

December 10, 2018

Olsson Associates**James Hix****1525 Raleigh St, Suite 400****Denver****CO 80204****Project Name - GWOG - Colorado State #2****Project Number - 018-3312**

Attached are your analytical results for GWOG - Colorado State #2 received by Origins Laboratory, Inc. December 03, 2018. This project is associated with Origins project number Y812001-01.

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



Olsson Associates

1525 Raleigh St, Suite 400

Denver CO 80204

James Hix

Project Number: 018-3312

Project: GWOG - Colorado State #2

CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
PZ-1	Y812001-01	Water	November 30, 2018 12:45	12/03/2018 08:45
PZ-2	Y812001-02	Water	November 30, 2018 14:00	12/03/2018 08:45
PZ-3	Y812001-03	Water	November 30, 2018 14:44	12/03/2018 08:45
PZ-4	Y812001-04	Water	November 30, 2018 15:25	12/03/2018 08:45
EGW-1	Y812001-05	Water	November 30, 2018 13:48	12/03/2018 08:45
SS-10N@6.0ft	Y812001-06	Soil	November 30, 2018 13:05	12/03/2018 08:45
SS-11W@6.0ft	Y812001-07	Soil	November 30, 2018 13:45	12/03/2018 08:45

Origins Laboratory, Inc.



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Jen Pellegrini, Project Manager

Olsson Associates
1525 Raleigh St, Suite 400
Denver CO 80204

James Hix
Project Number: 018-3312
Project: GWOG - Colorado State #2

Origins Laboratory

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

Sample Receipt Checklist

Origins Work Order: Y812001

Client: Olsson

Client Project ID: GWOG - Colorado State #2

Checklist Completed by: JG

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

Date/time completed: 12/3/2018

Airbill #: N/A

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

Cooler Number/Temperature: 1 / 4.6 °C _____ °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 ⁽¹⁾ ?	<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 ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Was adequate sample volume provided ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Are short holding time analytes or samples with HTs due within 48 hours present ⁽¹⁾ ?		<input checked="" type="checkbox"/>		
Is a chain-of-custody (COC) present and filled out completely ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Does the COC agree with the number and type of sample bottles received ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Do the sample IDs on the bottle labels match the COC ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Is the COC properly relinquished by the client with date and time recorded ⁽¹⁾ ?	<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 ⁽¹⁾ ? (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 ₃ , HCL, H ₂ SO ₄) / (pH > 10 for samples preserved with NaAsO ₂ +NaOH, ZnAc+NaOH)		<input checked="" type="checkbox"/>		
Additional Comments (if any):				

⁽¹⁾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 12/4/18

Origins Laboratory, Inc.

Jen Pellegrini

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Olsson Associates
1525 Raleigh St, Suite 400
Denver CO 80204

James Hix
Project Number: 018-3312
Project: GWOG - Colorado State #2

PZ-1

11/30/2018 12:45:00PM

Analyte	Result	Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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GEL Laboratories, LLC

Y812001-01 (Water)

Alkalinity by SM 2320B

Alkalinity, Total as CaCO ₃	312	4.00	mg/L	1	1827522	RXB5	11/30/2018	12/04/2018	
Bicarbonate alkalinity (CaCO ₃)	312	4.00	"	"	"	RXB5	"	"	
Carbonate alkalinity (CaCO ₃)	ND	4.00	"	"	"	RXB5	"	"	U

Anions by EPA 300.0

Chloride	197	20.0	mg/L	100	1828228	LXA2	"	12/05/2018	
Sulfate	1240	40.0	"	"	"	LXA2	"	"	

BTEX by EPA 8260C

Benzene	ND	1.00	ug/L	1	B8L0405	JTD	12/04/2018	12/05/2018	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	105 %	84-121	"	"	"
Surrogate: Toluene-d8	100 %	85-115	"	"	"
Surrogate: 4-Bromofluorobenzene	99.1 %	84-114	"	"	"

Dissolved Metals by 200.8

Calcium	303000	2000	ug/L	10	1828325	BAJ	12/05/2018	12/08/2018	
Iron	42.3	100	"	1	"	BAJ	"	"	J
Magnesium	141000	300	"	10	"	BAJ	"	"	

Origins Laboratory, Inc.



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Olsson Associates
1525 Raleigh St, Suite 400
Denver CO 80204

James Hix
Project Number: 018-3312
Project: GWOG - Colorado State #2

PZ-1

11/30/2018 12:45:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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GEL Laboratories, LLC
Y812001-01 (Water)

Dissolved Metals by 200.8

Manganese	159	5.00	ug/L	1	1828325	BAJ	12/05/2018	12/08/2018	
Potassium	5340	300	"	"	"	BAJ	"	"	
Sodium	209000	2500	"	10	"	BAJ	"	"	

Nitrate/Nitrite by EPA 353.2

Nitrogen, Nitrate/Nitrite	0.260	0.020	mg/L	1	1828704	KLP1	11/30/2018	12/06/2018	
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pH in Water by EPA 9040C

pH	7.09		pH Units	1	B8L0407	OLAB	12/04/2018	12/04/2018	
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Origins Laboratory, Inc.



