June 15, 2016

Mr. Scott Yount
BNN Western, LLC
4992 SW Buffalo Road
Towanda, KS 67144

RE: Produced Water Spill Environmental Oversight and Confirmation Soil Samples Weld County, Colorado - Olsson Project #016-1299

Dear Mr. Yount,

BNN Western, LLC (BNN) retained Olsson Associates (Olsson) to perform environmental oversight of surficial soil excavation and collect confirmation soil samples for the Colorado Oil and Gas Conservation Commission (COGCC) Table 910-1 soil parameters at the Razor 26J-2633L water handling facility (Site). A produced water spill occurred at the facility on May 25, 2016. This letter summarizes the project activities and confirmation soil sample analytical results. The produced water spill was reported to the COGCC on an initial Form 19 dated May 27, 2016. **Figure 1** shows the General Site Location, and **Figure 2** presents the Site Map included in **Attachment A**.

Site Location and Description
The Site is located in the northwest quarter of the southeast quarter in Section 26, Township 10 North, Range 58 West, of the Sixth Principal Meridian, with the approximate center point coordinates (40.808724 N; -103.831993 W). More generally the Site is located approximately 14 miles north of the town of New Raymer, Colorado and approximately three miles northeast of the intersection Weld County Road (WCR) 127 and WCR 110.

The water handling Site consists of a pump building, trucking loading/unloading facilities, a produced water storage tank battery containing (12) 400-barrel (bbl) capacity aboveground storage tanks (ASTs) and two 750-bbl capacity gun barrel separators, a filtered water tank battery with (12) 400-bbl capacity, two 400-bbl capacity condensate storage tanks. The surface ownership is fee land located within the Timbro Ranch and Cattle Company, LLC. There are multiple exploration and production oil and gas well pads operated by Whiting Petroleum in the vicinity of the Site. The Site handling facility stores filtered produced water for use in field hydraulic fracturing of oilfield production wells. Produced water is disposed at the Razor 26J-2633L saltwater disposal (SWD) well that is located on an adjacent well pad.

A broken pipe fitting inside the pump building resulted in the loss of approximately 100 bbls of filtered produced water on May 25, 2016. Some of the produced water exited the building through the doorways and was absorbed in the soils adjacent to the pump building. The majority of the produced water spill followed topography and ran to the south of the pump building. The spill area was irregular shaped and ran towards a stormwater ditch on the south-southeast side of the Site as shown in **Figure 2.** The Site map shows the extent of the produced water spill and the background and confirmation soil sample locations.

Excavation Oversight
M&E Trucking, LLC (M&E) of Greeley, Colorado conducted excavation activities on June 1, 2016. Olsson personnel performed environmental oversight to document the excavation activities and to collect confirmation soil samples following excavation of the upper two to four inches of soil across the produced water spill area. Underground utility locates had been performed and the locations of buried pipelines, electrical lines, and communications cables were marked with spray paint and pin flags prior to initiating excavation activities.

M&E personnel marked the extent of the produced water spill using spray paint and white pin flags to denote the boundaries of the excavation area. Olsson personnel used a Trimble GX 7 Series global positioning system (GPS) unit to map the boundaries of the produced water spill and record the locations of the confirmation soil samples and background soil samples at the Site. Olsson personnel took photographs of the produced water spill area and cleanup activities. M&E personnel constructed plastic lined containment cells on the west side of the Site to store the excavated soils pending disposal at the Waste Management (WM) North Weld County Landfill located near the town of Ault, Colorado.

Soil Sampling Activities
Olsson personnel collected confirmation soil samples following the completion of excavation activities. Soil samples were collected using a “sharp shooter” shovel from the surface to approximately three inches below the surface. Olsson personnel used disposal nitrile gloves to collect representative discrete soil samples. The soil samples were placed into clean, laboratory-provided, wide-mouthed glass sampling jars consisting of one 4-ounce jar and one 16-ounce jar. The confirmation samples were labeled with the sample Identification number, client’s name, the date and time the sample was collected, the requested analytical parameters, and the sampler’s signature. The samples were stored in plastic coolers on ice pending delivery to the laboratory for analysis following chain-of-custody protocols.

The samples were submitted to SGS Accutest in Wheat Ridge, Colorado for analysis of pH, electrical conductance (EC), and sodium adsorption ratio (SAR), per the COGCC Table 910-1 soil parameters, to assess salt impacts within the produced water spill area. Olsson also collected two background soil samples from offsite areas north and south of the Site to assess for site-specific background conditions for these same parameters and to compare with the confirmation soil sample results collected within the produced water spill area on the Site.

Soil Analytical Results and Background Soil Conditions
The confirmation and background soil samples were submitted for analysis of pH by Method SW846/9045D, electrical conductance using Method SM2540G-2011M, and SAR by Method USDA Handbook 60. The results are summarized in **Table 1** in **Attachment A** and are compared to the COGCC Table 910-1 levels for pH, EC, and SAR. Site photographs showing the extent of the spill area and the excavation activities are in **Attachment B**.

The results show that confirmation soil samples met the Table 910-l soil parameter levels. The pH results were all between 6 and 9 standard units (s.u.). The EC results are elevated above background levels, but were less than 4 micromohs per centimeter (mmohs/cm). The results for EC are slightly elevated above background; however, the background soil samples were representative of topsoil and the confirmation soil samples represent subsoil conditions

following grading of the Site prior to construction. The results for SAR are all less than 12 as shown in **Table 1**. A copy of the laboratory report is presented as **Attachment C**.

According to Table 9 – Physical and Chemical Properties of Soils in the USDA Soil Survey of Northern Weld County, the soils at the site consist of the Thedalund – Keota loams (Unit #67). The pH for these soils ranges from 7.4 s.u. to 8.4 s.u. in the surficial soil layer. The salinity for the interval from 0 to 3 inches in depth for both soil types is listed as being less than 2 mmohs/cm. However, the salinity for the Thedalund loam from 3-inches to 24-inches is reported as less than 8 mmhos/cm, and the pH range is from 7.4 s.u. to 9.0 s.u. The Theduland loam soil formed in calcareous residuum derived from fine-grained sandstone, shale, and siltstone bedrock of the Tertiary-age White River Group.

The soil is calcareous throughout. The topsoil was removed during the construction of the Site, and stockpiled adjacent to the Site. Therefore, the upper soil interval on Site impacted by the produced water spill may be more representative of the subsoil conditions and have higher pH and electrical conductance due to natural conditions. This may be a consideration when the Site is at its end of production life and the Site is ready to be reclaimed.

Conclusion

No further action appears warranted at this time based on a comparison of the confirmation soil sample results with the COGCC Table 910-1 levels and the site specific background soil results. The results for pH, EC, and SAR met the Table 910-1 levels. The EC levels are elevated as compared to the background soil samples; however, the background samples were collected from areas with topsoil and the confirmation soil samples from subsoil on the Site. The salinity of the subsoil may be higher than the topsoil according to data in the Soil Survey of Northern Weld County.

Olsson Associates appreciates the opportunity to participate in this project on behalf of BNN Western, LLC. If you have questions or require further information, please call us at 303.237.2072.

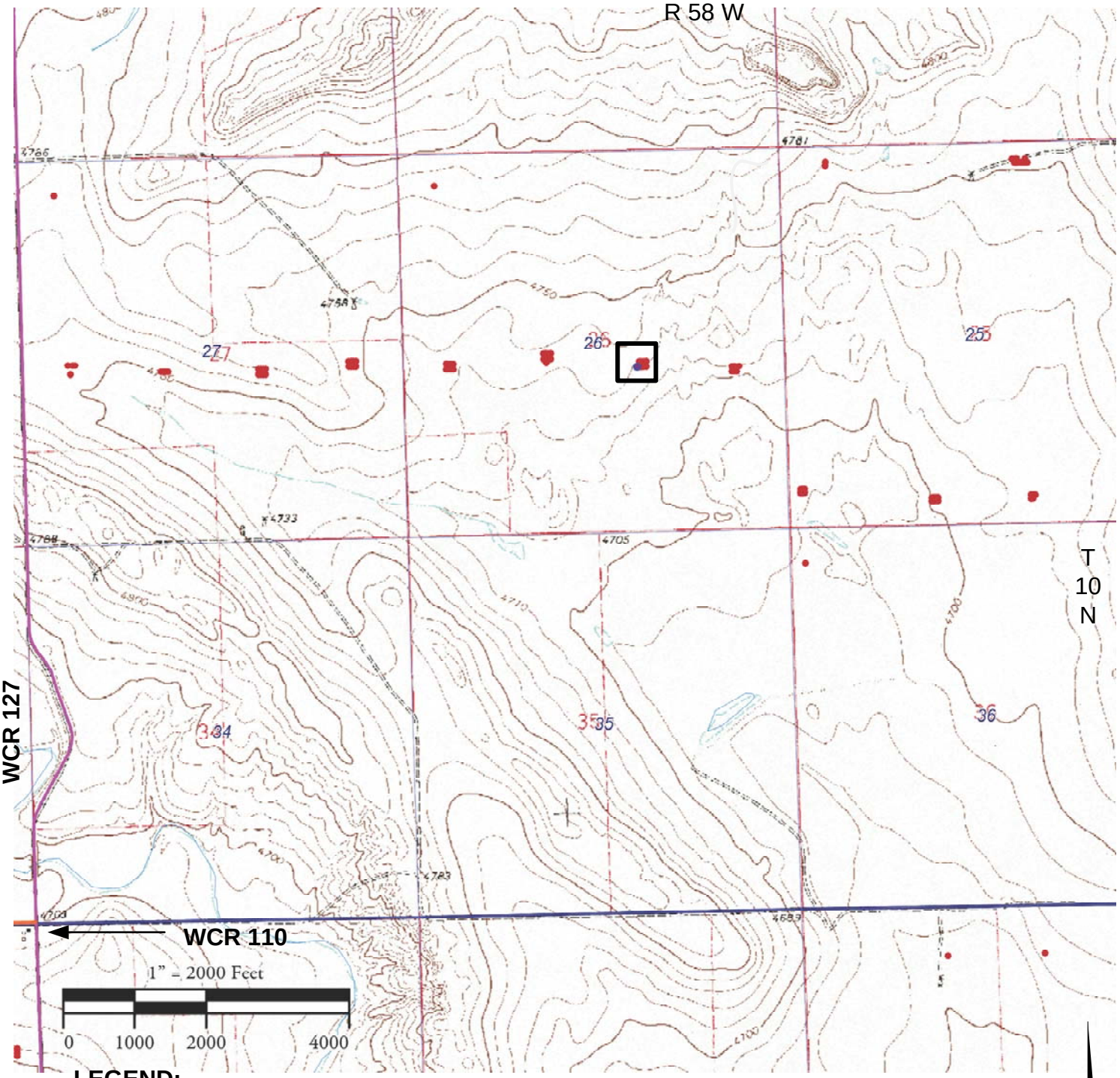
Sincerely,

Olsson Associates, Inc.

