

April 3, 2020

Steve Moskal
BP America Production Company
1199 Main Ave Suite 101
Durango, CO 81301

**RE: Leroy McCaw B#1
March 2020 Monitoring**

Dear Mr. Moskal,

Cottonwood Consulting LLC (Cottonwood) is pleased to provide you with the results of the monitoring conducted on March 17, 2020 at the Leroy McCaw B#1 produced water release site (API#: 05-067-07009; release #: 325804). Details regarding the monitoring and results are summarized below.

Background

A release occurred from a BP America Production Company (BP) water gathering system near the Leroy McCaw B#1 in April 2019. Approximately 8.6 barrels of produced water were released and flowed through a neighboring pasture/field and into a nearby wetland tributary to Salt Creek. Initial soil sampling, water sampling, and field measurements conducted on April 2, 2019 indicated that SAR (sodium adsorption ratio) was elevated above the Colorado Oil & Gas Conservation Commission (COGCC) standard in soil samples collected from the point of release and wetland area immediately downstream from the point of release. Boron was also elevated above the COGCC standard in some samples. Total dissolved solids (TDS) and conductivity were elevated in some of the initial water samples collected adjacent to the release area; however, there is no COGCC standard for surface water. No hydrocarbons were detected in any of the samples. BP received approval to perform quarterly vegetation monitoring, soil sampling, and water sampling to assess conditions within the flow path. Cottonwood was retained to conduct the quarterly monitoring starting in May 2019.

Methodology

Vegetation monitoring was conducted at three established transects located within the release area. A map of the project site with transect locations, soil sample locations, and water sample locations can be found in Figure 1 and specific methodology used by Cottonwood to conduct the vegetation monitoring can be found in Attachment 1.

At the soil sample locations, a decontaminated stainless steel shovel was used to transfer soil into a stainless steel bowl. The soil was mixed thoroughly in the bowl to create a homogeneous sample.

Soil was transferred into one gallon plastic bags, placed in a cooler with ice, and submitted to Green Analytical Laboratories (GAL) for analysis of COGCC Table 910-1 inorganics. Observations regarding the physical characteristics of the soil and sample location were recorded in a field notebook. Cottonwood also collected photographs of the sample locations. Photographs of the soil sample locations and a results table summarizing all soil samples collected at the site can be found in Attachment 2.

Cottonwood also collected one water sample within the wet area adjacent to the point of release. At the sample location, water was transferred into a laboratory-provided sample bottle using a decontaminated bottle. The sample bottle was immediately placed in a cooler with ice and submitted to GAL for analysis of various water quality parameters, including, but not limited to, conductivity, pH, and TDS. Observations regarding the physical characteristics of the water and sample location were recorded in a field notebook. Cottonwood also collected photographs of the sample location. Photographs of the sample location and a results table summarizing all water samples collected at the site can be found in Attachment 3. Analytical lab data for both soil and water sampling can be found in Attachment 4.

Results

Results from the vegetation monitoring are summarized in the vegetation monitoring report (Attachment 1).

SAR was below the COGCC standard in SS11 and SS12.

Conductivity and TDS were elevated in WS05, collected adjacent to the point of release.

Conclusion

Based on vegetation monitoring conducted on March 17, 2020, the vegetation within the flow path on the Leroy McCaw B#1 site is consistent with seasonal conditions and surrounding vegetative conditions. Minimal new seasonal growth was observed along the transect or in surrounding areas.

SAR was below the COGCC standard in both SS11 and SS12. Results indicate that SAR has been below the COGCC standard in the wetland area immediately downstream of the point of release since the first follow-up samples were collected on May 3, 2019. SAR results from the point of release have ranged from 10.7 to 17.2 since beginning sampling on May 3, 2019.

Conductivity and TDS were elevated in WS05, collected adjacent to the point of release; however, there is no COGCC surface water standard with which to compare results.

Future monitoring events will be conducted to evaluate potential changes in vegetative conditions over time. The next monitoring event is scheduled for the second quarter of 2020.

Should you have any questions, please do not hesitate to contact me at 970-764-7356. Cottonwood appreciates the opportunity to provide services to BP.

Sincerely,

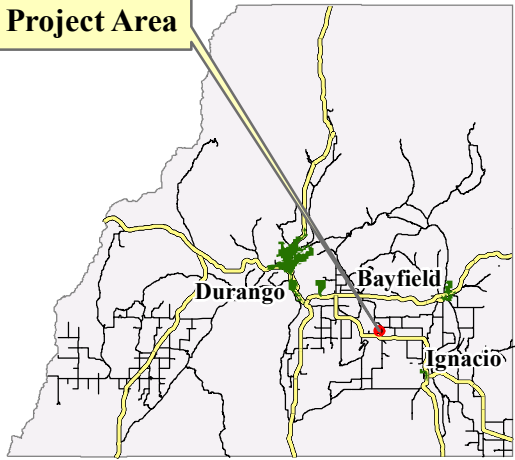


Kyle Siesser, P.G.
Cottonwood Consulting LLC

Attachments: Figure 1 – Project Area
Attachment 1 – Vegetation Monitoring Report
Attachment 2 – Soil Sampling Photo Log and Table
Attachment 3 – Water Sampling Photo Log and Table
Attachment 4 – Analytical Lab Results

FIGURE 1

Project Area



La Plata County, Colorado

WS03/WS04/WS05

SS02/SS05/SS07/SS09/SS11

Transect 1



Transect 2

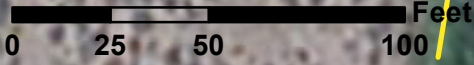


Transect 3








SS03/SS06/SS08/SS10/SS12

Sec 21 T34N R8W



SS01, SS02, SS03, and SS04 collected 4/2/19. WS03, SS05, and SS06 collected 5/3/19. WS04, SS07, and SS08 collected 8/1/19. SS09 and SS10 collected 11/8/19. WS05, SS11, and SS12 collected 3/17/20.