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Olsson Associates
1525 Raleigh St, Suite 400
Denver CO 80204

James Hix
Project Number: 018-3312
Project: GWOG - Colorado State #2

PZ-2

11/30/2018 2:00:00PM

Analyte	Result	Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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GEL Laboratories, LLC

Y812001-02 (Water)

Alkalinity by SM 2320B

Alkalinity, Total as CaCO ₃	262	4.00	mg/L	1	1827522	RXB5	11/30/2018	12/04/2018	
Bicarbonate alkalinity (CaCO ₃)	262	4.00	"	"	"	RXB5	"	"	
Carbonate alkalinity (CaCO ₃)	ND	4.00	"	"	"	RXB5	"	"	U

Anions by EPA 300.0

Chloride	46.2	20.0	mg/L	100	1828228	LXA2	"	12/05/2018	
Sulfate	578	40.0	"	"	"	LXA2	"	"	

BTEX by EPA 8260C

Benzene	ND	1.00	ug/L	1	B8L0405	JTD	12/04/2018	12/05/2018	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	103 %	84-121	"	"	"
Surrogate: Toluene-d8	100 %	85-115	"	"	"
Surrogate: 4-Bromofluorobenzene	97.2 %	84-114	"	"	"

Dissolved Metals by 200.8

Calcium	174000	2000	ug/L	10	1828325	BAJ	12/05/2018	12/08/2018	
Iron	ND	100	"	1	"	BAJ	"	"	U
Magnesium	82800	300	"	10	"	BAJ	"	"	

Origins Laboratory, Inc.



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1525 Raleigh St, Suite 400
Denver CO 80204

James Hix
Project Number: 018-3312
Project: GWOG - Colorado State #2

PZ-2

11/30/2018 2:00:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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GEL Laboratories, LLC
Y812001-02 (Water)

Dissolved Metals by 200.8

Manganese	305	5.00	ug/L	1	1828325	BAJ	12/05/2018	12/08/2018	
Potassium	7120	300	"	"	"	BAJ	"	"	
Sodium	65200	2500	"	10	"	BAJ	"	"	

Nitrate/Nitrite by EPA 353.2

Nitrogen, Nitrate/Nitrite	0.199	0.020	mg/L	1	1828704	KLP1	11/30/2018	12/06/2018	
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pH in Water by EPA 9040C

pH	7.73		pH Units	1	B8L0407	OLAB	12/04/2018	12/04/2018	
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Origins Laboratory, Inc.



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Denver CO 80204

James Hix
Project Number: 018-3312
Project: GWOG - Colorado State #2

PZ-3

11/30/2018 2:44:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Origins Laboratory, Inc. Y812001-03 (Water)

BTEX by EPA 8260C

Benzene	ND	1.00	ug/L	1	B8L0405	JTD	12/04/2018	12/05/2018	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	104 %	84-121	"	"	"
Surrogate: Toluene-d8	100 %	85-115	"	"	"
Surrogate: 4-Bromofluorobenzene	97.3 %	84-114	"	"	"

pH in Water by EPA 9040C

pH	7.79	pH Units	1	B8L0407	OLAB	12/04/2018	12/04/2018
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Origins Laboratory, Inc.



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Olsson Associates
1525 Raleigh St, Suite 400
Denver CO 80204

James Hix
Project Number: 018-3312
Project: GWOG - Colorado State #2

PZ-4

11/30/2018 3:25:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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GEL Laboratories, LLC

Y812001-04 (Water)

Alkalinity by SM 2320B

Alkalinity, Total as CaCO ₃	224	4.00	mg/L	1	1827522	RXB5	11/30/2018	12/04/2018	
Bicarbonate alkalinity (CaCO ₃)	224	4.00	"	"	"	RXB5	"	"	
Carbonate alkalinity (CaCO ₃)	ND	4.00	"	"	"	RXB5	"	"	U

Anions by EPA 300.0

Chloride	50.5	20.0	mg/L	100	1828228	LXA2	"	12/05/2018	
Sulfate	2030	80.0	"	200	"	LXA2	"	12/06/2018	

BTEX by EPA 8260C

Benzene	ND	1.00	ug/L	1	B8L0405	JTD	12/04/2018	12/05/2018	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	99.5 %	84-121	"	"	"
Surrogate: Toluene-d8	102 %	85-115	"	"	"
Surrogate: 4-Bromofluorobenzene	97.5 %	84-114	"	"	"

pH in Water by EPA 9040C

pH	7.63	pH Units	1	B8L0407	OLAB	12/04/2018	12/04/2018
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Origins Laboratory, Inc.