James W. Hix
Senior Geologist

Dana Mack
Team Leader

ATTACHMENT A
FIGURES AND TABLE



LEGEND:

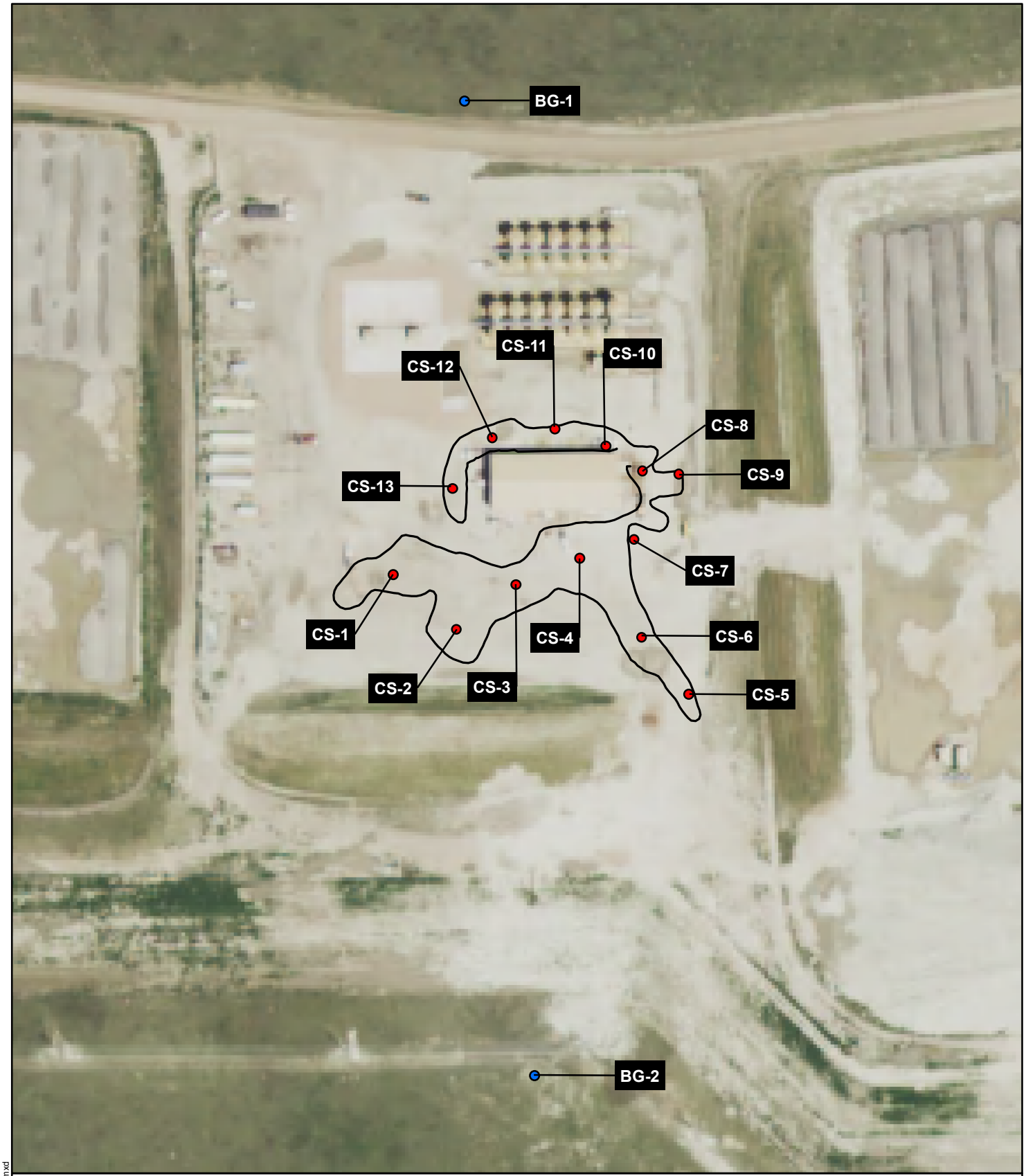
Site Location

Oil and Gas Well Location

WCR 127 Weld County Road

Source: COGCC GIS
USGS 7.5-minute
topographic map
Gatehook Spring, Colo.
1977

PROJECT NO: 016-1299	**GENERAL SITE LOCATION MAP** **BNN Western Razor 26J SWD** **Produced Water Spill Response** **Weld County, Colorado**	OLSSON ASSOCIATES	4690 Table Mountain Dr. #200 Golden, CO 80403 TEL 303.237.2072 FAX 303.237-2659	FIGURE
DRAWN BY: JWH				1
DATE: 06/14/2016				



Confirmation Soil Sample
Background Sample
Extent of Water Spill

0 65 130 Feet

N

Project Number: 016-1299	**Site Map** BNN Western, LLC Razor 26 SWD Produced Water Spill Weld County, Colorado	OLSSON ASSOCIATES	4690 Table Mountain Drive Suite 200 Golden, Colorado 80403 P: 303.237.2072 F: 303.237.2659	Figure **1**
Drawn By: JDF				
Revision Date: 6/3/2016				

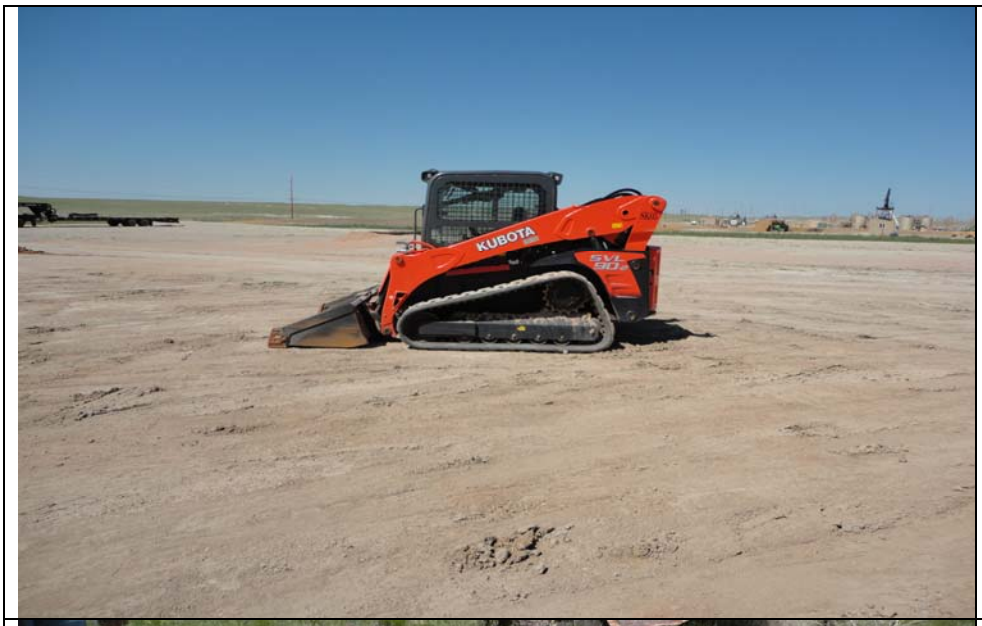
C:\Maps\for James H\BNN Razor\BNN Razor Map.mxd

ATTACHMENT B
SITE PHOTOGRAPHS

	**Subject:** A sign at the entrance to the BNN Razor 26 SWD facility shows the location and the COGCC Identification number. The sign was located on the north side of the Site. The photograph shows the filtered produced water aboveground storage tanks in the background. **Date:** June 1, 2016 **View:** East
	**Subject:** The photograph shows the north side of the pump building. The spill occurred inside the building and some of the water exited through the doors of the building. Buried utilities were marked prior to excavation. **Date:** June 1, 2016 **View:** West
	**Subject:** The photograph shows the east side of the pump house building. White flags mark the extent of the produced water spill that exited the building doors and flowed to the south. **Date:** June 1, 2016 **View:** South

	**Subject:** A front end loader was used by M&E Trucking, LLC of Greeley to scrape the surface soils of the spill area. The photograph shows the southwest corner of the building and ruts in the facility yard. **Date:** June 1, 2016 **View:** East
	**Subject:** Photograph shows the south side of the pump building and the produced water spill area. **Date:** June 1, 2016 **View:** North-northeast
	**Subject:** Photograph shows the interior of the pump building and the section of 4-inch diameter pipe where a fitting failed inside the pump building resulting in the filtered produced water spill. **Date:** June 1, 2016 **View:** East

	**Subject:** The M&E crew scraped soil from the upper few inches of the Site yard in the area of the spill southwest of the pump building. **Date:** June 1, 2016 **View:** West
	**Subject:** Lined secondary containment cells with earth and gravel berms were constructed on the southwest corner of the Site. The containments were used to store the excavated soils pending offsite disposal at a commercial landfill. **Date:** June 1, 2016 **View:** South
	**Subject:** Excavation was performed of the surface soils within the extent of the produced water spill on the south side of the pump building. **Date:** June 1, 2016 **View:** East



Subject: The M&E crew used a Kubota track-mounted skid steer to excavate surface soils within in the spill area.

Date: June 1, 2016

View: West

Subject: Background soil samples were collected from areas that had not been disturbed during construction of the water handling facility Site. Photograph shows the south background soil sample location.

Date: June 1, 2016

View: East

Subject: The photograph shows the produced water spill area being excavated on the southeast side of the pump building.

Date: June 1, 2016

View: North

ATTACHMENT C
SGS ACCUTEST
LABORATORY REPORT

e-Hardcopy 2.0
Automated Report

Technical Report for

Olsson Associates - Denver

BNN Western, LLC Razor 26 SWD

016-1299

SGS Accutest Job Number: D83172

Sampling Date: 06/01/16

Report to:

Olsson Associates
4690 Table Mountain Drive #200 Suite 200
Golden, CO 80403
jhix@olssonassociates.com

ATTN: James Hix

Total number of pages in report: 84

Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Program and/or state specific certification programs as applicable.

Scott Heideman
Laboratory Director

Client Service contact: Renea Lewis 303-425-6021

Certifications: CO (CO00049), ID, NE (CO00049), ND (R-027), NJ (CO 0007), OK (D9942), UT (NELAP CO00049), LA (LA150028), TX (T104704511), WY
CO (CO00049)

Table of Contents

Sample Summary

Olsson Associates - Denver

Job No: D83172

BNN Western, LLC Razor 26 SWD
Project No: 016-1299

Sample Number	Collected Date	Time	By	Received	Matrix Code	Type	Client Sample ID
D83172-1	06/01/16	12:10	JH	06/02/16	SO	Soil	BG-1
D83172-1A	06/01/16	12:10	JH	06/02/16	SO	Soil	BG-1
D83172-2	06/01/16	12:24	JH	06/02/16	SO	Soil	BG-2
D83172-2A	06/01/16	12:24	JH	06/02/16	SO	Soil	BG-2
D83172-3	06/01/16	12:35	JH	06/02/16	SO	Soil	CS-1
D83172-3A	06/01/16	12:35	JH	06/02/16	SO	Soil	CS-1
D83172-4	06/01/16	12:43	JH	06/02/16	SO	Soil	CS-2
D83172-4A	06/01/16	12:43	JH	06/02/16	SO	Soil	CS-2
D83172-5	06/01/16	12:47	JH	06/02/16	SO	Soil	CS-3
D83172-5A	06/01/16	12:47	JH	06/02/16	SO	Soil	CS-3
D83172-6	06/01/16	12:52	JH	06/02/16	SO	Soil	CS-4
D83172-6A	06/01/16	12:52	JH	06/02/16	SO	Soil	CS-4
D83172-7	06/01/16	14:35	JH	06/02/16	SO	Soil	CS-5

Soil samples reported on a dry weight basis unless otherwise indicated on result page.

