



April 29, 2019

**A.G. Wassenaar**

**Rachel Peterson**

**2180 South Ivanhoe Street - Suite 5**

**Denver**

**CO 80222**

**Project Name - Whiting Razor 25B**

**Project Number - 171120**

Attached are your analytical results for Whiting Razor 25B received by Origins Laboratory, Inc. April 16, 2019. This project is associated with Origins project number Y904292-01.

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  
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A.G. Wassenaar

2180 South Ivanhoe Street - Suite 5

Denver CO 80222

Rachel Peterson

Project Number: 171120

Project: Whiting Razor 25B

CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
HPGA-31910	Y904292-01	Water	April 16, 2019 13:30	04/16/2019 16:55

Origins Laboratory, Inc.



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 2180 South Ivanhoe Street - Suite 5  
 Denver CO 80222

Rachel Peterson  
 Project Number: 171120  
 Project: Whiting Razor 25B

Origins Laboratory

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

Sample Receipt Checklist

Origins Work Order: Y904292

Client: A.G. Wassenaar  
 Client Project ID: Whiting Razor

Checklist Completed by: JG

Shipped Via: HD  
 (UPS, FedEx, Hand Delivered, Pick-up, etc.)  
 Airbill #: N/A

Date/time completed: 4/17/2019

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

Cooler Number/Temperature: 1 / 5.6 °C \_\_\_\_\_ / \_\_\_\_\_ °C \_\_\_\_\_ / \_\_\_\_\_ °C

Thermometer ID: T003

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"/>			
Is there ice present (document if blue ice is used)	<input checked="" type="checkbox"/>			
Are custody seals present on cooler? (if so, document in comments if they are signed and dated, broken or intact)		<input checked="" 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 checked="" type="checkbox"/>		
Were all samples received intact <sup>(1)</sup> ?	<input checked="" type="checkbox"/>			
Was adequate sample volume provided <sup>(1)</sup> ?	<input checked="" type="checkbox"/>			
Are short holding time analytes or samples with HTs due within 48 hours present <sup>(1)</sup> ?		<input checked="" type="checkbox"/>		
Is a chain-of-custody (COC) present and filled out completely <sup>(1)</sup> ?	<input checked="" type="checkbox"/>			
Does the COC agree with the number and type of sample bottles received <sup>(1)</sup> ?	<input checked="" type="checkbox"/>			
Do the sample IDs on the bottle labels match the COC <sup>(1)</sup> ?	<input checked="" type="checkbox"/>			
Is the COC properly relinquished by the client with date and time recorded <sup>(1)</sup> ?	<input checked="" type="checkbox"/>			
For volatiles in water – is there headspace (> ¼ inch bubble) present? If yes, contact client and note in narrative.		<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 checked="" type="checkbox"/>		
Additional Comments (if any):				

<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: [Signature] (Project Manager)

Date/Time Reviewed: 4-18-19

Origins Laboratory, Inc.

Jefe Pellegrini

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 2180 South Ivanhoe Street - Suite 5  
 Denver CO 80222

Rachel Peterson  
 Project Number: 171120  
 Project: Whiting Razor 25B

**HPGA-31910**  
**4/16/2019 1:30:00PM**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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**GEL Laboratories, LLC**  
**Y904292-01 (Water)**

**Alkalinity by SM 2320B**

Alkalinity, Total as CaCO <sub>3</sub>	177	4.00	mg/L	1	1868970	RXB5	04/16/2019	04/19/2019	
Bicarbonate alkalinity (CaCO <sub>3</sub> )	166	4.00	"	"	"	RXB5	"	"	
Carbonate alkalinity (CaCO <sub>3</sub> )	10.7	4.00	"	"	"	RXB5	"	"	

**Anions by EPA 300.0**

Bromide	0.374	0.200	mg/L	1	1869196	LXA2	"	04/20/2019	
Chloride	48.3	2.00	"	10	"	LXA2	"	04/22/2019	
Fluoride	0.395	0.100	"	1	"	LXA2	"	04/20/2019	
Sulfate	2.56	0.400	"	"	"	LXA2	"	"	