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Olsson Associates
1525 Raleigh St, Suite 400
Denver CO 80204

James Hix
Project Number: 018-3312
Project: GWOG - Colorado State #2

EGW-1

11/30/2018 1:48:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Origins Laboratory, Inc. Y812001-05 (Water)

BTEX by EPA 8260C

Benzene	3.36	1.00	ug/L	1	B8L0405	JTD	12/04/2018	12/05/2018
Toluene	2.54	1.00	"	"	"	JTD	"	"
Ethylbenzene	11.4	1.00	"	"	"	JTD	"	"
Xylenes, total	83.9	1.00	"	"	"	JTD	"	"

Surrogate: 1,2-Dichloroethane-d4	98.9 %	84-121	"	"	"
Surrogate: Toluene-d8	104 %	85-115	"	"	"
Surrogate: 4-Bromofluorobenzene	97.6 %	84-114	"	"	"

Origins Laboratory, Inc.



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Jen Pellegrini, Project Manager

Olsson Associates
1525 Raleigh St, Suite 400
Denver CO 80204

James Hix
Project Number: 018-3312
Project: GWOG - Colorado State #2

SS-10N@6.0ft

11/30/2018 1:05:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y812001-06 (Soil)

BTEX by EPA 8260C

Benzene	ND	0.002	mg/kg	1	B8L0302	KDK	12/03/2018	12/04/2018	Ua
Toluene	ND	0.002	"	"	"	KDK	"	"	Ua
Ethylbenzene	ND	0.002	"	"	"	KDK	"	"	Ua
Xylenes, total	0.008	0.002	"	"	"	KDK	"	"	

Surrogate: 1,2-Dichloroethane-d4	107 %	70-130			"	"	"
Surrogate: Toluene-d8	92.9 %	70-130			"	"	"
Surrogate: 4-Bromofluorobenzene	94.7 %	70-130			"	"	"

TPH-Carbon Chain by EPA Method 8015C

Gasoline (C6-C10)	ND	50.0	mg/kg	1	B8L0303	JTD	12/03/2018	12/03/2018	Ua
Diesel (C10-C28)	ND	50.0	"	"	"	JTD	"	"	Ua
Residual Range Organics (C28-C40)	ND	200	"	"	"	JTD	"	"	Ua

Surrogate: o-Terphenyl	81.8 %	65-146			"	"	"
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Origins Laboratory, Inc.



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Jen Pellegrini, Project Manager

Olsson Associates
1525 Raleigh St, Suite 400
Denver CO 80204

James Hix
Project Number: 018-3312
Project: GWOG - Colorado State #2

SS-11W@6.0ft

11/30/2018 1:45:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y812001-07 (Soil)

BTEX by EPA 8260C

Benzene	ND	0.002	mg/kg	1	B8L0302	KDK	12/03/2018	12/04/2018	Ua
Toluene	ND	0.002	"	"	"	KDK	"	"	Ua
Ethylbenzene	ND	0.002	"	"	"	KDK	"	"	Ua
Xylenes, total	ND	0.002	"	"	"	KDK	"	"	Ua

Surrogate: 1,2-Dichloroethane-d4	107 %	70-130			"	"	"
Surrogate: Toluene-d8	93.3 %	70-130			"	"	"
Surrogate: 4-Bromofluorobenzene	104 %	70-130			"	"	"

TPH-Carbon Chain by EPA Method 8015C

Gasoline (C6-C10)	ND	50.0	mg/kg	1	B8L0303	JTD	12/03/2018	12/03/2018	Ua
Diesel (C10-C28)	ND	50.0	"	"	"	JTD	"	"	Ua
Residual Range Organics (C28-C40)	ND	200	"	"	"	JTD	"	"	Ua

Surrogate: o-Terphenyl	84.0 %	65-146			"	"	"
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Origins Laboratory, Inc.



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Jen Pellegrini, Project Manager

Olsson Associates
1525 Raleigh St, Suite 400
Denver CO 80204

James Hix
Project Number: 018-3312
Project: GWOG - Colorado State #2

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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Batch B8L0302 - EPA 5030 (soil)

Blank (B8L0302-BLK1)

Prepared: 12/03/2018 Analyzed: 12/03/2018

Benzene	ND	0.002	mg/kg							Ua
Toluene	ND	0.002	"							Ua
Ethylbenzene	ND	0.002	"							Ua
Xylenes, total	ND	0.002	"							Ua
Surrogate: 1,2-Dichloroethane-d4	0.13		"	0.125	107		70-130			
Surrogate: Toluene-d8	0.12		"	0.125	93.5		70-130			
Surrogate: 4-Bromofluorobenzene	0.12		"	0.125	95.8		70-130			

Origins Laboratory, Inc.