Sample Summary
(continued)

Olsson Associates - Denver

Job No: D83172

BNN Western, LLC Razor 26 SWD
Project No: 016-1299

Sample Number	Collected Date	Time	By	Received	Matrix Code	Type	Client Sample ID
D83172-7A	06/01/16	14:35	JH	06/02/16	SO	Soil	CS-5
D83172-8	06/01/16	14:41	JH	06/02/16	SO	Soil	CS-6
D83172-8A	06/01/16	14:41	JH	06/02/16	SO	Soil	CS-6
D83172-9	06/01/16	15:16	JH	06/02/16	SO	Soil	CS-7
D83172-9A	06/01/16	15:16	JH	06/02/16	SO	Soil	CS-7
D83172-10	06/01/16	15:25	JH	06/02/16	SO	Soil	CS-8
D83172-10A	06/01/16	15:25	JH	06/02/16	SO	Soil	CS-8
D83172-11	06/01/16	15:32	JH	06/02/16	SO	Soil	CS-9
D83172-11A	06/01/16	15:32	JH	06/02/16	SO	Soil	CS-9
D83172-12	06/01/16	15:50	JH	06/02/16	SO	Soil	CS-10
D83172-12A	06/01/16	15:50	JH	06/02/16	SO	Soil	CS-10
D83172-13	06/01/16	15:58	JH	06/02/16	SO	Soil	CS-11
D83172-13A	06/01/16	15:58	JH	06/02/16	SO	Soil	CS-11

Soil samples reported on a dry weight basis unless otherwise indicated on result page.

Sample Summary
(continued)

Olsson Associates - Denver

Job No: D83172

BNN Western, LLC Razor 26 SWD
Project No: 016-1299

Sample Number	Collected Date	Time	By	Received	Matrix Code	Type	Client Sample ID
D83172-14	06/01/16	16:06	JH	06/02/16	SO	Soil	CS-12
D83172-14A	06/01/16	16:06	JH	06/02/16	SO	Soil	CS-12
D83172-15	06/01/16	16:12	JH	06/02/16	SO	Soil	CS-13
D83172-15A	06/01/16	16:12	JH	06/02/16	SO	Soil	CS-13

Soil samples reported on a dry weight basis unless otherwise indicated on result page.

CASE NARRATIVE / CONFORMANCE SUMMARY

Client: Olsson Associates - Denver **Job No:** D83172

Site: BNN Western, LLC Razor 26 SWD **Report Date** 6/8/2016 9:41:59 AM

On 06/02/2016, 15 sample(s), 0 Trip Blank(s), and 0 Field Blank(s) were received at Accutest Mountain States (AMS) at a temperature of 3.3 °C. The samples were intact and properly preserved, unless noted below. An AMS Job Number of D83172 was assigned to the project. The lab sample ID, client sample ID, and date of sample collection are detailed in the report's Results Summary.

Specified quality control criteria were achieved for this job except as noted below. For more information, please refer to the analytical results and QC summary pages.

Metals By Method SW846 6010C

Matrix: AQ **Batch ID:** MP18856

- All samples were digested and analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D83172-8AMS, D83172-8AMSD, D83172-8ASDL were used as the QC samples for the metals analysis.

Matrix: AQ **Batch ID:** MP18863

- All samples were digested and analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D83172-11AMS, D83172-11AMSD, D83172-11ASDL were used as the QC samples for the metals analysis.

Wet Chemistry By Method SM2540G-2011 M

Matrix: SO **Batch ID:** GN34722

- The data for SM2540G-2011 M meets quality control requirements.

Wet Chemistry By Method SW846 9045D

Matrix: SO **Batch ID:** GN34764

- The following samples were run outside of holding time for method SW846 9045D: D83172-1, D83172-10, D83172-11, D83172-12, D83172-13, D83172-14, D83172-15, D83172-2, D83172-3, D83172-4, D83172-5, D83172-6, D83172-7, D83172-8, D83172-9

Wet Chemistry By Method USDA HANDBOOK 60

Matrix: SO **Batch ID:** MP18856

- D83172-1A, 2A, 3A, 4A, 5A, 6A, 7A, 8A, 9A, 10A, 11A, 12A, 13A, 14A, 15A for Sodium Adsorption Ratio: Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+(Mg meq/L)/2]

AMS certifies that data reported for samples received, listed on the associated custody chain or analytical task order, were produced to specifications meeting AMS's Quality System precision, accuracy and completeness objectives except as noted.

Estimated non-standard method measurement uncertainty data is available on request, based on quality control bias and implicit for standard methods. Acceptable uncertainty requires tested parameter quality control data to meet method criteria.

AMS is not responsible for data quality assumptions if partial reports are used and recommends that this report be used in its entirety. This report is authorized by AMS indicated via signature on the report cover.

Summary of Hits

Job Number: D83172
Account: Olsson Associates - Denver
Project: BNN Western, LLC Razor 26 SWD
Collected: 06/01/16

Lab Sample ID / Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
D83172-1	**BG-1**					
Specific Conductivity		163	1.0		umhos/cm	SM 2510B-2011 MOD
pH		8.87			su	SW846 9045D
D83172-1A	**BG-1**					
Calcium		24.1	2.0		mg/l	SW846 6010C
Magnesium		2.60	1.0		mg/l	SW846 6010C
Sodium		6.54	2.0		mg/l	SW846 6010C
Sodium Adsorption Ratio [a]		0.338			ratio	USDA HANDBOOK 60
D83172-2	**BG-2**					
Specific Conductivity		216	1.0		umhos/cm	SM 2510B-2011 MOD
pH		8.98			su	SW846 9045D
D83172-2A	**BG-2**					
Calcium		23.0	2.0		mg/l	SW846 6010C
Magnesium		1.94	1.0		mg/l	SW846 6010C
Sodium		33.7	2.0		mg/l	SW846 6010C
Sodium Adsorption Ratio [a]		1.81			ratio	USDA HANDBOOK 60
D83172-3	**CS-1**					
Specific Conductivity		468	1.0		umhos/cm	SM 2510B-2011 MOD
pH		8.64			su	SW846 9045D
D83172-3A	**CS-1**					
Calcium		48.4	2.0		mg/l	SW846 6010C
Magnesium		5.34	1.0		mg/l	SW846 6010C
Sodium		35.1	2.0		mg/l	SW846 6010C
Sodium Adsorption Ratio [a]		1.28			ratio	USDA HANDBOOK 60
D83172-4	**CS-2**					
Specific Conductivity		777	1.0		umhos/cm	SM 2510B-2011 MOD
pH		8.43			su	SW846 9045D
D83172-4A	**CS-2**					
Calcium		83.8	2.0		mg/l	SW846 6010C
Magnesium		8.42	1.0		mg/l	SW846 6010C

Summary of Hits

Job Number: D83172
Account: Olsson Associates - Denver
Project: BNN Western, LLC Razor 26 SWD
Collected: 06/01/16

Lab Sample ID / Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
Sodium		62.6	2.0		mg/l	SW846 6010C
Sodium Adsorption Ratio [a]		1.74			ratio	USDA HANDBOOK 60
D83172-5	**CS-3**					
Specific Conductivity		408	1.0		umhos/cm	SM 2510B-2011 MOD
pH		8.40			su	SW846 9045D
D83172-5A	**CS-3**					
Calcium		57.6	2.0		mg/l	SW846 6010C
Magnesium		4.97	1.0		mg/l	SW846 6010C
Sodium		16.9	2.0		mg/l	SW846 6010C
Sodium Adsorption Ratio [a]		0.573			ratio	USDA HANDBOOK 60
D83172-6	**CS-4**					
Specific Conductivity		439	1.0		umhos/cm	SM 2510B-2011 MOD
pH		8.58			su	SW846 9045D
D83172-6A	**CS-4**					
Calcium		50.2	2.0		mg/l	SW846 6010C
Magnesium		5.27	1.0		mg/l	SW846 6010C
Sodium		28.1	2.0		mg/l	SW846 6010C
Sodium Adsorption Ratio [a]		1.01			ratio	USDA HANDBOOK 60
D83172-7	**CS-5**					
Specific Conductivity		1430	1.0		umhos/cm	SM 2510B-2011 MOD
pH		8.20			su	SW846 9045D
D83172-7A	**CS-5**					
Calcium		157	2.0		mg/l	SW846 6010C
Magnesium		14.4	1.0		mg/l	SW846 6010C
Sodium		83.6	2.0		mg/l	SW846 6010C
Sodium Adsorption Ratio [a]		1.71			ratio	USDA HANDBOOK 60
D83172-8	**CS-6**					
Specific Conductivity		1310	1.0		umhos/cm	SM 2510B-2011 MOD
pH		8.33			su	SW846 9045D

Summary of Hits

Job Number: D83172
Account: Olsson Associates - Denver
Project: BNN Western, LLC Razor 26 SWD
Collected: 06/01/16

Lab Sample ID / Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
D83172-8A	**CS-6**					
Calcium		120	2.0		mg/l	SW846 6010C
Magnesium		13.9	1.0		mg/l	SW846 6010C
Sodium		116	2.0		mg/l	SW846 6010C
Sodium Adsorption Ratio [a]		2.67			ratio	USDA HANDBOOK 60
D83172-9	**CS-7**					
Specific Conductivity		393	1.0		umhos/cm	SM 2510B-2011 MOD
pH		8.75			su	SW846 9045D
D83172-9A	**CS-7**					
Calcium		44.1	2.0		mg/l	SW846 6010C
Magnesium		4.28	1.0		mg/l	SW846 6010C
Sodium		43.5	2.0		mg/l	SW846 6010C
Sodium Adsorption Ratio [a]		1.67			ratio	USDA HANDBOOK 60
D83172-10	**CS-8**					
Specific Conductivity		658	1.0		umhos/cm	SM 2510B-2011 MOD
pH		8.71			su	SW846 9045D
D83172-10A	**CS-8**					
Calcium		75.5	2.0		mg/l	SW846 6010C
Magnesium		7.48	1.0		mg/l	SW846 6010C
Sodium		49.4	2.0		mg/l	SW846 6010C
Sodium Adsorption Ratio [a]		1.45			ratio	USDA HANDBOOK 60
D83172-11	**CS-9**					
Specific Conductivity		2050	1.0		umhos/cm	SM 2510B-2011 MOD
pH		8.38			su	SW846 9045D
D83172-11A	**CS-9**					
Calcium		169	2.0		mg/l	SW846 6010C
Magnesium		15.9	1.0		mg/l	SW846 6010C
Sodium		193	2.0		mg/l	SW846 6010C
Sodium Adsorption Ratio [a]		3.80			ratio	USDA HANDBOOK 60