Legend

-  Point of Release
-  Vegetation Transects
-  Water Sample Location
-  Soil Sample Location
-  Wet Area (4/2/2019)



Mapping by: E. Millar, 3/26/2020
 Coordinate System:
 NAD 1983 UTM Zone 13 N

Location: SWNE Sec 21 T34N R8W, NMPM

Leroy McCaw B #1
March 2020 Monitoring
BP America
Production Company

ATTACHMENT 1

**VEGETATION MONITORING
BP AMERICA PRODUCTION CO**

Monitoring Site: **Leroy McCaw B#1 Release**
Lat 37.179638 Long -107.719044
SWNE Sec 21 T34N R8W, NMPM, La Plata County, Colorado
Release Number: 325804

Vegetation monitoring was conducted on March 17, 2020 at the Leroy McCaw B#1 Release site.

Cottonwood staff biologists surveyed three 100-foot transects to assess species presence and general plant vigor. Dominant species in the plant community at this site include cattail (*Typha latifolia*) as well as pinyon pine (*Pinus edulis*), Utah juniper (*Juniperus osteosperma*), big sagebrush (*Artemisia tridentata*), and western wheatgrass (*Pascopyrum smithii*) in adjacent areas. Transect locations, vigor, and species observed are provided in Table 1 and photographs of site location and transects are provided in the Photo Log.

Table 1. March 2020 Vegetation Monitoring Results

Transect	Azimuth	Vigor	Species Observed
1 37.179990/ -107.718436	173°	Grasses- Not stressed Forbs- Moderately stressed Shrubs- NA	Kochia (<i>Bassia scoparia</i>), prostrate knotweed (<i>Polygonum aviculare</i>), narrowleaf plantain (<i>Plantago lanceolata</i>) and an unknown forb.
2 37.179613/ -107.718525	210°	Grasses- Not stressed Forbs- Moderately stressed Shrubs- NA	Cattail, prickly lettuce (<i>Lactuca serriola</i>), bottlebrush squirreltail (<i>Elymus elymoides</i>), western wheatgrass, musk thistle (<i>Carduus nutans</i>), and an unknown forb.
3 37.179187/ -107.718863	191°	Grasses- Not stressed Forbs- Moderately stressed Shrubs- Not stressed	Cattail, yarrow (<i>Achillea millefolium</i>), Kentucky bluegrass (<i>Poa pratensis</i>), Carruth's sagewort (<i>Artemisia carruthii</i>), bottlebrush squirreltail, big sagebrush (<i>Artemisia tridentata</i>).

Results:

Species diversity and abundance were consistent with seasonal conditions. Moderately stressed forbs were observed along all transects, possibly due to early season conditions. Vegetation along Transect 1 shows impacts of grazing and appeared to be consistent with surrounding vegetation that was not impacted during the release. Some lighter soils were observed near Transect 1.



Photo 1: Start of Transect 1, 3/17/2020.



Photo 2: Start of Transect 2, 3/17/2020.



Photo 3: Start of Transect 3, 3/17/2020.

ATTACHMENT 2

Leroy McCaw B#1
Soil Sampling
Photographic Log
BP America Production Co.



Photo 1: SS11 collected from near the point of release, 3/17/2020.



Photo 2: SS12 collected within release area, 3/17/2020.

**Soil Sampling Results
Leroy McCaw B#1
BP America Production Company**

Parameter	SS01	SS02	SS05	SS07	SS09	SS11	COGCC	Units
Sample Date	4/2/2019	4/2/2019	5/3/2019	8/1/2019	11/8/2019	3/17/2020		
Sample Location	Background	Point of Release	Point of Release	Point of Release	Point of Release	Point of Release	Table 910	
Field, PID	1.8	0.8	1.3	-	-	-	NA	ppm
Conductivity	0.254	3.870	1.230	1.770	3.630	0.853	<4 or 2x BG	mmhos/cm
pH	6.66	7.29	7.96	8.17	8.04	8.05	6-9	pH units
SAR	0.39	14.1	10.7	14.0	17.2	11.7	<12	no units
Calcium	35.5	111	22.0	32.3	38.6	24.1	NA	mg/L
Magnesium	6.19	17.9	6.96	5.62	9.44	5.25	NA	mg/L
Sodium	9.46	607	225	327	459	243	NA	mg/L
Arsenic	2.64	4.04	2.72	2.82	2.22	3.35	0.39	mg/kg
Barium	452	275	286	261	309	367	15,000	mg/kg
Cadmium	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	70	mg/kg
Chromium	7.17	6.42	6.58	8.23	18.8	7.99	23	mg/kg
Copper	24.4	22.5	17.9	18.6	19.5	10.9	3,100	mg/kg
Lead	16.1	11.4	10.3	10.1	11.8	<10.0	400	mg/kg
Nickel	10.6	8.96	10.3	9.31	14.1	9.98	1,600	mg/kg
Selenium	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	390	mg/kg
Silver	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	390	mg/kg
Zinc	55.2	50.5	46.8	57.2	53.9	53.6	23,000	mg/kg
Mercury	<0.0496	<0.0553	<0.0480	<0.0426	<0.0428	<0.0475	23	mg/kg
Boron	<1.20	2.18	<1.20	1.28	<1.20	<1.20	2	mg/L
Benzene	<0.050	<0.050	-	-	-	-	0.17	mg/kg
Toluene	<0.050	<0.050	-	-	-	-	85	mg/kg
Ethylbenzene	<0.050	<0.050	-	-	-	-	100	mg/kg
Total Xylenes	<0.150	<0.150	-	-	-	-	175	mg/kg
Total BTEX	<0.300	<0.300	-	-	-	-	NA	mg/kg
TPH (GRO)	<10.0	<10.0	-	-	-	-	NA	mg/kg
TPH (DRO)	<10.0	<10.0	-	-	-	-	NA	mg/kg
TPH (EXT DRO)	<10.0	<10.0	-	-	-	-	NA	mg/kg
Total TPH	<30.0	<30.0	-	-	-	-	500	mg/kg
Naphthalene	<0.014	<0.014	-	-	-	-	23	mg/kg
Acenaphthene	<0.007	<0.007	-	-	-	-	1,000	mg/kg
Fluorene	<0.006	<0.006	-	-	-	-	1,000	mg/kg
Anthracene	<0.008	<0.008	-	-	-	-	1,000	mg/kg
Fluoranthene	<0.006	<0.006	-	-	-	-	1,000	mg/kg
Pyrene	<0.007	<0.007	-	-	-	-	1,000	mg/kg
Benzo(a)anthracene	<0.008	<0.008	-	-	-	-	0.22	mg/kg
Chrysene	<0.010	<0.010	-	-	-	-	22	mg/kg
Benzo(b)fluoranthene	<0.009	<0.009	-	-	-	-	0.22	mg/kg
Benzo(k)fluoranthene	<0.010	<0.010	-	-	-	-	2.2	mg/kg
Benzo(a)pyrene	<0.007	<0.007	-	-	-	-	0.022	mg/kg
Indeno(1,2,3-cd)pyrene	<0.010	<0.010	-	-	-	-	0.22	mg/kg
Dibenz(a,h)anthracene	<0.006	<0.006	-	-	-	-	0.022	mg/kg