**BTEX by EPA 8260D**

Benzene	ND	1.00	ug/L	1	B9D1707	JTD	04/17/2019	04/17/2019	Ua
Toluene	ND	1.00	"	"	"	JTD	"	"	Ua
Ethylbenzene	ND	1.00	"	"	"	JTD	"	"	Ua
Xylenes, total	ND	1.00	"	"	"	JTD	"	"	Ua

Surrogate: 1,2-Dichloroethane-d4	101 %	70-130			"	"	"		
Surrogate: Toluene-d8	98.1 %	70-130			"	"	"		
Surrogate: 4-Bromofluorobenzene	100 %	70-130			"	"	"		

**Dissolved Gasses by RSK 175**

Ethane	ND	10	ug/L	1	11111		04/16/2019	04/22/2019	
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**HPGA-31910**  
**4/16/2019 1:30:00PM**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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**Pace Analytical**  
**Y904292-01 (Water)**

**Dissolved Gasses by RSK 175**

Methane	ND	10	ug/L	1	11111		04/16/2019	04/22/2019	
n-Propane	ND	20	"	"	"		"	"	

**Dissolved Metals by EPA 200.8**

Calcium	<b>26100</b>	200	ug/L	1	1869150	PRB	04/19/2019	04/22/2019	
Magnesium	<b>6940</b>	30.0	"	"	"	PRB	"	"	
Potassium	<b>7750</b>	300	"	"	"	PRB	"	"	
Sodium	<b>64000</b>	2500	"	10	"	PRB	"	04/23/2019	

**DRO by 8015C**

Diesel Range Organics	ND	194	ug/L	1	1869108	LXA1	"	04/22/2019	U
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*Surrogate: o-Terphenyl* 54 % 40-109 " " "

**GRO by 8015C**

Gasoline Range Organics	ND	100	ug/L	1	1868956	RXY1	04/16/2019	04/25/2019	U
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*Surrogate: Bromofluorobenzene* 107 % 75-127 " " "

**TDS by SM 2540C**

Total Dissolved Solids	<b>249</b>	14.3	mg/L	1	1869872	KLP1	"	04/22/2019	
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**Volatile Organic Compounds by GC/MS SW846 8260D - 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 B9D1707 - EPA 5030B (Water)**

**Blank (B9D1707-BLK1)**

Prepared: 04/17/2019 Analyzed: 04/17/2019

Benzene	ND	1.00	ug/L							Ua
Toluene	ND	1.00	"							Ua
Ethylbenzene	ND	1.00	"							Ua
Xylenes, total	ND	1.00	"							Ua
Surrogate: 1,2-Dichloroethane-d4	62		"	62.5	99.9		70-130			
Surrogate: Toluene-d8	62		"	62.5	99.7		70-130			
Surrogate: 4-Bromofluorobenzene	62		"	62.5	99.9		70-130			

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Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch B9D1707 - EPA 5030B (Water)**

**Blank (B9D1707-BLK2)**

Prepared: 04/17/2019 Analyzed: 04/17/2019

Benzene	ND	1.00	ug/L							Ua
Toluene	ND	1.00	"							Ua
Ethylbenzene	ND	1.00	"							Ua
Xylenes, total	ND	1.00	"							Ua
Surrogate: 1,2-Dichloroethane-d4	63		"	62.5		101	70-130			
Surrogate: Toluene-d8	62		"	62.5		99.6	70-130			
Surrogate: 4-Bromofluorobenzene	61		"	62.5		97.5	70-130			

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Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B9D1707 - EPA 5030B (Water)