Summary of Hits

Job Number: D83172
Account: Olsson Associates - Denver
Project: BNN Western, LLC Razor 26 SWD
Collected: 06/01/16

Lab Sample ID / Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
D83172-12	**CS-10**					
Specific Conductivity		759	1.0		umhos/cm	SM 2510B-2011 MOD
pH		8.66			su	SW846 9045D
D83172-12A	**CS-10**					
Calcium		72.9	2.0		mg/l	SW846 6010C
Magnesium		7.54	1.0		mg/l	SW846 6010C
Sodium		81.9	2.0		mg/l	SW846 6010C
Sodium Adsorption Ratio [a]		2.44			ratio	USDA HANDBOOK 60
D83172-13	**CS-11**					
Specific Conductivity		558	1.0		umhos/cm	SM 2510B-2011 MOD
pH		8.85			su	SW846 9045D
D83172-13A	**CS-11**					
Calcium		58.7	2.0		mg/l	SW846 6010C
Magnesium		6.01	1.0		mg/l	SW846 6010C
Sodium		52.5	2.0		mg/l	SW846 6010C
Sodium Adsorption Ratio [a]		1.74			ratio	USDA HANDBOOK 60
D83172-14	**CS-12**					
Specific Conductivity		680	1.0		umhos/cm	SM 2510B-2011 MOD
pH		8.70			su	SW846 9045D
D83172-14A	**CS-12**					
Calcium		76.0	2.0		mg/l	SW846 6010C
Magnesium		6.65	1.0		mg/l	SW846 6010C
Sodium		39.7	2.0		mg/l	SW846 6010C
Sodium Adsorption Ratio [a]		1.17			ratio	USDA HANDBOOK 60
D83172-15	**CS-13**					
Specific Conductivity		595	1.0		umhos/cm	SM 2510B-2011 MOD
pH		8.69			su	SW846 9045D
D83172-15A	**CS-13**					
Calcium		64.0	2.0		mg/l	SW846 6010C
Magnesium		7.19	1.0		mg/l	SW846 6010C

Summary of Hits

Job Number: D83172
Account: Olsson Associates - Denver
Project: BNN Western, LLC Razor 26 SWD
Collected: 06/01/16

Lab Sample ID / Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
Sodium		43.8	2.0		mg/l	SW846 6010C
Sodium Adsorption Ratio [a]		1.38			ratio	USDA HANDBOOK 60

(a) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

Sample Results

Report of Analysis

Report of Analysis

Client Sample ID:	BG-1		
Lab Sample ID:	D83172-1	**Date Sampled:**	06/01/16
Matrix:	SO - Soil	**Date Received:**	06/02/16
		Percent Solids:	74.8
Project:	BNN Western, LLC Razor 26 SWD		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
%solids							
Solids, Percent	74.8		%	1	06/03/16	SWT	SM2540G-2011 M
prep: DEPT.OF AG, BOOK N9							
Specific Conductivity	163	1.0	umhos/cm	1	06/03/16	TJ	SM 2510B-2011 MOD
pH	8.87		su	1	06/06/16 11:30	BA	SW846 9045D

RL = Reporting Limit

Report of Analysis

Client Sample ID:	BG-1		
Lab Sample ID:	D83172-1A	**Date Sampled:**	06/01/16
Matrix:	SO - Soil	**Date Received:**	06/02/16
		Percent Solids:	74.8
Project:	BNN Western, LLC Razor 26 SWD		

SAR Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	24.1	2.0	mg/l	1	06/03/16	06/06/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Magnesium	2.60	1.0	mg/l	1	06/03/16	06/06/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Sodium	6.54	2.0	mg/l	1	06/03/16	06/06/16	AS	SW846 6010C [1]	SW846 3010A/M [2]

(1) Instrument QC Batch: MA7374
(2) Prep QC Batch: MP18856

RL = Reporting Limit

Report of Analysis

Client Sample ID:	BG-1		
Lab Sample ID:	D83172-1A	**Date Sampled:**	06/01/16
Matrix:	SO - Soil	**Date Received:**	06/02/16
		Percent Solids:	74.8
Project:	BNN Western, LLC Razor 26 SWD		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio [a]	0.338		ratio	1	06/06/16 11:40	AS	USDA HANDBOOK 60

(a) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

RL = Reporting Limit

Report of Analysis

Client Sample ID:	BG-2		
Lab Sample ID:	D83172-2	**Date Sampled:**	06/01/16
Matrix:	SO - Soil	**Date Received:**	06/02/16
		Percent Solids:	76.8
Project:	BNN Western, LLC Razor 26 SWD		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
%solids							
Solids, Percent	76.8		%	1	06/03/16	SWT	SM2540G-2011 M
prep: DEPT.OF AG, BOOK N9							
Specific Conductivity	216	1.0	umhos/cm	1	06/03/16	TJ	SM 2510B-2011 MOD
pH	8.98		su	1	06/06/16 11:30	BA	SW846 9045D

RL = Reporting Limit

Report of Analysis

Client Sample ID:	BG-2		
Lab Sample ID:	D83172-2A	**Date Sampled:**	06/01/16
Matrix:	SO - Soil	**Date Received:**	06/02/16
		Percent Solids:	76.8
Project:	BNN Western, LLC Razor 26 SWD		

SAR Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	23.0	2.0	mg/l	1	06/03/16	06/06/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Magnesium	1.94	1.0	mg/l	1	06/03/16	06/06/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Sodium	33.7	2.0	mg/l	1	06/03/16	06/06/16	AS	SW846 6010C [1]	SW846 3010A/M [2]

(1) Instrument QC Batch: MA7374
(2) Prep QC Batch: MP18856

RL = Reporting Limit

Report of Analysis

Client Sample ID:	BG-2		
Lab Sample ID:	D83172-2A	**Date Sampled:**	06/01/16
Matrix:	SO - Soil	**Date Received:**	06/02/16
		Percent Solids:	76.8
Project:	BNN Western, LLC Razor 26 SWD		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio [a]	1.81		ratio	1	06/06/16 11:47	AS	USDA HANDBOOK 60

(a) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

RL = Reporting Limit

Report of Analysis

Client Sample ID: CS-1
Lab Sample ID: D83172-3
Matrix: SO - Soil
Project: BNN Western, LLC Razor 26 SWD

Date Sampled: 06/01/16
Date Received: 06/02/16
Percent Solids: 71.1

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
%solids							
Solids, Percent	71.1		%	1	06/03/16	SWT	SM2540G-2011 M
prep: DEPT.OF AG, BOOK N9							
Specific Conductivity	468	1.0	umhos/cm	1	06/03/16	TJ	SM 2510B-2011 MOD
pH	8.64		su	1	06/06/16 11:30	BA	SW846 9045D

RL = Reporting Limit

Report of Analysis

Client Sample ID:	CS-1		
Lab Sample ID:	D83172-3A	**Date Sampled:**	06/01/16
Matrix:	SO - Soil	**Date Received:**	06/02/16
		Percent Solids:	71.1
Project:	BNN Western, LLC Razor 26 SWD		

SAR Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	48.4	2.0	mg/l	1	06/03/16	06/06/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Magnesium	5.34	1.0	mg/l	1	06/03/16	06/06/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Sodium	35.1	2.0	mg/l	1	06/03/16	06/06/16	AS	SW846 6010C [1]	SW846 3010A/M [2]

(1) Instrument QC Batch: MA7374
(2) Prep QC Batch: MP18856

RL = Reporting Limit

Report of Analysis

Client Sample ID:	CS-1		
Lab Sample ID:	D83172-3A	**Date Sampled:**	06/01/16
Matrix:	SO - Soil	**Date Received:**	06/02/16
		Percent Solids:	71.1
Project:	BNN Western, LLC Razor 26 SWD		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio [a]	1.28		ratio	1	06/06/16 11:54	AS	USDA HANDBOOK 60

(a) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

RL = Reporting Limit

Report of Analysis

Client Sample ID:	CS-2		
Lab Sample ID:	D83172-4	**Date Sampled:**	06/01/16
Matrix:	SO - Soil	**Date Received:**	06/02/16
		Percent Solids:	76.5
Project:	BNN Western, LLC Razor 26 SWD		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
%solids							
Solids, Percent	76.5		%	1	06/03/16	SWT	SM2540G-2011 M
prep: DEPT.OF AG, BOOK N9							
Specific Conductivity	777	1.0	umhos/cm	1	06/03/16	TJ	SM 2510B-2011 MOD
pH	8.43		su	1	06/06/16 11:30	BA	SW846 9045D

RL = Reporting Limit

Report of Analysis

Client Sample ID:	CS-2		
Lab Sample ID:	D83172-4A	**Date Sampled:**	06/01/16
Matrix:	SO - Soil	**Date Received:**	06/02/16
		Percent Solids:	76.5
Project:	BNN Western, LLC Razor 26 SWD		

SAR Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	83.8	2.0	mg/l	1	06/03/16	06/06/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Magnesium	8.42	1.0	mg/l	1	06/03/16	06/06/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Sodium	62.6	2.0	mg/l	1	06/03/16	06/06/16	AS	SW846 6010C [1]	SW846 3010A/M [2]

(1) Instrument QC Batch: MA7374
(2) Prep QC Batch: MP18856

RL = Reporting Limit

Report of Analysis

Client Sample ID:	CS-2		
Lab Sample ID:	D83172-4A	**Date Sampled:**	06/01/16
Matrix:	SO - Soil	**Date Received:**	06/02/16
		Percent Solids:	76.5
Project:	BNN Western, LLC Razor 26 SWD		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio [a]	1.74		ratio	1	06/06/16 12:01	AS	USDA HANDBOOK 60

(a) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

RL = Reporting Limit

Report of Analysis

Client Sample ID:	CS-3		
Lab Sample ID:	D83172-5	**Date Sampled:**	06/01/16
Matrix:	SO - Soil	**Date Received:**	06/02/16
		Percent Solids:	75.9
Project:	BNN Western, LLC Razor 26 SWD		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
%solids							
Solids, Percent	75.9		%	1	06/03/16	SWT	SM2540G-2011 M
prep: DEPT.OF AG, BOOK N9							
Specific Conductivity	408	1.0	umhos/cm	1	06/03/16	TJ	SM 2510B-2011 MOD
pH	8.40		su	1	06/06/16 11:30	BA	SW846 9045D

RL = Reporting Limit

Report of Analysis

Client Sample ID:	CS-3		
Lab Sample ID:	D83172-5A	**Date Sampled:**	06/01/16
Matrix:	SO - Soil	**Date Received:**	06/02/16
		Percent Solids:	75.9
Project:	BNN Western, LLC Razor 26 SWD		