Notes: SS01 collected as a background sample. SS02, SS05, SS07, SS09, and SS11 collected from the same sample location near the point of release. SS03, SS06, SS08, SS10, and SS12 collected from the same sample location within the wetland area.

ppm - parts per million

mg/kg - milligrams per kilogram

mg/L - milligrams per liter

mmhos/cm - millihos per centimeter

PID - Photoionization Detector

SAR - Sodium Adsorption Ratio

NA - Not Applicable

"-" - indicates no data

BTEX - Benzene, Toluene, Ethylbenzene, and Total Xylenes

TPH - Total Petroleum Hydrocarbons

GRO - Gasoline Range Organics

DRO - Diesel Range Organics

EXT - Extended

BG - Background

COGCC- Colorado Oil & Gas Conservation Commission

Bold values exceed COGCC Table 910.

**Soil Sampling Results (continued)
Leroy McCaw B#1
BP America Production Company**

Parameter	SS04	SS03	SS06	SS08	SS10	SS12	COGCC	Units
Sample Date	4/2/2019	4/2/2019	5/3/2019	8/1/2019	11/8/2019	3/17/2020	Table 910	
Sample Location	Downstream	Wetland Area	Wetland Area	Wetland Area	Wetland Area	Wetland Area		
Field, PID	0.5	0.6	0.6	-	-	-	NA	ppm
Conductivity	1.000	1.770	2.740	1.210	1.740	1.890	<4 or 2x BG	mmhos/cm
pH	5.50	8.01	6.70	6.89	6.73	6.66	6-9	pH units
SAR	2.80	19.3	9.50	6.03	5.10	6.91	<12	no units
Calcium	74.4	74.7	143	71.6	128	92.1	NA	mg/L
Magnesium	14.6	11.7	21.1	11.8	21.7	16.4	NA	mg/L
Sodium	101	681	460	209	237	274	NA	mg/L
Arsenic	2.48	3.12	1.92	1.82	2.32	2.91	0.39	mg/kg
Barium	251	322	322	254	324	317	15,000	mg/kg
Cadmium	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	70	mg/kg
Chromium	6.25	6.02	6.26	5.17	6.52	7.10	23	mg/kg
Copper	16.8	16.3	14.4	11.7	15.8	6.22	3,100	mg/kg
Lead	11.9	13.2	11.7	10.6	11.8	10.0	400	mg/kg
Nickel	7.95	7.67	7.49	6.65	7.68	7.89	1,600	mg/kg
Selenium	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	390	mg/kg
Silver	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	390	mg/kg
Zinc	51.2	55.6	54.8	53.6	61.0	53.1	23,000	mg/kg
Mercury	<0.0651	<0.0660	<0.0657	<0.0635	<0.0615	<0.0692	23	mg/kg
Boron	<1.20	<1.20	2.21	1.41	1.43	<1.20	2	mg/L
Benzene	<0.050	<0.050	-	-	-	-	0.17	mg/kg
Toluene	<0.050	<0.050	-	-	-	-	85	mg/kg
Ethylbenzene	<0.050	<0.050	-	-	-	-	100	mg/kg
Total Xylenes	<0.150	<0.150	-	-	-	-	175	mg/kg
Total BTEX	<0.300	<0.300	-	-	-	-	NA	mg/kg
TPH (GRO)	<10.0	<10.0	-	-	-	-	NA	mg/kg
TPH (DRO)	<10.0	<10.0	-	-	-	-	NA	mg/kg
TPH (EXT DRO)	<10.0	<10.0	-	-	-	-	NA	mg/kg
Total TPH	<30.0	<30.0	-	-	-	-	500	mg/kg
Naphthalene	<0.014	<0.014	-	-	-	-	23	mg/kg
Acenaphthene	<0.007	<0.007	-	-	-	-	1,000	mg/kg
Fluorene	<0.006	<0.006	-	-	-	-	1,000	mg/kg
Anthracene	<0.008	<0.008	-	-	-	-	1,000	mg/kg
Fluoranthene	<0.006	<0.006	-	-	-	-	1,000	mg/kg
Pyrene	<0.007	<0.007	-	-	-	-	1,000	mg/kg
Benzo(a)anthracene	0.009	<0.008	-	-	-	-	0.22	mg/kg
Chrysene	<0.010	<0.010	-	-	-	-	22	mg/kg
Benzo(b)fluoranthene	<0.009	<0.009	-	-	-	-	0.22	mg/kg
Benzo(k)fluoranthene	<0.010	<0.010	-	-	-	-	2.2	mg/kg
Benzo(a)pyrene	<0.007	<0.007	-	-	-	-	0.022	mg/kg
Indeno(1,2,3-cd)pyrene	<0.010	<0.010	-	-	-	-	0.22	mg/kg
Dibenz(a,h)anthracene	<0.006	<0.006	-	-	-	-	0.022	mg/kg