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Jen Pellegrini, Project Manager

Olsson Associates
1525 Raleigh St, Suite 400
Denver CO 80204

James Hix
Project Number: 018-3312
Project: GWOG - Colorado State #2

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
Batch B8L0302 - EPA 5030 (soil)										
Blank (B8L0302-BLK2)					Prepared: 12/03/2018 Analyzed: 12/03/2018					
Benzene	ND	0.002	mg/kg							Ua
Toluene	ND	0.002	"							Ua
Ethylbenzene	ND	0.002	"							Ua
Xylenes, total	ND	0.002	"							Ua
Surrogate: 1,2-Dichloroethane-d4	0.13		"	0.125		105	70-130			
Surrogate: Toluene-d8	0.12		"	0.125		93.7	70-130			
Surrogate: 4-Bromofluorobenzene	0.12		"	0.125		95.9	70-130			

Origins Laboratory, Inc.



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Jen Pellegrini, Project Manager

Olsson Associates
1525 Raleigh St, Suite 400
Denver CO 80204

James Hix
Project Number: 018-3312
Project: GWOG - Colorado State #2

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
Batch B8L0302 - EPA 5030 (soil)										
LCS (B8L0302-BS1)					Prepared: 12/03/2018 Analyzed: 12/03/2018					
Benzene	0.113	0.002	mg/kg	0.100		113	77.1-124			
Toluene	0.102	0.002	"	0.100		102	74.5-128			
Ethylbenzene	0.105	0.002	"	0.100		105	66.4-127			
m,p-Xylene	0.208	0.004	"	0.200		104	76.6-124			
o-Xylene	0.105	0.002	"	0.100		105	76.6-124			
Surrogate: 1,2-Dichloroethane-d4	0.13		"	0.125		103	70-130			
Surrogate: Toluene-d8	0.12		"	0.125		94.1	70-130			
Surrogate: 4-Bromofluorobenzene	0.13		"	0.125		102	70-130			

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James Hix
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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
Batch B8L0302 - EPA 5030 (soil)										
LCS (B8L0302-BS2)					Prepared: 12/03/2018 Analyzed: 12/03/2018					
Benzene	0.119	0.002	mg/kg	0.100		119	77.1-124			
Toluene	0.105	0.002	"	0.100		105	74.5-128			
Ethylbenzene	0.106	0.002	"	0.100		106	66.4-127			
m,p-Xylene	0.210	0.004	"	0.200		105	76.6-124			
o-Xylene	0.106	0.002	"	0.100		106	76.6-124			
Surrogate: 1,2-Dichloroethane-d4	0.13		"	0.125		103	70-130			
Surrogate: Toluene-d8	0.12		"	0.125		92.4	70-130			
Surrogate: 4-Bromofluorobenzene	0.13		"	0.125		102	70-130			

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Denver CO 80204

James Hix
Project Number: 018-3312
Project: GWOG - Colorado State #2

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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Batch B8L0302 - EPA 5030 (soil)

Matrix Spike (B8L0302-MS1)		Source: Y811425-01			Prepared: 12/03/2018 Analyzed: 12/03/2018					
Benzene	0.120	0.002	mg/kg	0.100	ND	120	71.8-126			
Toluene	0.103	0.002	"	0.100	ND	103	65.1-130			
Ethylbenzene	0.109	0.002	"	0.100	0.0006	108	62.2-130			
m,p-Xylene	0.216	0.004	"	0.200	0.003	107	46.5-137			
o-Xylene	0.109	0.002	"	0.100	0.001	107	54.2-134			
Surrogate: 1,2-Dichloroethane-d4	0.13		"	0.125		106	70-130			
Surrogate: Toluene-d8	0.12		"	0.125		93.6	70-130			
Surrogate: 4-Bromofluorobenzene	0.13		"	0.125		105	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 B8L0302 - EPA 5030 (soil)

Matrix Spike (B8L0302-MS2)		Source: Y811425-02			Prepared: 12/03/2018 Analyzed: 12/03/2018					
Benzene	0.099	0.002	mg/kg	0.100	ND	98.6	71.8-126			
Toluene	0.082	0.002	"	0.100	ND	81.5	65.1-130			
Ethylbenzene	0.083	0.002	"	0.100	ND	83.4	62.2-130			
m,p-Xylene	0.165	0.004	"	0.200	0.001	81.9	46.5-137			
o-Xylene	0.085	0.002	"	0.100	0.001	83.4	54.2-134			
Surrogate: 1,2-Dichloroethane-d4	0.14		"	0.125		110	70-130			
Surrogate: Toluene-d8	0.12		"	0.125		92.1	70-130			
Surrogate: 4-Bromofluorobenzene	0.13		"	0.125		104	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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Batch B8L0302 - EPA 5030 (soil)