**LCS (B9D1707-BS1)**

Prepared: 04/17/2019 Analyzed: 04/17/2019

Benzene	48.7	1.00	ug/L	50.0		97.4	70-130			
Toluene	47.4	1.00	"	50.0		94.9	70-130			
Ethylbenzene	48.6	1.00	"	50.0		97.2	70-130			
m,p-Xylene	96.6	2.00	"	100		96.6	70-130			
o-Xylene	47.8	1.00	"	50.0		95.5	70-130			
Surrogate: 1,2-Dichloroethane-d4	60		"	62.5		95.8	70-130			
Surrogate: Toluene-d8	62		"	62.5		99.3	70-130			
Surrogate: 4-Bromofluorobenzene	63		"	62.5		101	70-130			

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Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B9D1707 - EPA 5030B (Water)

**LCS (B9D1707-BS2)**

Prepared: 04/17/2019 Analyzed: 04/17/2019

Benzene	44.9	1.00	ug/L	50.0		89.8	70-130			
Toluene	44.7	1.00	"	50.0		89.5	70-130			
Ethylbenzene	44.8	1.00	"	50.0		89.5	70-130			
m,p-Xylene	88.7	2.00	"	100		88.7	70-130			
o-Xylene	44.3	1.00	"	50.0		88.5	70-130			
Surrogate: 1,2-Dichloroethane-d4	60		"	62.5		95.6	70-130			
Surrogate: Toluene-d8	63		"	62.5		100	70-130			
Surrogate: 4-Bromofluorobenzene	62		"	62.5		99.4	70-130			

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**Origins Laboratory, Inc.**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch B9D1707 - EPA 5030B (Water)**

<b>Matrix Spike (B9D1707-MS1)</b>	<b>Source: Y904289-01</b>			<b>Prepared: 04/17/2019 Analyzed: 04/17/2019</b>						
Benzene	49.2	1.00	ug/L	50.0	ND	98.4	70-130			
Toluene	48.7	1.00	"	50.0	ND	97.3	70-130			
Ethylbenzene	49.0	1.00	"	50.0	ND	98.0	70-130			
m,p-Xylene	96.4	2.00	"	100	ND	96.4	70-130			
o-Xylene	48.0	1.00	"	50.0	ND	96.1	70-130			
Surrogate: 1,2-Dichloroethane-d4	59		"	62.5		94.4	70-130			
Surrogate: Toluene-d8	62		"	62.5		99.7	70-130			
Surrogate: 4-Bromofluorobenzene	63		"	62.5		100	70-130			

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**Volatile Organic Compounds by GC/MS SW846 8260D - Quality Control**  
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Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B9D1707 - EPA 5030B (Water)

Matrix Spike (B9D1707-MS2)	Source: Y904289-02			Prepared: 04/17/2019 Analyzed: 04/17/2019						
Benzene	47.6	1.00	ug/L	50.0	ND	95.2	70-130			
Toluene	47.5	1.00	"	50.0	ND	95.0	70-130			
Ethylbenzene	47.8	1.00	"	50.0	ND	95.5	70-130			
m,p-Xylene	94.2	2.00	"	100	ND	94.2	70-130			
o-Xylene	47.4	1.00	"	50.0	ND	94.9	70-130			
Surrogate: 1,2-Dichloroethane-d4	58		"	62.5		92.2	70-130			
Surrogate: Toluene-d8	62		"	62.5		99.7	70-130			
Surrogate: 4-Bromofluorobenzene	61		"	62.5		97.5	70-130			

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**Volatile Organic Compounds by GC/MS SW846 8260D - 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 B9D1707 - EPA 5030B (Water)**

Matrix Spike Dup (B9D1707-MSD1)	Source: Y904289-01			Prepared: 04/17/2019 Analyzed: 04/17/2019						
Benzene	47.1	1.00	ug/L	50.0	ND	94.1	70-130	4.41	20	
Toluene	47.2	1.00	"	50.0	ND	94.4	70-130	3.05	20	
Ethylbenzene	47.4	1.00	"	50.0	ND	94.8	70-130	3.32	20	
m,p-Xylene	94.2	2.00	"	100	ND	94.2	70-130	2.33	20	
o-Xylene	46.8	1.00	"	50.0	ND	93.6	70-130	2.57	20	
Surrogate: 1,2-Dichloroethane-d4	58		"	62.5		93.2	70-130			
Surrogate: Toluene-d8	62		"	62.5		100	70-130			
Surrogate: 4-Bromofluorobenzene	62		"	62.5		98.7	70-130			