Notes: SS01 collected as a background sample. SS02, SS05, SS07, SS09, and SS11 collected from the same sample location near the point of release. SS03, SS06, SS08, SS10, and SS12 collected from the same sample location within the wetland area.

ppm - parts per million

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TPH - Total Petroleum Hydrocarbons

GRO - Gasoline Range Organics

DRO - Diesel Range Organics

EXT - Extended

BG - Background

COGCC- Colorado Oil & Gas Conservation Commission

Bold values exceed COGCC Table 910.

ATTACHMENT 3

Leroy McCaw B#1
Water Sampling
Photographic Log
BP America Production Co.



Photo 3: WS05 collected from wet area adjacent to point of release, 3/17/2020.

**Water Sampling Results
Leroy McCaw B#1
BP America Production Company**

Parameter	WS01	WS02	WS03	WS04	WS05	
Sample Date	4/2/19	4/2/19	5/3/19	8/1/19	3/17/2020	
Sample Location	Release Area	Downstream	Adjacent Wetland	Adjacent Wetland	Adjacent Wetland	Units
Alkalinity, Bicarbonate	1,880	59.0	314	78.0	387	mg/L
Alkalinity, Carbonate	100	<10.0	<10.0	<10.0	<10.0	mg/L
Alkalinity, Total	1,980	59.0	314	78.0	387	mg/L
Chloride	771	161	48.2	2.81	217	mg/L
Conductivity	5,530	831	888	181	1,840	uS/cm
pH	7.79	6.66	7.93	7.42	7.46	pH Units
Resistivity	181	1,200	1,130	5,530	545	ohm/cm
TDS	3,250	470	510	155	1,010	mg/L
Sulfate	<4.00	62.6	64.9	6.01	118	mg/L
Hardness	51.4	182	200	74.7	325	mg/L
Barium	2.93	0.209	0.146	0.093	0.216	mg/L
Calcium	14.7	55.5	58.2	22.9	99.6	mg/L
Dissolved Iron	<0.250	<0.250	0.170	0.092	<0.100	mg/L
Total Iron	4.90	3.14	0.315	0.994	0.276	mg/L
Magnesium	3.54	10.4	13.3	4.27	18.5	mg/L
Manganese	0.340	0.163	0.101	0.045	<0.040	mg/L
Potassium	7.02	<5.00	4.76	3.26	3.49	mg/L
Sodium	1,290	93.3	117	13.8	228	mg/L
Strontium	2.32	0.683	1.04	0.290	1.65	mg/L
Benzene	<0.001	<0.001	-	-	-	mg/L
Toluene	<0.001	<0.001	-	-	-	mg/L
Ethylbenzene	<0.001	<0.001	-	-	-	mg/L
Total Xylenes	<0.003	<0.003	-	-	-	mg/L
Total BTEX	<0.006	<0.006	-	-	-	mg/L
TPH (GRO)	<1.00	<1.00	-	-	-	mg/L
TPH (DRO)	<1.00	<1.00	-	-	-	mg/L
TPH (EXT DRO)	<1.00	<1.00	-	-	-	mg/L

Notes: WS03, WS04, and WS05 collected from the same sample location within the wetland adjacent to the point of release.

mg/L - milligrams per liter

uS/cm - microsiemens per centimeter

ohm/cm - ohms per centimeter

TDS - Total Dissolved Solids

BTEX - Benzene, Toluene, Ethylbenzene, Total Xylenes

TPH - Total Petroleum Hydrocarbons

GRO - Gasoline Range Organics

DRO - Diesel Range Organics

EXT - Extended

"-" - indicates no data

ATTACHMENT 4



75 Suttle Street
Durango, CO 81303
970.247.4220 Phone
970.247.4227 Fax
www.greenanalytical.com

01 April 2020

Steve Moskal

BP America

1199 Main Ave Suite 101

Durango, CO 81303

RE: API Water, Table 910 Soil Inorganics

Enclosed are the results of analyses for samples received by the laboratory on 03/17/20 13:44. This data replaces the previous report (See case narrative). If you need any further assistance, please feel free to contact me.

Sincerely,

A handwritten signature in black ink that reads "Debbie Zufelt". The signature is written in a cursive, flowing style.

Debbie Zufelt

Reports Manager

All accredited analytes contained in this report are denoted by an asterisk (*). For a complete list of accredited analytes please do not hesitate to contact us via any of the contact information contained in this report. All of our certifications can be viewed at

<http://greenanalytical.com/certifications/>

Green Analytical Laboratories is NELAP accredited through the Texas Commission on Environmental Quality. Accreditation applies to drinking water and non-potable water matrices for trace metals and a variety of inorganic parameters. Green Analytical Laboratories is also accredited through the Colorado Department of Public Health and Environment and EPA region 8 for trace metals, Cyanide, Fluoride, Nitrate, and Nitrite in drinking water.