Matrix Spike Dup (B8L0302-MSD1)		Source: Y811425-01			Prepared: 12/03/2018 Analyzed: 12/03/2018					
Benzene	0.116	0.002	mg/kg	0.100	ND	116	71.8-126	3.38	11.3	
Toluene	0.097	0.002	"	0.100	ND	97.0	65.1-130	6.06	15.4	
Ethylbenzene	0.097	0.002	"	0.100	0.0006	96.7	62.2-130	11.2	19.6	
m,p-Xylene	0.193	0.004	"	0.200	0.003	95.5	46.5-137	11.2	19.2	
o-Xylene	0.098	0.002	"	0.100	0.001	96.8	54.2-134	10.2	17.9	
Surrogate: 1,2-Dichloroethane-d4	0.13		"	0.125		105	70-130			
Surrogate: Toluene-d8	0.12		"	0.125		92.9	70-130			
Surrogate: 4-Bromofluorobenzene	0.13		"	0.125		102	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 B8L0302 - EPA 5030 (soil)

Matrix Spike Dup (B8L0302-MSD2)		Source: Y811425-02			Prepared: 12/03/2018 Analyzed: 12/03/2018					
Benzene	0.107	0.002	mg/kg	0.100	ND	107	71.8-126	8.19	11.3	
Toluene	0.089	0.002	"	0.100	ND	88.6	65.1-130	8.39	15.4	
Ethylbenzene	0.088	0.002	"	0.100	ND	87.5	62.2-130	4.82	19.6	
m,p-Xylene	0.175	0.004	"	0.200	0.001	86.6	46.5-137	5.51	19.2	
o-Xylene	0.089	0.002	"	0.100	0.001	88.1	54.2-134	5.45	17.9	
Surrogate: 1,2-Dichloroethane-d4	0.13		"	0.125		106	70-130			
Surrogate: Toluene-d8	0.12		"	0.125		92.0	70-130			
Surrogate: 4-Bromofluorobenzene	0.13		"	0.125		103	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
Batch B8L0405 - EPA 5030B (Water)										
Blank (B8L0405-BLK1)					Prepared: 12/04/2018 Analyzed: 12/05/2018					
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		99.2	84-121			
Surrogate: Toluene-d8	66		"	62.5		106	85-115			
Surrogate: 4-Bromofluorobenzene	65		"	62.5		104	84-114			

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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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Batch B8L0405 - EPA 5030B (Water)

Blank (B8L0405-BLK2)

Prepared: 12/04/2018 Analyzed: 12/05/2018

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	65		"	62.5	104		84-121			
Surrogate: Toluene-d8	65		"	62.5	104		85-115			
Surrogate: 4-Bromofluorobenzene	64		"	62.5	102		84-114			

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Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B8L0405 - EPA 5030B (Water)										
LCS (B8L0405-BS1)					Prepared: 12/04/2018 Analyzed: 12/05/2018					
Benzene	45.6	1.00	ug/L	50.0		91.2	73.3-129			
Toluene	50.2	1.00	"	50.0		100	76.2-123			
Ethylbenzene	50.8	1.00	"	50.0		102	73.6-130			
m,p-Xylene	102	2.00	"	100		102	76.1-126			
o-Xylene	51.8	1.00	"	50.0		104	76.6-124			
Surrogate: 1,2-Dichloroethane-d4	63		"	62.5		100	84-121			
Surrogate: Toluene-d8	66		"	62.5		106	85-115			
Surrogate: 4-Bromofluorobenzene	62		"	62.5		99.5	84-114			

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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 B8L0405 - EPA 5030B (Water)

LCS (B8L0405-BS2)

Prepared: 12/04/2018 Analyzed: 12/05/2018

Benzene	55.8	1.00	ug/L	50.0	112	73.3-129
Toluene	54.2	1.00	"	50.0	108	76.2-123
Ethylbenzene	56.3	1.00	"	50.0	113	73.6-130
m,p-Xylene	109	2.00	"	100	109	76.1-126
o-Xylene	55.1	1.00	"	50.0	110	76.6-124
Surrogate: 1,2-Dichloroethane-d4	62		"	62.5	99.3	84-121
Surrogate: Toluene-d8	59		"	62.5	94.4	85-115
Surrogate: 4-Bromofluorobenzene	61		"	62.5	97.0	84-114

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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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Batch B8L0405 - EPA 5030B (Water)

Matrix Spike (B8L0405-MS1)		Source: Y811437-01			Prepared: 12/04/2018 Analyzed: 12/05/2018					
Benzene	55.0	1.00	ug/L	50.0	ND	110	74-130			
Toluene	58.2	1.00	"	50.0	ND	116	73-131			
Ethylbenzene	58.7	1.00	"	50.0	ND	117	76-132			
m,p-Xylene	117	2.00	"	100	ND	117	69-139			
o-Xylene	59.6	1.00	"	50.0	ND	119	74-131			
Surrogate: 1,2-Dichloroethane-d4	69		"	62.5		110	84-121			
Surrogate: Toluene-d8	65		"	62.5		104	85-115			
Surrogate: 4-Bromofluorobenzene	62		"	62.5		99.6	84-114			

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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 B8L0405 - EPA 5030B (Water)

