratory, Inc.

*Jefe Pellegrini*

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Golden CO 80403

Jason Davidson  
Project Number: 018-0775  
Project: GWOC Cudney Sandsted TB

Origins Laboratory

F-012207-01-R1  
Effective Date: 01/09/12

## Sample Receipt Checklist

Origins Work Order: 1803016

Client: Olsson Associates

Client Project ID: GWOC Cudney Sandsted TB

Checklist Completed by: Don Lee

Shipped Via: UPS  
(UPS, FedEx, Hand Delivered, Pick-up, etc.)

Date/time completed: 3-1-18

Airbill #: RP

Matrix(s) Received: (Check all that apply): ☒ Soil/Solid ☐ Water ☐ Other: \_\_\_\_\_

Cooler Number/Temperature: ☒ 12.6 °C ☐ \_\_\_\_\_ °C ☐ \_\_\_\_\_ °C ☐ \_\_\_\_\_ °C (Describe)

Thermometer ID: 1005

Requirement Description	Yes	No	N/A	Comments (if any)
If samples require cooling, was the temperature between 0°C to ≤ 6°C <sup>(1)</sup> ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Is there ice present (document if blue ice is used)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Are custody seals present on cooler? (if so, document in comments if they are signed and dated, broken or intact)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Are custody seals present on each sample container? (if so, document in comments if they are signed and dated, broken or intact)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Were all samples received intact <sup>(1)</sup> ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Was adequate sample volume provided <sup>(1)</sup> ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Are short holding time analytes or samples with HTs due within 48 hours present <sup>(1)</sup> ?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Is a chain-of-custody (COC) present and filled out completely <sup>(1)</sup> ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Does the COC agree with the number and type of sample bottles received <sup>(1)</sup> ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Do the sample IDs on the bottle labels match the COC <sup>(1)</sup> ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Is the COC properly relinquished by the client with date and time recorded <sup>(1)</sup> ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
For volatiles in water – is there headspace (> ¼ inch bubble) present? If yes, contact client and note in narrative.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Are samples preserved that require preservation and was it checked <sup>(1)</sup> ? (note ID of confirmation instrument used in comments) / (preservation is not confirmed for subcontracted analyses in order to insure sample integrity)/(pH <2 for samples preserved with HNO <sub>3</sub> , HCL, H <sub>2</sub> SO <sub>4</sub> ) / (pH >10 for samples preserved with NaAsO <sub>2</sub> +NaOH, ZnAc+NaOH)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Additional Comments (if any): <u>Per the phone call from Trent on 3/1/18 we will go ahead with the analysis for BTEX on all samples. JP 3/1/18</u>				

<sup>(1)</sup>If NO, then contact the client before proceeding with analysis and note date/time and person contacted as well as the corrective action to in the additional comments (above) and the case narrative.

Reviewed by (Project Manager) JP

Date/Time Reviewed 3/5/18

Origins Laboratory, Inc.

*Jefe Pellegrini*

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Olsson Associates  
4690 Table Mountain Drive  
Golden CO 80403

Jason Davidson  
Project Number: 018-0775  
Project: GWOC Cudney Sandsted TB

**Base-01**  
**3/1/2018 9:50:00AM**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Origins Laboratory, Inc.**  
**Y803016-01 (Soil)**

**BTEX by EPA 8260C**

Benzene	ND	0.050	mg/kg	25	B8C0503	03/05/2018	03/06/2018	U
Toluene	ND	0.050	"	"	"	"	"	U
Ethylbenzene	ND	0.050	"	"	"	"	"	U
Xylenes, total	ND	0.050	"	"	"	"	"	U

Surrogate: 1,2-Dichloroethane-d4	104 %	70-130			"	"	"	
Surrogate: Toluene-d8	99.3 %	70-130			"	"	"	
Surrogate: 4-Bromofluorobenzene	92.3 %	70-130			"	"	"	

**GRO (TVPH)/DRO (TEPH)by EPA 8015C**

Gasoline (C6-C10)	ND	50.0	mg/kg	1	B8C0504	03/05/2018	03/05/2018	U
Diesel (C10-C28)	<b>145</b>	50.0	"	"	"	"	"	

Surrogate: o-Terphenyl	87.3 %	59-131			"	"	"	
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Project Number: 018-0775  
Project: GWOC Cudney Sandsted TB