Our affiliate laboratory, Cardinal Laboratories, is also NELAP accredited through the Texas Commission on Environmental Quality for a variety of organic constituents in drinking water, non-potable water and solid matrices. Cardinal is also accredited for regulated VOCs, TTHM, and HAA-5 in drinking water through the Colorado Department of Public Health and Environment and EPA region 8.



BP America
1199 Main Ave Suite 101
Durango CO, 81303

Project: API Water, Table 910 Soil Inorganics
Project Name / Number: Leroy McCaw B#1
Project Manager: Steve Moskal

Reported:
04/01/20 12:42

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received	Notes
SS11	2003118-01	Solid	03/17/20 12:20	03/17/20 13:44	
SS12	2003118-02	Solid	03/17/20 12:35	03/17/20 13:44	
WS05	2003118-03	Water	03/17/20 12:40	03/17/20 13:44	

Green Analytical Laboratories

Debbie Zufelt, Reports Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety. In no event shall Green Analytical Laboratories be liable for incidental or consequential damages. GALs liability, and clients exclusive remedy for any claim arising, shall be limited to the amount paid by client for analyses. All claims, including those for negligence and any other cause whatsoever, shall be deemed waived unless made in writing and received within thirty days after completion of the applicable service.



BP America
1199 Main Ave Suite 101
Durango CO, 81303

Project: API Water, Table 910 Soil Inorganics
Project Name / Number: Leroy McCaw B#1
Project Manager: Steve Moskal

Reported:
04/01/20 12:42

Originally API metals were logged in as Potentially Dissolved in error. Dissolved metals were analyzed and reported herein. This RE report is revised and replaces the original report dated 03/30/20.

Green Analytical Laboratories

A handwritten signature in black ink that reads 'Debbie Zufelt'.

Debbie Zufelt, Reports Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety. In no event shall Green Analytical Laboratories be liable for incidental or consequential damages. GALs liability, and clients exclusive remedy for any claim arising, shall be limited to the amount paid by client for analyses. All claims, including those for negligence and any other cause whatsoever, shall be deemed waived unless made in writing and received within thirty days after completion of the applicable service.



BP America 1199 Main Ave Suite 101 Durango CO, 81303	Project: API Water, Table 910 Soil Inorganics Project Name / Number: Leroy McCaw B#1 Project Manager: Steve Moskal	Reported: 04/01/20 12:42
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SS11

2003118-01 (Soil)

Analyte	Result	RL	MDL	Units	Dilution	Analyzed	Method	Notes	Analyst
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General Chemistry

% Dry Solids	84.2			%	1	03/18/20 16:15	EPA160.3/1684		VJW
Saturated Paste Extraction									
Calcium	24.1	0.100	0.017	mg/L	1	03/27/20 15:17	EPA200.7		AES
Conductivity	853			umho/cm @ 25.0°C	1	03/26/20 10:45	ASA#9 10-3.3		VJW
Magnesium	5.25	0.100	0.023	mg/L	1	03/27/20 15:17	EPA200.7		AES
pH	8.05			pH Units	1	03/25/20 13:05	ASA#9 12-2.6		VJW
SAR	11.7			No Unit	1	03/27/20 15:17	Calculation		AES
Sodium	243	1.00	0.101	mg/L	1	03/27/20 15:17	EPA200.7		AES

Total Metals by ICP

Barium	367	5.00	0.318	mg/kg dry	100	03/25/20 11:05	6010B		AES
Cadmium	<5.00	5.00	0.310	mg/kg dry	100	03/25/20 11:05	6010B		AES
Chromium	7.99	5.00	0.416	mg/kg dry	100	03/25/20 11:05	6010B		AES
Copper	10.9	5.00	1.40	mg/kg dry	100	03/25/20 11:05	6010B		AES
Lead	<10.0	10.0	0.661	mg/kg dry	100	03/25/20 11:05	6010B		AES
Nickel	9.98	5.00	0.507	mg/kg dry	100	03/25/20 11:05	6010B		AES
Selenium	<20.0	20.0	7.60	mg/kg dry	100	03/25/20 11:04	6010B		AES
Silver	<1.00	1.00	0.390	mg/kg dry	100	03/25/20 11:05	6010B		AES
Zinc	53.6	10.0	2.60	mg/kg dry	100	03/25/20 11:05	6010B		AES

Total Metals by ICPMS

Arsenic	3.35	1.00	0.0807	mg/kg dry	1000	03/25/20 15:28	6020A		AES
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Total Mercury by CVAA

Mercury	<0.0475	0.0475	0.0082	mg/kg dry	200	03/23/20 10:52	EPA7471		LLG
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Hot Water Extractable

Boron	<1.20	1.20	0.059	mg/L	4	03/27/20 14:46	EPA200.7		AES
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Cation/Anion Balance	100.
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SS12

2003118-02 (Soil)

Analyte	Result	RL	MDL	Units	Dilution	Analyzed	Method	Notes	Analyst
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General Chemistry

% Dry Solids	57.8			%	1	03/18/20 16:15	EPA160.3/1684		VJW
Saturated Paste Extraction									
Calcium	92.1	0.200	0.033	mg/L	2	03/27/20 15:21	EPA200.7		AES
Conductivity	1890			umho/cm @ 25.0°C	1	03/26/20 10:45	ASA#9 10-3.3		VJW
Magnesium	16.4	0.200	0.047	mg/L	2	03/27/20 15:21	EPA200.7		AES
pH	6.66			pH Units	1	03/25/20 13:05	ASA#9 12-2.6		VJW
SAR	6.91			No Unit	1	03/27/20 15:21	Calculation		AES
Sodium	274	2.00	0.201	mg/L	2	03/27/20 15:21	EPA200.7		AES