SAR Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	57.6	2.0	mg/l	1	06/03/16	06/06/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Magnesium	4.97	1.0	mg/l	1	06/03/16	06/06/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Sodium	16.9	2.0	mg/l	1	06/03/16	06/06/16	AS	SW846 6010C [1]	SW846 3010A/M [2]

(1) Instrument QC Batch: MA7374
(2) Prep QC Batch: MP18856

RL = Reporting Limit

Report of Analysis

Client Sample ID:	CS-3		
Lab Sample ID:	D83172-5A	**Date Sampled:**	06/01/16
Matrix:	SO - Soil	**Date Received:**	06/02/16
		Percent Solids:	75.9
Project:	BNN Western, LLC Razor 26 SWD		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio [a]	0.573		ratio	1	06/06/16 12:29	AS	USDA HANDBOOK 60

(a) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

RL = Reporting Limit

Report of Analysis

Client Sample ID:	CS-4		
Lab Sample ID:	D83172-6	**Date Sampled:**	06/01/16
Matrix:	SO - Soil	**Date Received:**	06/02/16
		Percent Solids:	74.8
Project:	BNN Western, LLC Razor 26 SWD		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
%solids							
Solids, Percent	74.8		%	1	06/03/16	SWT	SM2540G-2011 M
prep: DEPT.OF AG, BOOK N9							
Specific Conductivity	439	1.0	umhos/cm	1	06/03/16	TJ	SM 2510B-2011 MOD
pH	8.58		su	1	06/06/16 11:30	BA	SW846 9045D

RL = Reporting Limit

Report of Analysis

Client Sample ID:	CS-4		
Lab Sample ID:	D83172-6A	**Date Sampled:**	06/01/16
Matrix:	SO - Soil	**Date Received:**	06/02/16
		Percent Solids:	74.8
Project:	BNN Western, LLC Razor 26 SWD		

SAR Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	50.2	2.0	mg/l	1	06/03/16	06/06/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Magnesium	5.27	1.0	mg/l	1	06/03/16	06/06/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Sodium	28.1	2.0	mg/l	1	06/03/16	06/06/16	AS	SW846 6010C [1]	SW846 3010A/M [2]

(1) Instrument QC Batch: MA7374
(2) Prep QC Batch: MP18856

RL = Reporting Limit

Report of Analysis

Client Sample ID:	CS-4		
Lab Sample ID:	D83172-6A	**Date Sampled:**	06/01/16
Matrix:	SO - Soil	**Date Received:**	06/02/16
		Percent Solids:	74.8
Project:	BNN Western, LLC Razor 26 SWD		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio [a]	1.01		ratio	1	06/06/16 12:37	AS	USDA HANDBOOK 60

(a) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

RL = Reporting Limit

Report of Analysis

Client Sample ID:	CS-5		
Lab Sample ID:	D83172-7	**Date Sampled:**	06/01/16
Matrix:	SO - Soil	**Date Received:**	06/02/16
		Percent Solids:	75.2
Project:	BNN Western, LLC Razor 26 SWD		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
%solids							
Solids, Percent	75.2		%	1	06/03/16	SWT	SM2540G-2011 M
prep: DEPT.OF AG, BOOK N9							
Specific Conductivity	1430	1.0	umhos/cm	1	06/03/16	TJ	SM 2510B-2011 MOD
pH	8.20		su	1	06/06/16 11:30	BA	SW846 9045D

RL = Reporting Limit

Report of Analysis

Client Sample ID:	CS-5		
Lab Sample ID:	D83172-7A	**Date Sampled:**	06/01/16
Matrix:	SO - Soil	**Date Received:**	06/02/16
		Percent Solids:	75.2
Project:	BNN Western, LLC Razor 26 SWD		

SAR Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	157	2.0	mg/l	1	06/03/16	06/06/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Magnesium	14.4	1.0	mg/l	1	06/03/16	06/06/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Sodium	83.6	2.0	mg/l	1	06/03/16	06/06/16	AS	SW846 6010C [1]	SW846 3010A/M [2]

(1) Instrument QC Batch: MA7374
(2) Prep QC Batch: MP18856

RL = Reporting Limit

Report of Analysis

Client Sample ID:	CS-5		
Lab Sample ID:	D83172-7A	**Date Sampled:**	06/01/16
Matrix:	SO - Soil	**Date Received:**	06/02/16
		Percent Solids:	75.2
Project:	BNN Western, LLC Razor 26 SWD		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio [a]	1.71		ratio	1	06/06/16 12:44	AS	USDA HANDBOOK 60

(a) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

RL = Reporting Limit

Report of Analysis

Client Sample ID:	CS-6		
Lab Sample ID:	D83172-8	**Date Sampled:**	06/01/16
Matrix:	SO - Soil	**Date Received:**	06/02/16
		Percent Solids:	72.4
Project:	BNN Western, LLC Razor 26 SWD		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
%solids							
Solids, Percent	72.4		%	1	06/03/16	SWT	SM2540G-2011 M
prep: DEPT.OF AG, BOOK N9							
Specific Conductivity	1310	1.0	umhos/cm	1	06/03/16	TJ	SM 2510B-2011 MOD
pH	8.33		su	1	06/06/16 11:30	BA	SW846 9045D

RL = Reporting Limit

Report of Analysis

Client Sample ID:	CS-6		
Lab Sample ID:	D83172-8A	**Date Sampled:**	06/01/16
Matrix:	SO - Soil	**Date Received:**	06/02/16
		Percent Solids:	72.4
Project:	BNN Western, LLC Razor 26 SWD		

SAR Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	120	2.0	mg/l	1	06/03/16	06/06/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Magnesium	13.9	1.0	mg/l	1	06/03/16	06/06/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Sodium	116	2.0	mg/l	1	06/03/16	06/06/16	AS	SW846 6010C [1]	SW846 3010A/M [2]

(1) Instrument QC Batch: MA7374
(2) Prep QC Batch: MP18856

RL = Reporting Limit

Report of Analysis

Client Sample ID:	CS-6		
Lab Sample ID:	D83172-8A	**Date Sampled:**	06/01/16
Matrix:	SO - Soil	**Date Received:**	06/02/16
		Percent Solids:	72.4
Project:	BNN Western, LLC Razor 26 SWD		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio [a]	2.67		ratio	1	06/06/16 11:11	AS	USDA HANDBOOK 60

(a) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

RL = Reporting Limit

Report of Analysis

Client Sample ID: CS-7
Lab Sample ID: D83172-9
Matrix: SO - Soil
Project: BNN Western, LLC Razor 26 SWD

Date Sampled: 06/01/16
Date Received: 06/02/16
Percent Solids: 84.2

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
%solids							
Solids, Percent	84.2		%	1	06/03/16	SWT	SM2540G-2011 M
prep: DEPT.OF AG, BOOK N9							
Specific Conductivity	393	1.0	umhos/cm	1	06/03/16	TJ	SM 2510B-2011 MOD
pH	8.75		su	1	06/06/16 11:30	BA	SW846 9045D

RL = Reporting Limit

Report of Analysis

Client Sample ID:	CS-7		
Lab Sample ID:	D83172-9A	**Date Sampled:**	06/01/16
Matrix:	SO - Soil	**Date Received:**	06/02/16
		Percent Solids:	84.2
Project:	BNN Western, LLC Razor 26 SWD		

SAR Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	44.1	2.0	mg/l	1	06/03/16	06/06/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Magnesium	4.28	1.0	mg/l	1	06/03/16	06/06/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Sodium	43.5	2.0	mg/l	1	06/03/16	06/06/16	AS	SW846 6010C [1]	SW846 3010A/M [2]

(1) Instrument QC Batch: MA7374
(2) Prep QC Batch: MP18856

RL = Reporting Limit

Report of Analysis

Client Sample ID:	CS-7		
Lab Sample ID:	D83172-9A	**Date Sampled:**	06/01/16
Matrix:	SO - Soil	**Date Received:**	06/02/16
		Percent Solids:	84.2
Project:	BNN Western, LLC Razor 26 SWD		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio [a]	1.67		ratio	1	06/06/16 12:51	AS	USDA HANDBOOK 60

(a) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

RL = Reporting Limit

Report of Analysis

Client Sample ID:	CS-8		
Lab Sample ID:	D83172-10	**Date Sampled:**	06/01/16
Matrix:	SO - Soil	**Date Received:**	06/02/16
		Percent Solids:	75.5
Project:	BNN Western, LLC Razor 26 SWD		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
%solids							
Solids, Percent	75.5		%	1	06/03/16	SWT	SM2540G-2011 M
prep: DEPT.OF AG, BOOK N9							
Specific Conductivity	658	1.0	umhos/cm	1	06/03/16	TJ	SM 2510B-2011 MOD
pH	8.71		su	1	06/06/16 11:30	BA	SW846 9045D

RL = Reporting Limit

Report of Analysis

Client Sample ID:	CS-8		
Lab Sample ID:	D83172-10A	**Date Sampled:**	06/01/16
Matrix:	SO - Soil	**Date Received:**	06/02/16
		Percent Solids:	75.5
Project:	BNN Western, LLC Razor 26 SWD		

SAR Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	75.5	2.0	mg/l	1	06/03/16	06/06/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Magnesium	7.48	1.0	mg/l	1	06/03/16	06/06/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Sodium	49.4	2.0	mg/l	1	06/03/16	06/06/16	AS	SW846 6010C [1]	SW846 3010A/M [2]

(1) Instrument QC Batch: MA7374
(2) Prep QC Batch: MP18856

RL = Reporting Limit

Report of Analysis

Client Sample ID:	CS-8		
Lab Sample ID:	D83172-10A	**Date Sampled:**	06/01/16
Matrix:	SO - Soil	**Date Received:**	06/02/16
		Percent Solids:	75.5
Project:	BNN Western, LLC Razor 26 SWD		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio [a]	1.45		ratio	1	06/06/16 12:58	AS	USDA HANDBOOK 60

(a) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

RL = Reporting Limit

Report of Analysis

Client Sample ID: CS-9
Lab Sample ID: D83172-11
Matrix: SO - Soil
Project: BNN Western, LLC Razor 26 SWD

Date Sampled: 06/01/16
Date Received: 06/02/16
Percent Solids: 75.1

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
%solids							
Solids, Percent	75.1		%	1	06/03/16	SWT	SM2540G-2011 M
prep: DEPT.OF AG, BOOK N9							
Specific Conductivity	2050	1.0	umhos/cm	1	06/07/16	JD	SM 2510B-2011 MOD
pH	8.38		su	1	06/06/16 11:30	BA	SW846 9045D

RL = Reporting Limit

Report of Analysis

Client Sample ID:	CS-9		
Lab Sample ID:	D83172-11A	**Date Sampled:**	06/01/16
Matrix:	SO - Soil	**Date Received:**	06/02/16
		Percent Solids:	75.1
Project:	BNN Western, LLC Razor 26 SWD		