Matrix Spike (B8L0405-MS2)		Source: Y811437-02			Prepared: 12/04/2018 Analyzed: 12/05/2018					
Benzene	50.7	1.00	ug/L	50.0	ND	101	74-130			
Toluene	54.1	1.00	"	50.0	ND	108	73-131			
Ethylbenzene	54.0	1.00	"	50.0	ND	108	76-132			
m,p-Xylene	107	2.00	"	100	ND	107	69-139			
o-Xylene	53.3	1.00	"	50.0	ND	107	74-131			
Surrogate: 1,2-Dichloroethane-d4	63		"	62.5		101	84-121			
Surrogate: Toluene-d8	65		"	62.5		104	85-115			
Surrogate: 4-Bromofluorobenzene	62		"	62.5		100	84-114			

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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 B8L0405 - EPA 5030B (Water)

Matrix Spike Dup (B8L0405-MSD1)		Source: Y811437-01			Prepared: 12/04/2018 Analyzed: 12/05/2018					
Benzene	56.8	1.00	ug/L	50.0	ND	114	74-130	3.18	20	
Toluene	59.0	1.00	"	50.0	ND	118	73-131	1.35	20	
Ethylbenzene	59.2	1.00	"	50.0	ND	118	76-132	0.967	20	
m,p-Xylene	120	2.00	"	100	ND	120	69-139	2.61	20	
o-Xylene	59.8	1.00	"	50.0	ND	120	74-131	0.402	20	
Surrogate: 1,2-Dichloroethane-d4	64		"	62.5		103	84-121			
Surrogate: Toluene-d8	64		"	62.5		102	85-115			
Surrogate: 4-Bromofluorobenzene	61		"	62.5		97.7	84-114			

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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 B8L0405 - EPA 5030B (Water)

Matrix Spike Dup (B8L0405-MSD2)		Source: Y811437-02			Prepared: 12/04/2018 Analyzed: 12/05/2018					
Benzene	51.6	1.00	ug/L	50.0	ND	103	74-130	1.76	20	
Toluene	54.2	1.00	"	50.0	ND	108	73-131	0.258	20	
Ethylbenzene	53.8	1.00	"	50.0	ND	108	76-132	0.315	20	
m,p-Xylene	108	2.00	"	100	ND	108	69-139	0.886	20	
o-Xylene	54.5	1.00	"	50.0	ND	109	74-131	2.19	20	
Surrogate: 1,2-Dichloroethane-d4	60		"	62.5		95.7	84-121			
Surrogate: Toluene-d8	65		"	62.5		104	85-115			
Surrogate: 4-Bromofluorobenzene	62		"	62.5		99.7	84-114			

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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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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 B8L0303 - EPA 3550B

Blank (B8L0303-BLK1)

Prepared: 12/03/2018 Analyzed: 12/03/2018

Gasoline (C6-C10)	ND	50.0	mg/kg							Ua
Diesel (C10-C28)	ND	50.0	"							Ua
Residual Range Organics (C28-C40)	ND	200	"							Ua

Surrogate: o-Terphenyl

35.3

"

50.0

70.6

65-146

Blank (B8L0303-BLK2)

Prepared: 12/03/2018 Analyzed: 12/03/2018

Gasoline (C6-C10)	ND	50.0	mg/kg							Ua
Diesel (C10-C28)	ND	50.0	"							Ua
Residual Range Organics (C28-C40)	ND	200	"							Ua

Surrogate: o-Terphenyl

39.9

"

50.0

79.7

65-146

Blank (B8L0303-BLK3)

Prepared: 12/03/2018 Analyzed: 12/03/2018

Gasoline (C6-C10)	ND	50.0	mg/kg							Ua
Diesel (C10-C28)	ND	50.0	"							Ua
Residual Range Organics (C28-C40)	ND	200	"							Ua

Surrogate: o-Terphenyl

41.8

"

50.0

83.6

65-146

LCS (B8L0303-BS1)

Prepared: 12/03/2018 Analyzed: 12/03/2018

Gasoline (C6-C10)	927	50.0	mg/kg	1000		92.7	66.7-119			
Diesel (C10-C28)	916	50.0	"	1000		91.6	70.1-127			
Residual Range Organics (C28-C40)	846	200	"	1000		84.6	54.5-139			

Surrogate: o-Terphenyl

43.0

"