Total Metals by ICP

Barium	317	5.00	0.318	mg/kg dry	100	03/25/20 11:09	6010B		AES
Cadmium	<5.00	5.00	0.310	mg/kg dry	100	03/25/20 11:09	6010B		AES
Chromium	7.10	5.00	0.416	mg/kg dry	100	03/25/20 11:09	6010B		AES
Copper	6.22	5.00	1.40	mg/kg dry	100	03/25/20 11:09	6010B		AES
Lead	10.0	10.0	0.661	mg/kg dry	100	03/25/20 11:09	6010B		AES
Nickel	7.89	5.00	0.507	mg/kg dry	100	03/25/20 11:09	6010B		AES
Selenium	<20.0	20.0	7.60	mg/kg dry	100	03/25/20 11:09	6010B		AES
Silver	<1.00	1.00	0.390	mg/kg dry	100	03/25/20 11:09	6010B		AES
Zinc	53.1	10.0	2.60	mg/kg dry	100	03/25/20 11:09	6010B		AES

Total Metals by ICPMS

Arsenic	2.91	1.00	0.0807	mg/kg dry	1000	03/25/20 15:39	6020A		AES
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Total Mercury by CVAA

Mercury	<0.0692	0.0692	0.0119	mg/kg dry	200	03/23/20 10:52	EPA7471		LLG
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Hot Water Extractable

Boron	<1.20	1.20	0.059	mg/L	4	03/27/20 14:55	EPA200.7		AES
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Cation/Anion Balance	100.
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WS05

2003118-03 (Surface Water)

Analyte	Result	RL	MDL	Units	Dilution	Analyzed	Method	Notes	Analyst
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General Chemistry

Alkalinity, Bicarbonate as CaCO3*	387	10.0		mg/L	1	03/20/20 15:00	2320 B		VJW
Alkalinity, Carbonate as CaCO3*	<10.0	10.0		mg/L	1	03/20/20 15:00	2320 B		VJW
Alkalinity, Hydroxide as CaCO3*	<10.0	10.0		mg/L	1	03/20/20 15:00	2320 B		VJW
Alkalinity, Total as CaCO3*	387	10.0	7.16	mg/L	1	03/20/20 15:00	2320 B		VJW
Chloride*	217	25.0	2.21	mg/L	25	03/20/20 13:29	EPA300.0		AES
Conductivity*	1840	10.0		umho/cm @ 25.0°C	1	03/19/20 08:45	2510 B		FGH
pH*	7.46			pH Units	1	03/19/20 08:45	EPA150.1		FGH
Resistivity	545			ohm/cm	1	03/19/20 08:45	2510 B		FGH
Total Dissolved Solids*	1010	10.0		mg/L	1	03/18/20 10:45	EPA160.1		VJW
Specific Gravity	1.000	0.8000		No Unit	1	03/18/20 11:25	ASTM D1429-03		VJW
Sulfate*	118	25.0	3.81	mg/L	25	03/20/20 13:29	EPA300.0		AES

Total Recoverable Metals by ICP (E200.7)

Iron*	0.276	0.100	0.068	mg/L	2	03/31/20 15:34	EPA200.7		AES
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Dissolved Metals by ICP

Barium*	0.216	0.040	0.003	mg/L	2	03/31/20 15:52	EPA200.7		AES
Calcium*	99.6	0.200	0.033	mg/L	2	03/31/20 15:51	EPA200.7		AES
Hardness as CaCO3	325	1.32	0.276	mg/L	2	03/31/20 15:52	2340 B		AES
Iron*	<0.100	0.100	0.037	mg/L	2	03/31/20 15:52	EPA200.7		AES
Lead*	<0.200	0.200	0.010	mg/L	2	03/31/20 15:52	EPA200.7		AES
Magnesium*	18.5	0.200	0.047	mg/L	2	03/31/20 15:52	EPA200.7		AES
Manganese*	<0.040	0.040	0.003	mg/L	2	03/31/20 15:52	EPA200.7		AES
Potassium*	3.49	2.00	0.260	mg/L	2	03/31/20 15:52	EPA200.7		AES
Silicon	3.36	1.00	0.033	mg/L	2	03/31/20 15:52	EPA200.7		AES
Sodium*	228	2.00	0.201	mg/L	2	03/31/20 15:51	EPA200.7		AES
Strontium*	1.65	0.200	0.008	mg/L	2	03/31/20 15:51	EPA200.7		AES
Zinc*	<0.200	0.200	0.006	mg/L	2	03/31/20 15:52	EPA200.7		AES

Cation/Anion Balance .57

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General Chemistry - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B200419 - General Prep - Wet Chem

Blank (B200419-BLK1)		Prepared & Analyzed: 03/18/20								
Total Dissolved Solids	ND	10.0	mg/L							
Duplicate (B200419-DUP1)		Source: 2003083-01 Prepared & Analyzed: 03/18/20								
Total Dissolved Solids	430	10.0	mg/L		425			1.18	20	
Reference (B200419-SRM1)		Prepared & Analyzed: 03/18/20								
Total Dissolved Solids	575	10.0	mg/L	600		95.8	85-115			

Batch B200420 - General Prep - Wet Chem

Duplicate (B200420-DUP1)		Source: 2003118-01 Prepared & Analyzed: 03/18/20								
% Dry Solids	85.2		%		84.2			1.24	20	