SAR Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	169	2.0	mg/l	1	06/06/16	06/06/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Magnesium	15.9	1.0	mg/l	1	06/06/16	06/06/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Sodium	193	2.0	mg/l	1	06/06/16	06/06/16	AS	SW846 6010C [1]	SW846 3010A/M [2]

(1) Instrument QC Batch: MA7374
(2) Prep QC Batch: MP18863

RL = Reporting Limit

Report of Analysis

Client Sample ID:	CS-9		
Lab Sample ID:	D83172-11A	**Date Sampled:**	06/01/16
Matrix:	SO - Soil	**Date Received:**	06/02/16
		Percent Solids:	75.1
Project:	BNN Western, LLC Razor 26 SWD		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio [a]	3.80		ratio	1	06/06/16 13:19	AS	USDA HANDBOOK 60

(a) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

RL = Reporting Limit

Report of Analysis

Client Sample ID:	CS-10		
Lab Sample ID:	D83172-12	**Date Sampled:**	06/01/16
Matrix:	SO - Soil	**Date Received:**	06/02/16
		Percent Solids:	70.6
Project:	BNN Western, LLC Razor 26 SWD		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
%solids							
Solids, Percent	70.6		%	1	06/03/16	SWT	SM2540G-2011 M
prep: DEPT.OF AG, BOOK N9							
Specific Conductivity	759	1.0	umhos/cm	1	06/07/16	JD	SM 2510B-2011 MOD
pH	8.66		su	1	06/06/16 11:30	BA	SW846 9045D

RL = Reporting Limit

Report of Analysis

Client Sample ID:	CS-10		
Lab Sample ID:	D83172-12A	**Date Sampled:**	06/01/16
Matrix:	SO - Soil	**Date Received:**	06/02/16
		Percent Solids:	70.6
Project:	BNN Western, LLC Razor 26 SWD		

SAR Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	72.9	2.0	mg/l	1	06/06/16	06/06/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Magnesium	7.54	1.0	mg/l	1	06/06/16	06/06/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Sodium	81.9	2.0	mg/l	1	06/06/16	06/06/16	AS	SW846 6010C [1]	SW846 3010A/M [2]

(1) Instrument QC Batch: MA7374
(2) Prep QC Batch: MP18863

RL = Reporting Limit

Report of Analysis

Client Sample ID:	CS-10		
Lab Sample ID:	D83172-12A	**Date Sampled:**	06/01/16
Matrix:	SO - Soil	**Date Received:**	06/02/16
		Percent Solids:	70.6
Project:	BNN Western, LLC Razor 26 SWD		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio [a]	2.44		ratio	1	06/06/16 14:07	AS	USDA HANDBOOK 60

(a) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

RL = Reporting Limit

Report of Analysis

Client Sample ID:	CS-11		
Lab Sample ID:	D83172-13	**Date Sampled:**	06/01/16
Matrix:	SO - Soil	**Date Received:**	06/02/16
		Percent Solids:	68.2
Project:	BNN Western, LLC Razor 26 SWD		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
%solids							
Solids, Percent	68.2		%	1	06/03/16	SWT	SM2540G-2011 M
prep: DEPT.OF AG, BOOK N9							
Specific Conductivity	558	1.0	umhos/cm	1	06/07/16	JD	SM 2510B-2011 MOD
pH	8.85		su	1	06/06/16 11:30	BA	SW846 9045D

RL = Reporting Limit

Report of Analysis

Client Sample ID:	CS-11		
Lab Sample ID:	D83172-13A	**Date Sampled:**	06/01/16
Matrix:	SO - Soil	**Date Received:**	06/02/16
		Percent Solids:	68.2
Project:	BNN Western, LLC Razor 26 SWD		

SAR Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	58.7	2.0	mg/l	1	06/06/16	06/06/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Magnesium	6.01	1.0	mg/l	1	06/06/16	06/06/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Sodium	52.5	2.0	mg/l	1	06/06/16	06/06/16	AS	SW846 6010C [1]	SW846 3010A/M [2]

(1) Instrument QC Batch: MA7374
(2) Prep QC Batch: MP18863

RL = Reporting Limit

Report of Analysis

Client Sample ID:	CS-11		
Lab Sample ID:	D83172-13A	**Date Sampled:**	06/01/16
Matrix:	SO - Soil	**Date Received:**	06/02/16
		Percent Solids:	68.2
Project:	BNN Western, LLC Razor 26 SWD		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio [a]	1.74		ratio	1	06/06/16 14:13	AS	USDA HANDBOOK 60

(a) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

RL = Reporting Limit

Report of Analysis

Client Sample ID:	CS-12		
Lab Sample ID:	D83172-14	**Date Sampled:**	06/01/16
Matrix:	SO - Soil	**Date Received:**	06/02/16
		Percent Solids:	73.8
Project:	BNN Western, LLC Razor 26 SWD		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
%solids							
Solids, Percent	73.8		%	1	06/03/16	SWT	SM2540G-2011 M
prep: DEPT.OF AG, BOOK N9							
Specific Conductivity	680	1.0	umhos/cm	1	06/07/16	JD	SM 2510B-2011 MOD
pH	8.70		su	1	06/06/16 11:30	BA	SW846 9045D

RL = Reporting Limit

Report of Analysis

Client Sample ID:	CS-12		
Lab Sample ID:	D83172-14A	**Date Sampled:**	06/01/16
Matrix:	SO - Soil	**Date Received:**	06/02/16
		Percent Solids:	73.8
Project:	BNN Western, LLC Razor 26 SWD		

SAR Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	76.0	2.0	mg/l	1	06/06/16	06/06/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Magnesium	6.65	1.0	mg/l	1	06/06/16	06/06/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Sodium	39.7	2.0	mg/l	1	06/06/16	06/06/16	AS	SW846 6010C [1]	SW846 3010A/M [2]

(1) Instrument QC Batch: MA7374
(2) Prep QC Batch: MP18863

RL = Reporting Limit

Report of Analysis

Client Sample ID:	CS-12		
Lab Sample ID:	D83172-14A	**Date Sampled:**	06/01/16
Matrix:	SO - Soil	**Date Received:**	06/02/16
		Percent Solids:	73.8
Project:	BNN Western, LLC Razor 26 SWD		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio [a]	1.17		ratio	1	06/06/16 14:18	AS	USDA HANDBOOK 60

(a) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

RL = Reporting Limit

Report of Analysis

Client Sample ID:	CS-13		
Lab Sample ID:	D83172-15	**Date Sampled:**	06/01/16
Matrix:	SO - Soil	**Date Received:**	06/02/16
		Percent Solids:	78.8
Project:	BNN Western, LLC Razor 26 SWD		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
%solids							
Solids, Percent	78.8		%	1	06/03/16	SWT	SM2540G-2011 M
prep: DEPT.OF AG, BOOK N9							
Specific Conductivity	595	1.0	umhos/cm	1	06/07/16	JD	SM 2510B-2011 MOD
pH	8.69		su	1	06/06/16 11:30	BA	SW846 9045D

RL = Reporting Limit

Report of Analysis

Client Sample ID:	CS-13		
Lab Sample ID:	D83172-15A	**Date Sampled:**	06/01/16
Matrix:	SO - Soil	**Date Received:**	06/02/16
		Percent Solids:	78.8
Project:	BNN Western, LLC Razor 26 SWD		

SAR Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	64.0	2.0	mg/l	1	06/06/16	06/06/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Magnesium	7.19	1.0	mg/l	1	06/06/16	06/06/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Sodium	43.8	2.0	mg/l	1	06/06/16	06/06/16	AS	SW846 6010C [1]	SW846 3010A/M [2]

(1) Instrument QC Batch: MA7374
(2) Prep QC Batch: MP18863

RL = Reporting Limit

Report of Analysis

Client Sample ID:	CS-13		
Lab Sample ID:	D83172-15A	**Date Sampled:**	06/01/16
Matrix:	SO - Soil	**Date Received:**	06/02/16
		Percent Solids:	78.8
Project:	BNN Western, LLC Razor 26 SWD		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio [a]	1.38		ratio	1	06/06/16 14:24	AS	USDA HANDBOOK 60

(a) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

RL = Reporting Limit

Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody

SGS ACCUTEST

CHAIN OF CUSTODY

4036 Youngfield Street, Wheat Ridge, CO 80033
TEL. 303-425-6021 FAX: 303-425-6854
www.accutest.com

FED-EX Tracking # | Bottle Order Control #
SGS Accutest Quote # | SGS Accutest Job # D83172

Client / Reporting Information
Company Name: Olsson Associates
Street Address: 4690 Table Mountain #200
City: Golden, CO 80403
Project Contact: James Hix
Phone #: 303.589.1572/303.374.3139
Sampler(s) Name(s): James Hix

Project Information
Project Name: BNN Western, LLC - Razor 26 SWD
Street: WCR 114 / WCR 127
City: New Raymer State: CO
Project #: 016-1299
Client Purchase Order #
Project Manager

Billing Information (if different from Report to)
Company Name
Street Address
City
Attention:

Requested Analysis (see TEST CODE sheet): PH, EC, SAR

Matrix Codes: DW - Drinking Water, GW - Ground Water, WW - Water, SW - Surface Water, SO - Soil, SL- Sludge, SED-Sediment, OI - Oil, LIQ - Other Liquid, AIR - Air, SOL - Other Solid, WP - Wipe, FB-Field Blank, EB-Equipment Blank, RB- Rinse Blank, TB-Trip Blank

SGS Accutest Sample #	Field ID / Point of Collection	MEOH/DI Vial #	Collection Date	Collection Time	Sampled by	Matrix	# of bottles	HCl	NaOH	HNO3	H2SO4	NONE	DI Water	MEOH	ENCORE	PH	EC	SAR	LAB USE ONLY
	BG-1		06/01/16	1210	JH	S	2									✓	✓	✓	01
	BG-2		06/01/16	1224	JH	S	2									✓	✓	✓	02
	CS-1		06/01/16	1235	JH	S	2									✓	✓	✓	03
	CS-2		06/01/16	1243	JH	S	2									✓	✓	✓	04
	CS-3		06/01/16	1247	JH	S	2									✓	✓	✓	05
	CS-4		06/01/16	1252	JH	S	2									✓	✓	✓	06
	CS-5		06/01/16	1435	JH	S	2									✓	✓	✓	07
	CS-6		06/01/16	1441	JH	S	2									✓	✓	✓	08
	CS-7		06/01/16	1516	JH	S	2									✓	✓	✓	09
	CS-8		06/01/16	1525	JH	S	2									✓	✓	✓	10
	CS-9		06/01/16	1532	JH	S	2									✓	✓	✓	11

Turnaround Time (Business days)
- ☐ Std. 15 Business Days
- ☐ Std. 10 Business Days
- ☑ 5 Day RUSH
- ☐ 3 Day Emergency
- ☐ 2 Day Emergency
- ☐ 1 Day Emergency
- ☐

Emergency & Rush T/A data available VIA Lablink

Approved By (SGS Accutest PM): / Date:

Data Deliverable Information
- ☐ Commercial "A" (Level 1)
- ☐ Commercial "B" (Level 2)
- ☐ COMMBN
- ☐ COMMBN+
- ☐
- ☐ State Forms Required
- ☐ Send Forms to State
- ☐ Report by Fax
- ☐ Report by PDF
- ☐ EDD Format

Commercial "A" = Results Only
Commercial "B" = Results + QC Summary
Commercial BN = Results/QC/Narrative (+ = chromatograms)

Comments / Special Instructions

Sample Custody must be documented below each time samples change possession, including courier delivery.