50.0

86.0

65-146

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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
Batch B8L0303 - EPA 3550B										
LCS (B8L0303-BS2)					Prepared: 12/03/2018 Analyzed: 12/03/2018					
Gasoline (C6-C10)	773	50.0	mg/kg	1000		77.3	66.7-119			
Diesel (C10-C28)	778	50.0	"	1000		77.8	70.1-127			
Residual Range Organics (C28-C40)	725	200	"	1000		72.5	54.5-139			
Surrogate: o-Terphenyl	35.8		"	50.0		71.6	65-146			
LCS (B8L0303-BS3)					Prepared: 12/03/2018 Analyzed: 12/03/2018					
Gasoline (C6-C10)	953	50.0	mg/kg	1000		95.3	66.7-119			
Diesel (C10-C28)	1020	50.0	"	1000		102	70.1-127			
Residual Range Organics (C28-C40)	927	200	"	1000		92.7	54.5-139			
Surrogate: o-Terphenyl	47.7		"	50.0		95.5	65-146			
Matrix Spike (B8L0303-MS1)					Source: Y811425-01		Prepared: 12/03/2018 Analyzed: 12/03/2018			
Gasoline (C6-C10)	1080	50.0	mg/kg	1000	27.0	105	56.4-132			
Diesel (C10-C28)	1200	50.0	"	1000	ND	120	57.4-138			
Residual Range Organics (C28-C40)	1120	200	"	1000	23.6	110	47.7-129			
Surrogate: o-Terphenyl	54.5		"	50.0		109	65-146			
Matrix Spike (B8L0303-MS2)					Source: Y811425-02		Prepared: 12/03/2018 Analyzed: 12/03/2018			
Gasoline (C6-C10)	1050	50.0	mg/kg	1000	47.4	100	56.4-132			
Diesel (C10-C28)	1100	50.0	"	1000	43.7	105	57.4-138			
Residual Range Organics (C28-C40)	974	200	"	1000	24.0	95.1	47.7-129			
Surrogate: o-Terphenyl	49.5		"	50.0		99.1	65-146			
Matrix Spike (B8L0303-MS3)					Source: Y812010-01		Prepared: 12/03/2018 Analyzed: 12/03/2018			
Gasoline (C6-C10)	908	50.0	mg/kg	1000	ND	90.8	56.4-132			
Diesel (C10-C28)	962	50.0	"	1000	ND	96.2	57.4-138			
Residual Range Organics (C28-C40)	853	200	"	1000	6.77	84.6	47.7-129			

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Project: GWOG - Colorado State #2

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
Batch B8L0303 - EPA 3550B										
Matrix Spike (B8L0303-MS3)		Source: Y812010-01			Prepared: 12/03/2018 Analyzed: 12/03/2018					
Surrogate: o-Terphenyl	43.0		mg/kg	50.0		86.1	65-146			
Matrix Spike Dup (B8L0303-MSD1)		Source: Y811425-01			Prepared: 12/03/2018 Analyzed: 12/03/2018					
Gasoline (C6-C10)	1020	50.0	mg/kg	1000	27.0	98.8	56.4-132	5.97	22	
Diesel (C10-C28)	1170	50.0	"	1000	ND	117	57.4-138	2.49	18.3	
Residual Range Organics (C28-C40)	1110	200	"	1000	23.6	108	47.7-129	1.40	30.1	
Surrogate: o-Terphenyl	51.1		"	50.0		102	65-146			
Matrix Spike Dup (B8L0303-MSD2)		Source: Y811425-02			Prepared: 12/03/2018 Analyzed: 12/03/2018					
Gasoline (C6-C10)	994	50.0	mg/kg	1000	47.4	94.7	56.4-132	5.34	22	
Diesel (C10-C28)	1080	50.0	"	1000	43.7	104	57.4-138	1.49	18.3	
Residual Range Organics (C28-C40)	984	200	"	1000	24.0	96.0	47.7-129	0.972	30.1	
Surrogate: o-Terphenyl	49.3		"	50.0		98.5	65-146			
Matrix Spike Dup (B8L0303-MSD3)		Source: Y812010-01			Prepared: 12/03/2018 Analyzed: 12/03/2018					
Gasoline (C6-C10)	913	50.0	mg/kg	1000	ND	91.3	56.4-132	0.558	22	
Diesel (C10-C28)	956	50.0	"	1000	ND	95.6	57.4-138	0.538	18.3	
Residual Range Organics (C28-C40)	851	200	"	1000	6.77	84.4	47.7-129	0.266	30.1	
Surrogate: o-Terphenyl	42.4		"	50.0		84.7	65-146			

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Jen Pellegrini, Project Manager

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James Hix
Project Number: 018-3312
Project: GWOG - Colorado State #2

Classical Chemistry Parameters - 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 B8L0407 - NO PREP

Duplicate (B8L0407-DUP1)		Source: Y811364-01			Prepared: 12/04/2018 Analyzed: 12/04/2018					
pH	7.80		pH Units		7.80			0.00	200	