SWNorth-01  
3/1/2018 9:55:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Origins Laboratory, Inc.**  
**Y803016-02 (Soil)**

**BTEX by EPA 8260C**

Benzene	ND	0.002	mg/kg	1	B8C0503	03/05/2018	03/06/2018	U
Toluene	ND	0.002	"	"	"	"	"	U
Ethylbenzene	ND	0.002	"	"	"	"	"	U
Xylenes, total	ND	0.002	"	"	"	"	"	U

Surrogate: 1,2-Dichloroethane-d4	108 %	70-130			"	"	"	
Surrogate: Toluene-d8	100 %	70-130			"	"	"	
Surrogate: 4-Bromofluorobenzene	102 %	70-130			"	"	"	

**GRO (TVPH)/DRO (TEPH)by EPA 8015C**

Gasoline (C6-C10)	ND	50.0	mg/kg	1	B8C0504	03/05/2018	03/05/2018	U
Diesel (C10-C28)	<b>89.4</b>	50.0	"	"	"	"	"	

Surrogate: o-Terphenyl	82.3 %	59-131			"	"	"	
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**SWSouth-01**  
**3/1/2018 10:00:00AM**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Origins Laboratory, Inc.**  
**Y803016-03 (Soil)**

**BTEX by EPA 8260C**

Benzene	ND	0.002	mg/kg	1	B8C0503	03/05/2018	03/06/2018	U
Toluene	ND	0.002	"	"	"	"	"	U
Ethylbenzene	ND	0.002	"	"	"	"	"	U
Xylenes, total	ND	0.002	"	"	"	"	"	U

Surrogate: 1,2-Dichloroethane-d4	108 %	70-130			"	"	"	
Surrogate: Toluene-d8	99.8 %	70-130			"	"	"	
Surrogate: 4-Bromofluorobenzene	99.2 %	70-130			"	"	"	

**GRO (TVPH)/DRO (TEPH)by EPA 8015C**

Gasoline (C6-C10)	ND	50.0	mg/kg	1	B8C0504	03/05/2018	03/05/2018	U
Diesel (C10-C28)	<b>156</b>	50.0	"	"	"	"	"	

Surrogate: o-Terphenyl	84.4 %	59-131			"	"	"	
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**SWEast-01**  
**3/1/2018 10:05:00AM**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Origins Laboratory, Inc.**  
**Y803016-04 (Soil)**

**BTEX by EPA 8260C**

Benzene	ND	0.002	mg/kg	1	B8C0503	03/05/2018	03/06/2018	U
Toluene	ND	0.002	"	"	"	"	"	U
Ethylbenzene	ND	0.002	"	"	"	"	"	U
Xylenes, total	ND	0.002	"	"	"	"	"	U

Surrogate: 1,2-Dichloroethane-d4	109 %	70-130			"	"	"	
Surrogate: Toluene-d8	98.5 %	70-130			"	"	"	
Surrogate: 4-Bromofluorobenzene	98.8 %	70-130			"	"	"	

**GRO (TVPH)/DRO (TEPH)by EPA 8015C**

Gasoline (C6-C10)	ND	50.0	mg/kg	1	B8C0504	03/05/2018	03/05/2018	U
Diesel (C10-C28)	<b>75.8</b>	50.0	"	"	"	"	"	

Surrogate: o-Terphenyl	84.7 %	59-131			"	"	"	
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**SWWest-01**  
**3/1/2018 10:10:00AM**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Origins Laboratory, Inc.**  
**Y803016-05 (Soil)**

## BTEX by EPA 8260C

Benzene	ND	0.002	mg/kg	1	B8C0503	03/05/2018	03/06/2018	U
Toluene	ND	0.002	"	"	"	"	"	U
Ethylbenzene	ND	0.002	"	"	"	"	"	U
Xylenes, total	<b>0.003</b>	0.002	"	"	"	"	"	

Surrogate: 1,2-Dichloroethane-d4	110 %	70-130			"	"	"	
Surrogate: Toluene-d8	99.1 %	70-130			"	"	"	
Surrogate: 4-Bromofluorobenzene	96.8 %	70-130			"	"	"	

## GRO (TVPH)/DRO (TEPH)by EPA 8015C

Gasoline (C6-C10)	ND	50.0	mg/kg	1	B8C0504	03/05/2018	03/05/2018	U
Diesel (C10-C28)	ND	50.0	"	"	"	"	"	U