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**Volatile Organic Compounds by GC/MS SW846 8260D - Quality Control**  
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Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch B9D1707 - EPA 5030B (Water)**

Matrix Spike Dup (B9D1707-MSD2)	Source: Y904289-02			Prepared: 04/17/2019 Analyzed: 04/17/2019						
Benzene	46.9	1.00	ug/L	50.0	ND	93.7	70-130	1.55	20	
Toluene	46.9	1.00	"	50.0	ND	93.8	70-130	1.27	20	
Ethylbenzene	46.7	1.00	"	50.0	ND	93.5	70-130	2.20	20	
m,p-Xylene	92.8	2.00	"	100	ND	92.8	70-130	1.41	20	
o-Xylene	47.4	1.00	"	50.0	ND	94.8	70-130	0.127	20	
Surrogate: 1,2-Dichloroethane-d4	58		"	62.5		93.5	70-130			
Surrogate: Toluene-d8	62		"	62.5		99.9	70-130			
Surrogate: 4-Bromofluorobenzene	62		"	62.5		98.8	70-130			

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Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Alkalinity by SM 2320B - Quality Control**  
**GEL Laboratories, LLC**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch 1868970 -**

<b>DUP (1204265758 D)</b>		<b>Source: 476819001</b>			<b>Prepared: Analyzed: 04/19/2019</b>					
Carbonate alkalinity (CaCO3)	24.1	4.00	mg/L		28.1		0-20	15.4	20	
Bicarbonate alkalinity (CaCO3)	589	4.00	"		575		0-20	2.42	20	
Alkalinity, Total as CaCO3	613	4.00	"		603		0-20	1.65	20	
<b>MS (1204265759 S)</b>		<b>Source: 476819001</b>			<b>Prepared: Analyzed: 04/19/2019</b>					
Alkalinity, Total as CaCO3	730	4.00	mg/L	100	603	127	80-120			

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**Anions by EPA 300.0 - Quality Control**  
**GEL Laboratories, LLC**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch 1869196 -</b>										
<b>BLANK (1204264612-BLK)</b>					Prepared: Analyzed: 04/20/2019					
Sulfate	ND	0.400	mg/L				-			U
Bromide	ND	0.200	"				-			U
Fluoride	ND	0.100	"				-			U
Chloride	ND	0.200	"				-			U
<b>LCS (1204264613-BKS)</b>					Prepared: Analyzed: 04/20/2019					
Chloride	4.87	0.200	mg/L	5.00		97.3	90-110			
Fluoride	2.45	0.100	"	2.50		98	90-110			
Sulfate	9.91	0.400	"	10.0		99.1	90-110			
Bromide	1.33	0.200	"	1.25		106	90-110			
<b>DUP (1204264614 D)</b>		<b>Source: Y904292-01</b>			Prepared: Analyzed: 04/22/2019					
Chloride	48.0	2.00	mg/L		48.3		0-20	0.619	20	
Bromide	0.403	0.200	"		0.374		0-20	7.39	20	
Fluoride	0.397	0.100	"		0.395		0-20	0.455	20	
Sulfate	2.53	0.400	"		2.56		0-20	1.08	20	
<b>PS (1204264615 S)</b>		<b>Source: Y904292-01</b>			Prepared: Analyzed: 04/20/2019					
Sulfate	12.9	0.400	mg/L	10.0		103	90-110			
Fluoride	2.91	0.100	"	2.50		101	90-110			
Chloride	104	2.00	"	5.00		111	90-110			
Bromide	1.80	0.200	"	1.25		114	90-110			

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**Dissolved Metals by EPA 200.8 - Quality Control**  
**GEL Laboratories, LLC**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch 1869150 -**