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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
Batch 1827522 -										
LCS (1204170823-BKS)					Prepared: Analyzed: 12/04/2018					
Alkalinity, Total as CaCO ₃	105	4.00	mg/L	100		105	90-110			
DUP (1204170824 D)					Source: Y812001-04 Prepared: Analyzed: 12/04/2018					
Carbonate alkalinity (CaCO ₃)	ND	4.00	mg/L		<1.45		0-20	0	20	U
Alkalinity, Total as CaCO ₃	220	4.00	"		224		0-20	1.79	20	
Bicarbonate alkalinity (CaCO ₃)	220	4.00	"		224		0-20	1.79	20	
MS (1204170825 S)					Source: Y812001-04 Prepared: Analyzed: 12/04/2018					
Alkalinity, Total as CaCO ₃	322	4.00	mg/L	100	224	98.4	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
Batch 1828228 -										
BLANK (1204172348-BLK)					Prepared: Analyzed: 12/05/2018					
Chloride	ND	0.200	mg/L				-			U
Sulfate	ND	0.400	"				-			U
LCS (1204172349-BKS)					Prepared: Analyzed: 12/05/2018					
Chloride	4.93	0.200	mg/L	5.00		98.6	90-110			
Sulfate	10.3	0.400	"	10.0		103	90-110			
DUP (1204172350 D)					Source: Y812001-01		Prepared: Analyzed: 12/05/2018			
Sulfate	1230	40.0	mg/L		1240		0-20	1.26	20	
Chloride	198	20.0	"		197		0-20	0.79	20	
PS (1204172351 S)					Source: Y812001-01		Prepared: Analyzed: 12/05/2018			
Chloride	715	20.0	mg/L	5.00		104	90-110			
Sulfate	2330	40.0	"	10.0		109	90-110			

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Dissolved Metals by 200.8 - Quality Control GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1828325 -										
FLTB (1204172141-BLK)					Prepared: 12/05/2018 Analyzed: 12/08/2018					
Magnesium	ND	30.0	ug/L				-			U
Sodium	ND	250	"				-			U
Manganese	ND	5.00	"				-			U
Iron	ND	100	"				-			U
Calcium	ND	200	"				-			U
Potassium	ND	300	"				-			U
BLANK (1204172544-BLK)					Prepared: 12/05/2018 Analyzed: 12/08/2018					
Iron	ND	100	ug/L				-			U
Potassium	ND	300	"				-			U
Sodium	ND	250	"				-			U
Calcium	ND	200	"				-			U
Manganese	ND	5.00	"				-			U
Magnesium	ND	30.0	"				-			U
LCS (1204172545-BKS)					Prepared: 12/05/2018 Analyzed: 12/08/2018					
Calcium	2130	200	ug/L	2000		106	85-115			
Iron	2060	100	"	2000		103	85-115			
Magnesium	2210	30.0	"	2000		110	85-115			
Manganese	48.9	5.00	"	50.0		97.7	85-115			
Potassium	2010	300	"	2000		101	85-115			
Sodium	2110	250	"	2000		105	85-115			
DUP (1204172546 D)					Source: Y812001-01 Prepared: 12/05/2018 Analyzed: 12/08/2018					
Magnesium	142000	300	ug/L		141000		0-20	0.384	20	
Sodium	220000	2500	"		209000		0-20	5.34	20	
Manganese	159	5.00	"		159		0-20	0.0655	20	

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Dissolved Metals by 200.8 - Quality Control GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1828325 - EPA 200.2										
DUP (1204172546 D)		Source: Y812001-01			Prepared: 12/05/2018 Analyzed: 12/08/2018					
Iron	41.9	100	ug/L		42.3		0-20	1.05	20	J
Calcium	313000	2000	"		303000		0-20	2.94	20	
Potassium	5580	300	"		5340		0-20	4.35	20	
MS (1204172547 S)		Source: Y812001-01			Prepared: 12/05/2018 Analyzed: 12/08/2018					
Calcium	325000	2000	ug/L	2000	303000	NR	75-125			
Iron	2020	100	"	2000	42.3	98.9	75-125			
Magnesium	144000	300	"	2000	141000	131	75-125			
Manganese	211	5.00	"	50.0	159	105	75-125			
Potassium	7470	300	"	2000	5340	106	75-125			
Sodium	222000	2500	"	2000	209000	678	75-125			

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Nitrate/Nitrite by EPA 353.2 - Quality Control GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1828704 -										
BLANK (1204173365-BLK)					Prepared: Analyzed: 12/06/2018					
Nitrogen, Nitrate/Nitrite	ND	0.020	mg/L				-			U
LCS (1204173366-BKS)					Prepared: Analyzed: 12/06/2018					
Nitrogen, Nitrate/Nitrite	0.986	0.020	mg/L	1.00		98.6	90-110			
DUP (1204173367 D)					Source: Y812001-01 Prepared: Analyzed: 12/06/2018					
Nitrogen, Nitrate/Nitrite	0.263	0.020	mg/L		0.260		0-20	1.15	20	
PS (1204173369 S)					Source: Y812001-01 Prepared: Analyzed: 12/06/2018					
Nitrogen, Nitrate/Nitrite	1.30	0.020	mg/L	1.00		104	90-110			

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James Hix

Project Number: 018-3312

Project: GWOG - Colorado State #2

Notes and Definitions

Ua Sample is Non-Detect.

U Result not detected above the detection limit

J Greater than the detection limit but less than the reporting 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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