Surrogate: o-Terphenyl	79.3 %	59-131			"	"	"	
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Project Number: 018-0775  
Project: GWOC Cudney Sandsted TB

**Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control**  
**Origins Laboratory, Inc.**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch B8C0503 - EPA 5030 (soil)</b>										
<b>Blank (B8C0503-BLK1)</b>					Prepared: 03/05/2018 Analyzed: 03/05/2018					
Benzene	ND	0.002	mg/kg							U
Toluene	ND	0.002	"							U
Ethylbenzene	ND	0.002	"							U
Xylenes, total	ND	0.002	"							U
Surrogate: 1,2-Dichloroethane-d4	61		ug/kg	62.5		98.3	70-130			
Surrogate: Toluene-d8	64		"	62.5		103	70-130			
Surrogate: 4-Bromofluorobenzene	60		"	62.5		95.5	70-130			

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**Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control**  
**Origins Laboratory, Inc.**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch B8C0503 - EPA 5030 (soil)</b>										
<b>LCS (B8C0503-BS1)</b>					Prepared: 03/05/2018 Analyzed: 03/05/2018					
Benzene	0.099	0.002	mg/kg	0.100		99.4	77.1-124			
Toluene	0.099	0.002	"	0.100		98.5	74.5-128			
Ethylbenzene	0.089	0.002	"	0.100		89.1	66.4-127			
m,p-Xylene	0.185	0.004	"	0.200		92.5	76.6-124			
o-Xylene	0.091	0.002	"	0.100		91.2	76.6-124			
Surrogate: 1,2-Dichloroethane-d4	54		ug/kg	62.5		87.0	70-130			
Surrogate: Toluene-d8	63		"	62.5		102	70-130			
Surrogate: 4-Bromofluorobenzene	58		"	62.5		93.1	70-130			

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**Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control**  
**Origins Laboratory, Inc.**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch B8C0503 - EPA 5030 (soil)</b>										
<b>Matrix Spike (B8C0503-MS1)</b>		<b>Source: Y802358-01</b>			Prepared: 03/05/2018 Analyzed: 03/05/2018					
Benzene	0.092	0.002	mg/kg	0.100	ND	92.1	71.8-126			
Toluene	0.089	0.002	"	0.100	0.0007	88.9	65.1-130			
Ethylbenzene	0.078	0.002	"	0.100	ND	77.9	62.2-130			
m,p-Xylene	0.159	0.004	"	0.200	ND	79.5	46.5-137			
o-Xylene	0.080	0.002	"	0.100	ND	79.9	54.2-134			
Surrogate: 1,2-Dichloroethane-d4	63		ug/kg	62.5		101	70-130			
Surrogate: Toluene-d8	61		"	62.5		98.1	70-130			
Surrogate: 4-Bromofluorobenzene	59		"	62.5		94.2	70-130			

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**Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control**  
**Origins Laboratory, Inc.**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch B8C0503 - EPA 5030 (soil)</b>										
<b>Matrix Spike Dup (B8C0503-MSD1)</b>		<b>Source: Y802358-01</b>		Prepared: 03/05/2018 Analyzed: 03/05/2018						
Benzene	0.074	0.002	mg/kg	0.100	ND	73.9	71.8-126	21.9	11.3	QR-02
Toluene	0.070	0.002	"	0.100	0.0007	70.3	65.1-130	23.4	15.4	QR-02
Ethylbenzene	0.062	0.002	"	0.100	ND	61.8	62.2-130	23.0	19.6	QM-07, QR-03
m,p-Xylene	0.123	0.004	"	0.200	ND	61.3	46.5-137	25.9	19.2	QR-02
o-Xylene	0.063	0.002	"	0.100	ND	62.7	54.2-134	24.2	17.9	QR-02
Surrogate: 1,2-Dichloroethane-d4	66		ug/kg	62.5		105	70-130			
Surrogate: Toluene-d8	61		"	62.5		98.3	70-130			
Surrogate: 4-Bromofluorobenzene	59		"	62.5		93.9	70-130			

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**Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control**  
**Origins Laboratory, Inc.**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Extractable Petroleum Hydrocarbons by 8015C - Quality Control**  
**Origins Laboratory, Inc.**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch B8C0504 - EPA 3550B**