Relinquished by Sampler:	Date Time:	Received By:	Relinquished By:	Date Time:	Received By:
1 James Hix	06/02/16 8:30	1 [signature] 6/2/16 8:30	2		2
Relinquished by Sampler: 3	Date Time:	Received By: 3	Relinquished By: 4	Date Time:	Received By: 4
Relinquished by: 5	Date Time:	Received By: 5	Custody Seal # HD ☐ Intact ☐ Not intact	Preserved where applicable ☐	On Ice ☐ Cooler Temp. 3.3

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D83172: Chain of Custody
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SGS ACCUTEST

CHAIN OF CUSTODY

PAGE 2 OF 2

4036 Youngfield Street, Wheat Ridge, CO 80033
TEL. 303-425-6021 FAX: 303-425-6854
www.accutest.com

FED-EX Tracking #:
Bottle Order Control #:
SGS Accutest Quote #:
SGS Accutest Job #: D83172

Client / Reporting Information

Company Name: Olsson Associates
Street Address: 4690 Table Mountain Dr.
City: Golden, CO 80403
Project Contact: James Hix
Phone #: 303.589.1572/303.374.3139
Sampler(s) Name(s): James Hix

Project Information

Project Name: BNN Western, LLC - Razor 26 SWD
Street: WCR 114/WCR 127
City: New Raymer State: CO
Project #: 016-1299
Client Purchase Order #:
Project Manager:

Billing Information (if different from Report to)
Company Name:
Street Address:
City:
Attention:

Requested Analysis (see TEST CODE sheet)

SGS Accutest Sample #	Field ID / Point of Collection	MEOH/DI Vial #	Date	Time	Sampled by	Matrix	# of bottles	HCl	NaOH	HNO3	H2SO4	NONE	DI Water	MEOH	ENCORE	pH	EC	SAR	LAB USE ONLY
	CS-10		06/01/16	15:50	JH	S	2									✓	✓	✓	12
	CS-11		06/01/16	15:58	JH	S	2									✓	✓	✓	13
	CS-12		06/01/16	16:06	JH	S	2									✓	✓	✓	14
	CS-13		06/01/16	16:12	JH	S	2									✓	✓	✓	15

Matrix Codes

DW - Drinking Water
GW - Ground Water
WW - Water
SW - Surface Water
SO - Soil
SL - Sludge
SED - Sediment
OI - Oil
LIQ - Other Liquid
AIR - Air
SOL - Other Solid
WP - Wipe
FB - Field Blank
EB - Equipment Blank
RB - Rinse Blank
TB - Trip Blank

Turnaround Time (Business days)

- [ ] Std. 15 Business Days
- [ ] Std. 10 Business Days
- [x] 5 Day RUSH
- [ ] 3 Day Emergency
- [ ] 2 Day Emergency
- [ ] 1 Day Emergency
- [ ]

Emergency & Rush T/A data available VIA Lablink

Approved By (SGS Accutest PM): / Date:

Data Deliverable Information

- [ ] Commercial "A" (Level 1)
- [ ] Commercial "B" (Level 2)
- [ ] COMMBN
- [ ] COMMBN+
- [ ]
- [ ] State Forms Required
- [ ] Send Forms to State
- [ ] Report by Fax
- [ ] Report by PDF
- [ ] EDD Format

Commercial "A" = Results Only
Commercial "B" = Results + QC Summary
Commercial BN = Results/QC/Narrative (+ = chromatograms)

Comments / Special Instructions

Sample Custody must be documented below each time samples change possession, including courier delivery.

Relinquished by Sampler:	Date Time:	Received By:	Relinquished By:	Date Time:	Received By:
1 James Hix	06/02/16 8:30	1 [signature] 6/2/16 8:30	2		2
3 Relinquished by Sampler:	Date Time:	3 Received By:	4 Relinquished By:	Date Time:	4 Received By:
5 Relinquished by:	Date Time:	3 Received By:	Custody Seal # F10 ☐ Intact ☐ Not intact	Preserved where applicable ☐	On Ice ☐ Cooler Temp. 3.7

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D83172: Chain of Custody
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SGS Accutest Sample Receipt Summary

Job Number: D83172 **Client:** OLSSON **Project:** BNN

Date / Time Received: 6/2/2016 8:30:00 AM **Delivery Method:** **Airbill #'s:** HD

Cooler Temps (Initial/Adjusted): #1: (3.3/3.3);

Cooler Security	Y	or	N		Y	or	N
1. Custody Seals Present:	☑		☐	3. COC Present:	☑		☐
2. Custody Seals Intact:	☑		☐	4. Smpl Dates/Time OK	☑		☐

Cooler Temperature	Y	or	N
1. Temp criteria achieved:	☑		☐
2. Cooler temp verification:	IR Gun;		
3. Cooler media:	Ice (Bag)		
4. No. Coolers:	1		

Quality Control Preservation	Y	or	N	N/A
1. Trip Blank present / cooler:	☐		☐	☑
2. Trip Blank listed on COC:	☐		☐	☑
3. Samples preserved properly:	☑		☐	
4. VOCs headspace free:	☐		☐	☑

Comments

Sample Integrity - Documentation	Y	or	N
1. Sample labels present on bottles:	☑		☐
2. Container labeling complete:	☑		☐
3. Sample container label / COC agree:	☑		☐

Sample Integrity - Condition	Y	or	N
1. Sample recvd within HT:	☑		☐
2. All containers accounted for:	☑		☐
3. Condition of sample:	Intact		

Sample Integrity - Instructions	Y	or	N	N/A
1. Analysis requested is clear:	☑		☐	
2. Bottles received for unspecified tests	☐		☑	
3. Sufficient volume recvd for analysis:	☑		☐	
4. Compositing instructions clear:	☐		☐	☑
5. Filtering instructions clear:	☐		☐	☑

Metals Analysis

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Matrix Spike and Duplicate Summaries
- Blank Spike and Lab Control Sample Summaries
- Serial Dilution Summaries

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: D83172
Account: COCSCOG - Olsson Associates - Denver
Project: BNN Western, LLC Razor 26 SWD

QC Batch ID: MP18856
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 06/03/16

Metal	RL	IDL	MDL	MB raw	final
Aluminum	500	55	65		
Antimony	150	11	44		
Arsenic	130	19	60		
Barium	50	1	2		
Beryllium	50	4.5	8		
Boron	250	4	18		
Cadmium	50	1	4		
Calcium	2000	12	50	0.0	<2000
Chromium	50	1.5	3.5		
Cobalt	25	2.5	6		
Copper	50	4	19		
Iron	350	7.5	35		
Lead	250	11	25		
Lithium	25	2	3.5		
Magnesium	1000	34	200	55.5	<1000
Manganese	25	2.5	4.5		
Molybdenum	50	2	18		
Nickel	150	2.5	14		
Phosphorus	500	75	170		
Potassium	5000	500	360		
Selenium	250	36	50		
Silicon	250	24	42		
Silver	150	1.5	3		
Sodium	2000	37	70	-200	<2000
Strontium	25	.05	1.5		
Thallium	50	9	40		
Tin	250	60	60		
Titanium	50	.5	14		
Uranium	250	15	22		
Vanadium	50	2	3		
Zinc	150	2	18		

Associated samples MP18856: D83172-1A, D83172-2A, D83172-3A, D83172-4A, D83172-5A, D83172-6A, D83172-7A, D83172-8A, D83172-9A, D83172-10A

Results < IDL are shown as zero for calculation purposes

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: D83172
Account: COCSCOG - Olsson Associates - Denver
Project: BNN Western, LLC Razor 26 SWD

QC Batch ID: MP18856
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 06/03/16

Metal	RL	IDL	MDL	MB raw	final

(*) Outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D83172
Account: COCSCOG - Olsson Associates - Denver
Project: BNN Western, LLC Razor 26 SWD

QC Batch ID: MP18856
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 06/03/16

Metal	D83172-8A Original	MS	Spikelot ICPALL2	% Rec	QC Limits
Aluminum					
Antimony					
Arsenic					
Barium					
Beryllium					
Boron					
Cadmium					
Calcium	120000	250000	125000	104.0	75-125
Chromium					
Cobalt					
Copper					
Iron					
Lead					
Lithium					
Magnesium	13900	142000	125000	102.5	75-125
Manganese					
Molybdenum					
Nickel					
Phosphorus					
Potassium					
Selenium					
Silicon					
Silver					
Sodium	116000	237000	125000	96.8	75-125
Strontium					
Thallium					
Tin					
Titanium					
Uranium					
Vanadium					
Zinc					

Associated samples MP18856: D83172-1A, D83172-2A, D83172-3A, D83172-4A, D83172-5A, D83172-6A, D83172-7A, D83172-8A, D83172-9A, D83172-10A

Results < IDL are shown as zero for calculation purposes

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D83172
Account: COCSCOG - Olsson Associates - Denver
Project: BNN Western, LLC Razor 26 SWD

QC Batch ID: MP18856
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 06/03/16

Metal	D83172-8A Original MS	Spikelot ICPALL2	% Rec	QC Limits

(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D83172
Account: COCSCOG - Olsson Associates - Denver
Project: BNN Western, LLC Razor 26 SWD

QC Batch ID: MP18856
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 06/03/16

Metal	D83172-8A Original	MSD	Spikelot ICPALL2	% Rec	MSD RPD	QC Limit
Aluminum						
Antimony						
Arsenic						
Barium						
Beryllium						
Boron						
Cadmium						
Calcium	120000	247000	125000	101.6	1.2	20
Chromium						
Cobalt						
Copper						
Iron						
Lead						
Lithium						
Magnesium	13900	141000	125000	101.7	0.7	20
Manganese						
Molybdenum						
Nickel						
Phosphorus						
Potassium						
Selenium						
Silicon						
Silver						
Sodium	116000	233000	125000	93.6	1.7	20
Strontium						
Thallium						
Tin						
Titanium						
Uranium						
Vanadium						
Zinc						

Associated samples MP18856: D83172-1A, D83172-2A, D83172-3A, D83172-4A, D83172-5A, D83172-6A, D83172-7A, D83172-8A, D83172-9A, D83172-10A

Results < IDL are shown as zero for calculation purposes

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D83172
Account: COCSCOG - Olsson Associates - Denver
Project: BNN Western, LLC Razor 26 SWD

QC Batch ID: MP18856
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 06/03/16