Batch B200421 - General Prep - Wet Chem

Duplicate (B200421-DUP1)		Source: 2003118-03 Prepared & Analyzed: 03/18/20								
Specific Gravity	0.9950	0.8000	No Unit		1.000			0.501	20	

Batch B200438 - General Prep - Wet Chem

Blank (B200438-BLK1)		Prepared & Analyzed: 03/20/20								
Chloride	ND	1.00	mg/L							
Sulfate	ND	1.00	mg/L							
LCS (B200438-BS1)		Prepared & Analyzed: 03/20/20								
Chloride	23.7	1.00	mg/L	25.0		94.9	90-110			
Sulfate	23.8	1.00	mg/L	25.0		95.3	90-110			
LCS Dup (B200438-BSD1)		Prepared & Analyzed: 03/20/20								
Chloride	24.0	1.00	mg/L	25.0		96.0	90-110	1.17	20	
Sulfate	24.1	1.00	mg/L	25.0		96.6	90-110	1.30	20	

Batch B200445 - General Prep - Wet Chem

Duplicate (B200445-DUP1)		Source: 2003121-01 Prepared & Analyzed: 03/19/20								
pH	7.04		pH Units		7.02			0.284	20	
Reference (B200445-SRM1)		Prepared & Analyzed: 03/19/20								
pH	7.02		pH Units	7.00		100	98.5-101.4			

Batch B200447 - General Prep - Wet Chem

Duplicate (B200447-DUP1)		Source: 2003121-01 Prepared & Analyzed: 03/19/20								
Conductivity	434	10.0	umho/cm @ 25.0°C		443			2.05	20	
Reference (B200447-SRM1)		Prepared & Analyzed: 03/19/20								
Conductivity	484	10.0	umho/cm @ 25.0°C	491		98.6	90-110.1			

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**General Chemistry - Quality Control
(Continued)**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B200448 - General Prep - Wet Chem										
Blank (B200448-BLK1) Prepared & Analyzed: 03/20/20										
Alkalinity, Total as CaCO3	ND	10.0	mg/L							
LCS (B200448-BS1) Prepared & Analyzed: 03/20/20										
Alkalinity, Total as CaCO3	102	10.0	mg/L	100		102	85-115			
LCS Dup (B200448-BSD1) Prepared & Analyzed: 03/20/20										
Alkalinity, Total as CaCO3	104	10.0	mg/L	100		104	85-115	1.94	20	

Saturated Paste Extraction - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B200471 - Paste Extract										
Blank (B200471-BLK1) Prepared: 03/24/20 Analyzed: 03/27/20										
Calcium	ND	0.100	mg/L							
Magnesium	ND	0.100	mg/L							
Sodium	ND	1.00	mg/L							
Duplicate (B200471-DUP1) Source: 2003119-01 Prepared: 03/24/20 Analyzed: 03/27/20										
Calcium	38.8	0.500	mg/L		37.8			2.79	20	
Magnesium	8.78	0.500	mg/L		8.57			2.43	20	
SAR	36.4		No Unit		37.4			2.71	20	
Sodium	965	5.00	mg/L		979			1.42	20	
Batch B200472 - Paste Extract										
Duplicate (B200472-DUP1) Source: 2003119-01 Prepared: 03/24/20 Analyzed: 03/26/20										
Conductivity	4650		umho/cm @ 25.0°C		4890			5.03	20	
Batch B200473 - Paste Extract										
Duplicate (B200473-DUP1) Source: 2003119-01 Prepared: 03/24/20 Analyzed: 03/25/20										
pH	8.25		pH Units		8.29			0.484	20	

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Total Metals by ICP - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B200460 - EPA 3050

Blank (B200460-BLK1)

Prepared: 03/24/20 Analyzed: 03/25/20

Barium	ND	5.00	mg/kg dry							
Cadmium	ND	5.00	mg/kg dry							
Chromium	ND	5.00	mg/kg dry							
Copper	ND	5.00	mg/kg dry							
Lead	ND	10.0	mg/kg dry							
Nickel	ND	5.00	mg/kg dry							
Selenium	ND	20.0	mg/kg dry							
Silver	ND	1.00	mg/kg dry							
Zinc	ND	10.0	mg/kg dry							

LCS (B200460-BS1)

Prepared: 03/24/20 Analyzed: 03/25/20

Barium	199	5.00	mg/kg dry	200		99.7	80-120			
Cadmium	181	5.00	mg/kg dry	200		90.3	80-120			
Chromium	196	5.00	mg/kg dry	200		97.8	80-120			
Copper	408	5.00	mg/kg dry	400		102	80-120			
Lead	189	10.0	mg/kg dry	200		94.6	80-120			
Nickel	187	5.00	mg/kg dry	200		93.7	80-120			
Selenium	806	20.0	mg/kg dry	800		101	80-120			
Silver	10.3	1.00	mg/kg dry	10.0		103	80-120			
Zinc	178	10.0	mg/kg dry	200		89.0	80-120			

LCS Dup (B200460-BSD1)

Prepared: 03/24/20 Analyzed: 03/25/20

Barium	200	5.00	mg/kg dry	200		99.8	80-120	0.0698	20	
Cadmium	180	5.00	mg/kg dry	200		90.2	80-120	0.0584	20	
Chromium	196	5.00	mg/kg dry	200		97.8	80-120	0.00439	20	
Copper	410	5.00	mg/kg dry	400		103	80-120	0.703	20	
Lead	188	10.0	mg/kg dry	200		94.1	80-120	0.496	20	
Nickel	184	5.00	mg/kg dry	200		92.1	80-120	1.70	20	
Selenium	809	20.0	mg/kg dry	800		101	80-120	0.464	20	
Silver	10.2	1.00	mg/kg dry	10.0		102	80-120	0.693	20	
Zinc	176	10.0	mg/kg dry	200		88.1	80-120	0.977	20	