**Blank (B8C0504-BLK1)**

Prepared: 03/05/2018 Analyzed: 03/05/2018

Gasoline (C6-C10)	ND	50.0	mg/kg							U
Diesel (C10-C28)	ND	50.0	"							U
Surrogate: o-Terphenyl	47		"	50.0		94.9	59-131			

**Blank (B8C0504-BLK2)**

Prepared: 03/05/2018 Analyzed: 03/05/2018

Gasoline (C6-C10)	ND	50.0	mg/kg							U
Diesel (C10-C28)	ND	50.0	"							U
Surrogate: o-Terphenyl	46		"	50.0		91.5	59-131			

**LCS (B8C0504-BS1)**

Prepared: 03/05/2018 Analyzed: 03/05/2018

Gasoline (C6-C10)	891	50.0	mg/kg	1000		89.1	59-133			
Diesel (C10-C28)	1020	50.0	"	1000		102	64-121			
Surrogate: o-Terphenyl	49		"	50.0		98.0	59-131			

**LCS (B8C0504-BS2)**

Prepared: 03/05/2018 Analyzed: 03/05/2018

Gasoline (C6-C10)	991	50.0	mg/kg	1000		99.1	59-133			
Diesel (C10-C28)	1050	50.0	"	1000		105	64-121			
Surrogate: o-Terphenyl	51		"	50.0		102	59-131			

**Matrix Spike (B8C0504-MS1)**

Source: Y802375-01

Prepared: 03/05/2018 Analyzed: 03/05/2018

Gasoline (C6-C10)	957	50.0	mg/kg	1000	17.3	94.0	57-139			
Diesel (C10-C28)	1070	50.0	"	1000	ND	107	53-125			

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Project Number: 018-0775  
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## Extractable Petroleum Hydrocarbons by 8015C - Quality Control Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch B8C0504 - EPA 3550B</b>										
<b>Matrix Spike (B8C0504-MS1)</b>		<b>Source: Y802375-01</b>			Prepared: 03/05/2018 Analyzed: 03/05/2018					
Surrogate: o-Terphenyl	50		mg/kg	50.0		99.6	59-131			
<b>Matrix Spike (B8C0504-MS2)</b>		<b>Source: Y802376-01</b>			Prepared: 03/05/2018 Analyzed: 03/05/2018					
Gasoline (C6-C10)	1020	50.0	mg/kg	1000	19.3	100	57-139			
Diesel (C10-C28)	1120	50.0	"	1000	ND	112	53-125			
Surrogate: o-Terphenyl	53		"	50.0		106	59-131			
<b>Matrix Spike Dup (B8C0504-MSD1)</b>		<b>Source: Y802375-01</b>			Prepared: 03/05/2018 Analyzed: 03/05/2018					
Gasoline (C6-C10)	949	50.0	mg/kg	1000	17.3	93.1	57-139	0.928	20	
Diesel (C10-C28)	1030	50.0	"	1000	ND	103	53-125	3.05	20	
Surrogate: o-Terphenyl	49		"	50.0		98.6	59-131			
<b>Matrix Spike Dup (B8C0504-MSD2)</b>		<b>Source: Y802376-01</b>			Prepared: 03/05/2018 Analyzed: 03/05/2018					
Gasoline (C6-C10)	1010	50.0	mg/kg	1000	19.3	98.6	57-139	1.38	20	
Diesel (C10-C28)	1080	50.0	"	1000	ND	108	53-125	3.47	20	
Surrogate: o-Terphenyl	52		"	50.0		103	59-131			

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Project Number: 018-0775  
Project: GWOC Cudney Sandsted TB

### Notes and Definitions

U Sample is Non-Detect.

QR-03 The RPD value for the sample duplicate or MS/MSD was outside of QC acceptance limits due to matrix interference. QC batch accepted based on LCS and/or LCSD recovery and/or RPD values.

QR-02 The RPD result exceeded the QC control limits; however, both percent recoveries were acceptable. Sample results for the QC batch were accepted based on percent recoveries and completeness of QC data.

QM-07 The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on acceptable LCS recovery.

ND Analyte NOT DETECTED at or above the reporting limit

RPD Relative Percent Difference

All soil results are reported at a wet weight basis.

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Jen Pellegrini For Noelle Doyle Mathis, President