Metal	D83172-8A Original MSD	Spikelot ICPALL2 % Rec	MSD RPD	QC Limit

(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D83172
Account: COCSCOG - Olsson Associates - Denver
Project: BNN Western, LLC Razor 26 SWD

QC Batch ID: MP18856
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 06/03/16

Metal	BSP Result	Spikelot ICPALL2	% Rec	QC Limits
Aluminum				
Antimony				
Arsenic				
Barium				
Beryllium				
Boron				
Cadmium				
Calcium	132000	125000	105.6	80-120
Chromium				
Cobalt				
Copper				
Iron				
Lead				
Lithium				
Magnesium	129000	125000	103.2	80-120
Manganese				
Molybdenum				
Nickel				
Phosphorus				
Potassium				
Selenium				
Silicon				
Silver				
Sodium	123000	125000	98.4	80-120
Strontium				
Thallium				
Tin				
Titanium				
Uranium				
Vanadium				
Zinc				

Associated samples MP18856: D83172-1A, D83172-2A, D83172-3A, D83172-4A, D83172-5A, D83172-6A, D83172-7A, D83172-8A, D83172-9A, D83172-10A

Results < IDL are shown as zero for calculation purposes

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D83172
Account: COCSCOG - Olsson Associates - Denver
Project: BNN Western, LLC Razor 26 SWD

QC Batch ID: MP18856
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 06/03/16

Metal	BSP Result	Spikelot ICPALL2	% Rec	QC Limits

(*) Outside of QC limits
(anr) Analyte not requested

SERIAL DILUTION RESULTS SUMMARY

Login Number: D83172
Account: COCSCOG - Olsson Associates - Denver
Project: BNN Western, LLC Razor 26 SWD

QC Batch ID: MP18856
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 06/03/16

Metal	D83172-8A Original	SDL 1:5	%DIF	QC Limits
Aluminum				
Antimony				
Arsenic				
Barium				
Beryllium				
Boron				
Cadmium				
Calcium	23900	24900	4.0	0-10
Chromium				
Cobalt				
Copper				
Iron				
Lead				
Lithium				
Magnesium	2790	3020	8.5	0-10
Manganese				
Molybdenum				
Nickel				
Phosphorus				
Potassium				
Selenium				
Silicon				
Silver				
Sodium	23200	24800	6.8	0-10
Strontium				
Thallium				
Tin				
Titanium				
Uranium				
Vanadium				
Zinc				

Associated samples MP18856: D83172-1A, D83172-2A, D83172-3A, D83172-4A, D83172-5A, D83172-6A, D83172-7A, D83172-8A, D83172-9A, D83172-10A

Results < IDL are shown as zero for calculation purposes

SERIAL DILUTION RESULTS SUMMARY

Login Number: D83172
Account: COCSCOG - Olsson Associates - Denver
Project: BNN Western, LLC Razor 26 SWD

QC Batch ID: MP18856
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 06/03/16

	D83172-8A		QC
Metal	Original SDL 1:5	%DIF	Limits

(*) Outside of QC limits
(anr) Analyte not requested

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: D83172
Account: COCSCOG - Olsson Associates - Denver
Project: BNN Western, LLC Razor 26 SWD

QC Batch ID: MP18863
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 06/06/16

Metal	RL	IDL	MDL	MB raw	final
Aluminum	500	55	65		
Antimony	150	11	44		
Arsenic	130	19	60		
Barium	50	1	2		
Beryllium	50	4.5	8		
Boron	250	4	18		
Cadmium	50	1	4		
Calcium	2000	12	50	0.50	<2000
Chromium	50	1.5	3.5		
Cobalt	25	2.5	6		
Copper	50	4	19		
Iron	350	7.5	35		
Lead	250	11	25		
Lithium	25	2	3.5		
Magnesium	1000	34	200	16.5	<1000
Manganese	25	2.5	4.5		
Molybdenum	50	2	18		
Nickel	150	2.5	14		
Phosphorus	500	75	170		
Potassium	5000	500	360		
Selenium	250	36	50		
Silicon	250	24	42		
Silver	150	1.5	3		
Sodium	2000	37	70	-170	<2000
Strontium	25	.05	1.5		
Thallium	50	9	40		
Tin	250	60	60		
Titanium	50	.5	14		
Uranium	250	15	22		
Vanadium	50	2	3		
Zinc	150	2	18		

Associated samples MP18863: D83172-11A, D83172-12A, D83172-13A, D83172-14A, D83172-15A

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: D83172
Account: COCSCOG - Olsson Associates - Denver
Project: BNN Western, LLC Razor 26 SWD

QC Batch ID: MP18863
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 06/06/16

Metal	RL	IDL	MDL	MB raw	final

(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D83172
Account: COCSCOG - Olsson Associates - Denver
Project: BNN Western, LLC Razor 26 SWD

QC Batch ID: MP18863
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 06/06/16

Metal	D83172-11A Original	MS	Spikelot ICPALL2	% Rec	QC Limits
Aluminum					
Antimony					
Arsenic					
Barium					
Beryllium					
Boron					
Cadmium					
Calcium	169000	313000	125000	115.2	75-125
Chromium					
Cobalt					
Copper					
Iron					
Lead					
Lithium					
Magnesium	15900	144000	125000	102.5	75-125
Manganese					
Molybdenum					
Nickel					
Phosphorus					
Potassium					
Selenium					
Silicon					
Silver					
Sodium	193000	328000	125000	108.0	75-125
Strontium					
Thallium					
Tin					
Titanium					
Uranium					
Vanadium					
Zinc					

Associated samples MP18863: D83172-11A, D83172-12A, D83172-13A, D83172-14A, D83172-15A

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D83172
Account: COCSCOG - Olsson Associates - Denver
Project: BNN Western, LLC Razor 26 SWD

QC Batch ID: MP18863
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 06/06/16

Metal	D83172-11A Original MS	Spikelot ICPALL2	% Rec	QC Limits

(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D83172
Account: COCSCOG - Olsson Associates - Denver
Project: BNN Western, LLC Razor 26 SWD

QC Batch ID: MP18863
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 06/06/16

Metal	D83172-11A Original	MSD	Spikelot ICPALL2	% Rec	MSD RPD	QC Limit
Aluminum						
Antimony						
Arsenic						
Barium						
Beryllium						
Boron						
Cadmium						
Calcium	169000	314000	125000	116.0	0.3	20
Chromium						
Cobalt						
Copper						
Iron						
Lead						
Lithium						
Magnesium	15900	146000	125000	104.1	1.4	20
Manganese						
Molybdenum						
Nickel						
Phosphorus						
Potassium						
Selenium						
Silicon						
Silver						
Sodium	193000	323000	125000	104.0	1.5	20
Strontium						
Thallium						
Tin						
Titanium						
Uranium						
Vanadium						
Zinc						

Associated samples MP18863: D83172-11A, D83172-12A, D83172-13A, D83172-14A, D83172-15A

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D83172
Account: COCSCOG - Olsson Associates - Denver
Project: BNN Western, LLC Razor 26 SWD

QC Batch ID: MP18863
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 06/06/16

Metal	D83172-11A Original MSD	Spikelot ICPALL2 % Rec	MSD RPD	QC Limit

(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D83172
Account: COCSCOG - Olsson Associates - Denver
Project: BNN Western, LLC Razor 26 SWD

QC Batch ID: MP18863
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 06/06/16

Metal	BSP Result	Spikelot ICPALL2	% Rec	QC Limits
Aluminum				
Antimony				
Arsenic				
Barium				
Beryllium				
Boron				
Cadmium				
Calcium	129000	125000	103.2	80-120
Chromium				
Cobalt				
Copper				
Iron				
Lead				
Lithium				
Magnesium	127000	125000	101.6	80-120
Manganese				
Molybdenum				
Nickel				
Phosphorus				
Potassium				
Selenium				
Silicon				
Silver				
Sodium	121000	125000	96.8	80-120
Strontium				
Thallium				
Tin				
Titanium				
Uranium				
Vanadium				
Zinc				

Associated samples MP18863: D83172-11A, D83172-12A, D83172-13A, D83172-14A, D83172-15A

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D83172
Account: COCSCOG - Olsson Associates - Denver
Project: BNN Western, LLC Razor 26 SWD

QC Batch ID: MP18863
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 06/06/16

Metal	BSP Result	Spikelot ICPALL2	% Rec	QC Limits

(anr) Analyte not requested

SERIAL DILUTION RESULTS SUMMARY

Login Number: D83172
Account: COCSCOG - Olsson Associates - Denver
Project: BNN Western, LLC Razor 26 SWD

QC Batch ID: MP18863
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 06/06/16

Metal	D83172-11A Original	SDL 1:5	%DIF	QC Limits
Aluminum				
Antimony				
Arsenic				
Barium				
Beryllium				
Boron				
Cadmium				
Calcium	33800	33500	1.0	0-10
Chromium				
Cobalt				
Copper				
Iron				
Lead				
Lithium				
Magnesium	3170	3140	1.2	0-10
Manganese				
Molybdenum				
Nickel				
Phosphorus				
Potassium				
Selenium				
Silicon				
Silver				
Sodium	38500	37800	1.8	0-10
Strontium				
Thallium				
Tin				
Titanium				
Uranium				
Vanadium				
Zinc				

Associated samples MP18863: D83172-11A, D83172-12A, D83172-13A, D83172-14A, D83172-15A

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits

SERIAL DILUTION RESULTS SUMMARY

Login Number: D83172
Account: COCSCOG - Olsson Associates - Denver
Project: BNN Western, LLC Razor 26 SWD

QC Batch ID: MP18863
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 06/06/16

	D83172-11A		QC
Metal	Original SDL 1:5	%DIF	Limits

(anr) Analyte not requested

General Chemistry

QC Data Summaries

Includes the following where applicable:

- Method Blank and Blank Spike Summaries
- Duplicate Summaries
- Matrix Spike Summaries

METHOD BLANK AND SPIKE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: D83172
Account: COCSCOG - Olsson Associates - Denver
Project: BNN Western, LLC Razor 26 SWD

Analyte	Batch ID	RL	MB Result	Units	Spike Amount	BSP Result	BSP %Recov	QC Limits
Specific Conductivity	GP18052/GN34729			umhos/cm	1001	981	98.0	90-110%
Specific Conductivity	GP18081/GN34775			umhos/cm	9989	9760	97.7	90-110%
pH	GN34764			su	8.00	8.01	100.1	99.1-100.9%

Associated Samples:
Batch GN34764: D83172-1, D83172-2, D83172-3, D83172-4, D83172-5, D83172-6, D83172-7, D83172-8, D83172-9, D83172-10, D83172-11, D83172-12, D83172-13, D83172-14, D83172-15
Batch GP18052: D83172-1, D83172-2, D83172-3, D83172-4, D83172-5, D83172-6, D83172-7, D83172-8, D83172-9, D83172-10
Batch GP18081: D83172-11, D83172-12, D83172-13, D83172-14, D83172-15
(*) Outside of QC limits