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Total Recoverable Metals by ICP (E200.7) - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B200506 - Total Rec. 200.7/200.8/200.2										
Blank (B200506-BLK1)				Prepared & Analyzed: 03/31/20						
Iron	ND	0.050	mg/L							
LCS (B200506-BS1)				Prepared & Analyzed: 03/31/20						
Iron	3.85	0.050	mg/L	4.00		96.2	85-115			
LCS Dup (B200506-BSD1)				Prepared & Analyzed: 03/31/20						
Iron	3.79	0.050	mg/L	4.00		94.7	85-115	1.56	20	

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Dissolved Metals by ICP - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B200513 - Diss. 200.7/200.8

Blank (B200513-BLK1)

Prepared & Analyzed: 03/31/20

Barium	ND	0.020	mg/L							
Calcium	ND	0.100	mg/L							
Iron	ND	0.050	mg/L							
Lead	ND	0.100	mg/L							
Magnesium	ND	0.100	mg/L							
Manganese	ND	0.020	mg/L							
Potassium	ND	1.00	mg/L							
Silicon	ND	0.500	mg/L							
Sodium	ND	1.00	mg/L							
Strontium	ND	0.100	mg/L							
Zinc	ND	0.100	mg/L							

LCS (B200513-BS1)

Prepared & Analyzed: 03/31/20

Barium	2.28	0.020	mg/L	2.50		91.1	85-115			
Calcium	4.66	0.100	mg/L	5.00		93.2	85-115			
Iron	4.53	0.050	mg/L	5.00		90.6	85-115			
Lead	2.26	0.100	mg/L	2.50		90.5	85-115			
Magnesium	24.2	0.100	mg/L	25.0		96.6	85-115			
Manganese	2.27	0.020	mg/L	2.50		90.7	85-115			
Potassium	9.75	1.00	mg/L	10.0		97.5	85-115			
Silicon	4.71	0.500	mg/L	5.00		94.1	85-115			
Sodium	3.86	1.00	mg/L	4.05		95.4	85-115			
Strontium	4.63	0.100	mg/L	5.00		92.7	85-115			
Zinc	2.19	0.100	mg/L	2.50		87.5	85-115			

LCS Dup (B200513-BSD1)

Prepared & Analyzed: 03/31/20

Barium	2.34	0.020	mg/L	2.50	93.7	85-115	2.79	20		
Calcium	4.75	0.100	mg/L	5.00	95.0	85-115	1.93	20		
Iron	4.63	0.050	mg/L	5.00	92.6	85-115	2.22	20		
Lead	2.34	0.100	mg/L	2.50	93.4	85-115	3.11	20		
Magnesium	24.6	0.100	mg/L	25.0	98.3	85-115	1.68	20		
Manganese	2.33	0.020	mg/L	2.50	93.1	85-115	2.68	20		
Potassium	9.98	1.00	mg/L	10.0	99.8	85-115	2.40	20		
Silicon	4.76	0.500	mg/L	5.00	95.1	85-115	1.03	20		
Sodium	3.95	1.00	mg/L	4.05	97.6	85-115	2.30	20		
Strontium	4.75	0.100	mg/L	5.00	94.9	85-115	2.42	20		
Zinc	2.25	0.100	mg/L	2.50	90.2	85-115	2.97	20		

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Total Metals by ICPMS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B200461 - EPA 3050M										
Blank (B200461-BLK1) Prepared: 03/24/20 Analyzed: 03/25/20										
Arsenic	ND	0.100	mg/kg dry							
LCS (B200461-BS1) Prepared: 03/24/20 Analyzed: 03/25/20										
Arsenic	5.32	0.100	mg/kg dry	5.00		106	80-120			
LCS Dup (B200461-BSD1) Prepared: 03/24/20 Analyzed: 03/25/20										
Arsenic	5.28	0.100	mg/kg dry	5.00		106	80-120	0.884	20	

Total Mercury by CVAA - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B200429 - EPA 7471										
Blank (B200429-BLK1) Prepared: 03/19/20 Analyzed: 03/23/20										
Mercury	ND	0.0002	mg/kg wet							
LCS (B200429-BS1) Prepared: 03/19/20 Analyzed: 03/23/20										
Mercury	0.0053	0.0002	mg/kg wet	0.00500		106	85-115			
LCS Dup (B200429-BSD1) Prepared: 03/19/20 Analyzed: 03/23/20										
Mercury	0.0052	0.0002	mg/kg wet	0.00500		105	85-115	0.760	20	

Hot Water Extractable - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B200481 - Hot Water Soluble Metals Extract										
Blank (B200481-BLK1) Prepared: 03/26/20 Analyzed: 03/27/20										
Boron	ND	1.20	mg/L							
Duplicate (B200481-DUP1) Source: 2003118-01 Prepared: 03/26/20 Analyzed: 03/27/20										
Boron	0.701	1.20	mg/L		0.784			11.2	200	

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BP America 1199 Main Ave Suite 101 Durango CO, 81303	Project: API Water, Table 910 Soil Inorganics Project Name / Number: Leroy McCaw B#1 Project Manager: Steve Moskal	Reported: 04/01/20 12:42
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Notes and Definitions

- DET Analyte DETECTED
- ND Analyte NOT DETECTED at or above the reporting limit
- NR Not Reported
- dry Sample results reported on a dry weight basis
*Results reported on as received basis unless designated as dry.
- RPD Relative Percent Difference
- LCS Laboratory Control Sample (Blank Spike)
- RL Report Limit
- MDL Method Detection Limit

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Debbie Zufelt, Reports Manager

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