**FLT (1204264116-BLK)**

Prepared: 04/19/2019 Analyzed: 04/22/2019

Magnesium	ND	30.0	ug/L				-			U
Potassium	ND	300	"				-			U
Sodium	ND	250	"				-			U
Calcium	ND	200	"				-			U

**BLANK (1204264515-BLK)**

Prepared: 04/19/2019 Analyzed: 04/22/2019

Potassium	ND	300	ug/L				-			U
Magnesium	ND	30.0	"				-			U
Calcium	ND	200	"				-			U
Sodium	ND	250	"				-			U

**LCS (1204264516-BKS)**

Prepared: 04/19/2019 Analyzed: 04/22/2019

Potassium	1970	300	ug/L	2000		98.5	85-115			
Sodium	2020	250	"	2000		101	85-115			
Magnesium	1980	30.0	"	2000		99.2	85-115			
Calcium	2170	200	"	2000		109	85-115			

**DUP (1204264517 D)**

**Source: Y904292-01**

Prepared: 04/19/2019 Analyzed: 04/23/2019

Sodium	67500	2500	ug/L		64000		0-20	5.24	20	
Potassium	7760	300	"		7750		0-20	0.0519	20	
Magnesium	7200	30.0	"		6940		0-20	3.71	20	
Calcium	26900	200	"		26100		0-20	2.83	20	

**MS (1204264518 S)**

**Source: Y904292-01**

Prepared: 04/19/2019 Analyzed: 04/22/2019

Magnesium	9400	30.0	ug/L	2000	6940	123	75-125			
Potassium	9790	300	"	2000	7750	102	75-125			
Calcium	29600	200	"	2000	26100	173	75-125			
Sodium	65500	2500	"	2000	64000	73.7	75-125			

Origins Laboratory, Inc.



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Denver CO 80222

Rachel Peterson  
Project Number: 171120  
Project: Whiting Razor 25B

**Dissolved Metals by EPA 200.8 - Quality Control**  
**GEL Laboratories, LLC**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1869150 - EPA 200.2

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**GRO by 8015C - Quality Control**  
**GEL Laboratories, LLC**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch 1868956 -</b>										
<b>PS (1204264132 S)</b>		<b>Source: 476530001</b>			Prepared: Analyzed: 04/25/2019					
Gasoline Range Organics	432	100	ug/L	500		75	68-127			
Surrogate: Bromofluorobenzene	53.8		"	50.0		108	75-127			
<b>PSD (1204264133 SD)</b>		<b>Source: 476530001</b>			Prepared: Analyzed: 04/25/2019					
Gasoline Range Organics	541	100	ug/L	500		97	68-127	22	30	
Surrogate: Bromofluorobenzene	46.3		"	50.0		93	75-127			
<b>BLANK (1204269234-BLK)</b>					Prepared: Analyzed: 04/25/2019					
Gasoline Range Organics	ND	100	ug/L				-			U
Surrogate: Bromofluorobenzene	52.1		"	50.0		104	75-127			
<b>LCS (1204269235-BKS)</b>					Prepared: Analyzed: 04/25/2019					
Gasoline Range Organics	407	100	ug/L	500		81	80-120			
Surrogate: Bromofluorobenzene	55.6		"	50.0		111	75-127			

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**TDS by SM 2540C - Quality Control**  
**GEL Laboratories, LLC**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch 1869872 -</b>										
<b>BLANK (1204266207-BLK)</b>					Prepared: Analyzed: 04/22/2019					
Total Dissolved Solids	ND	14.3	mg/L				-			U
<b>LCS (1204266208-BKS)</b>					Prepared: Analyzed: 04/22/2019					
Total Dissolved Solids	300	14.3	mg/L	300		100	95-105			
<b>DUP (1204266209 D)</b>		<b>Source: 476577001</b>			Prepared: Analyzed: 04/22/2019					
Total Dissolved Solids	250	14.3	mg/L		261		0-5	4.47	5	

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**Notes and Definitions**

Ua Sample is Non-Detect.

U Result not detected above the detection limit

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