Natural Soda LLC

2020 Project Status Report
&
Annual Plan of Development
January 2021

Please note CONFIDENTIAL data sections of this document

Prepared for:
Colorado Division of Reclamation Mining and Safety
1313 Sherman Street, Room 215
Denver, CO 80203

Submitted by:
Natural Soda LLC
3200 Rio Blanco County Road 31
Rifle, CO 81650

Prepared by:
Daub & Associates, Inc.
1985 ½ South Broadway
Grand Junction, CO 81507-9649

Vegetation Monitoring Report by:
Rusty Roberts, Rangeland Ecologist/Biologist

Table of Contents

List of Figures

List of Tables (Not including tables in Vegetation Monitoring Report)

1.0 Introduction and Project Summary

This 2020 Project Status Report and Annual Plan of Development is submitted to fulfill the requirements of BLM sodium leases, COC-00118326, COC-00118327, COC-0119986, and COC-37474 as stated in Federal Regulations 43 CFR, Subpart 3591 and 3592 and the Project Record of Decision dated January 20, 1987. This report is also submitted to the Colorado Division of Reclamation Mining and Safety (DRMS) to meet the requirements for an Annual Report per State permit number M-1983-194, and in part to meet the requirements contained in the EPA UIC Class III Area Permits: CO30358-00000 and CO32169-00000.

This report summarizes the Natural Soda LLC (NS) 2020 process operations, production activities, reclamation status, geotechnical and environmental monitoring results, as well as the status of surface facilities and wells. Proposed operations for 2021 will be described in this report, including drilling new groundwater monitor wells (GMWs); AG-2, BG-10, BG-11, and PA-1 to monitor multiple aquifers. In 2021 Plugging and Abandonment (P&A) operations will be undertaken. GMWs and water supply wells (WSWs) will be maintained. A survey of NS surface subsidence monuments (SSMs) will be conducted in 2021.

2.0 Description of Project Area

2.1 Location and Regional Setting

The four NS federal sodium leases are located in the Piceance Creek Basin in Rio Blanco County in northwestern Colorado (Figures 1 and 2). The sodium leases are located primarily between the Yellow Creek and Piceance Creek drainages, approximately 41 miles from Meeker, Colorado and 53 miles from Rifle, Colorado. The climate is semi-arid with annual precipitation averaging 12-14 inches. Precipitation generally occurs as snow from November to March and as rain during the remainder of the year. The vegetation is predominantly pinyon pine, sagebrush, Utah juniper, western wheatgrass, and needle-and-thread grass. The total area contained within the four sodium leases is 8,379 acres more or less. The principal area of operation is located in and around Section 26, T1S, R98W, 6th Principal Meridian. Figure 1 shows the NS leases and regional setting. Figure 2 shows sodium leases within the Piceance Creek Basin. Figure 3 and Figure 4 show the NS well locations and proposed well locations.

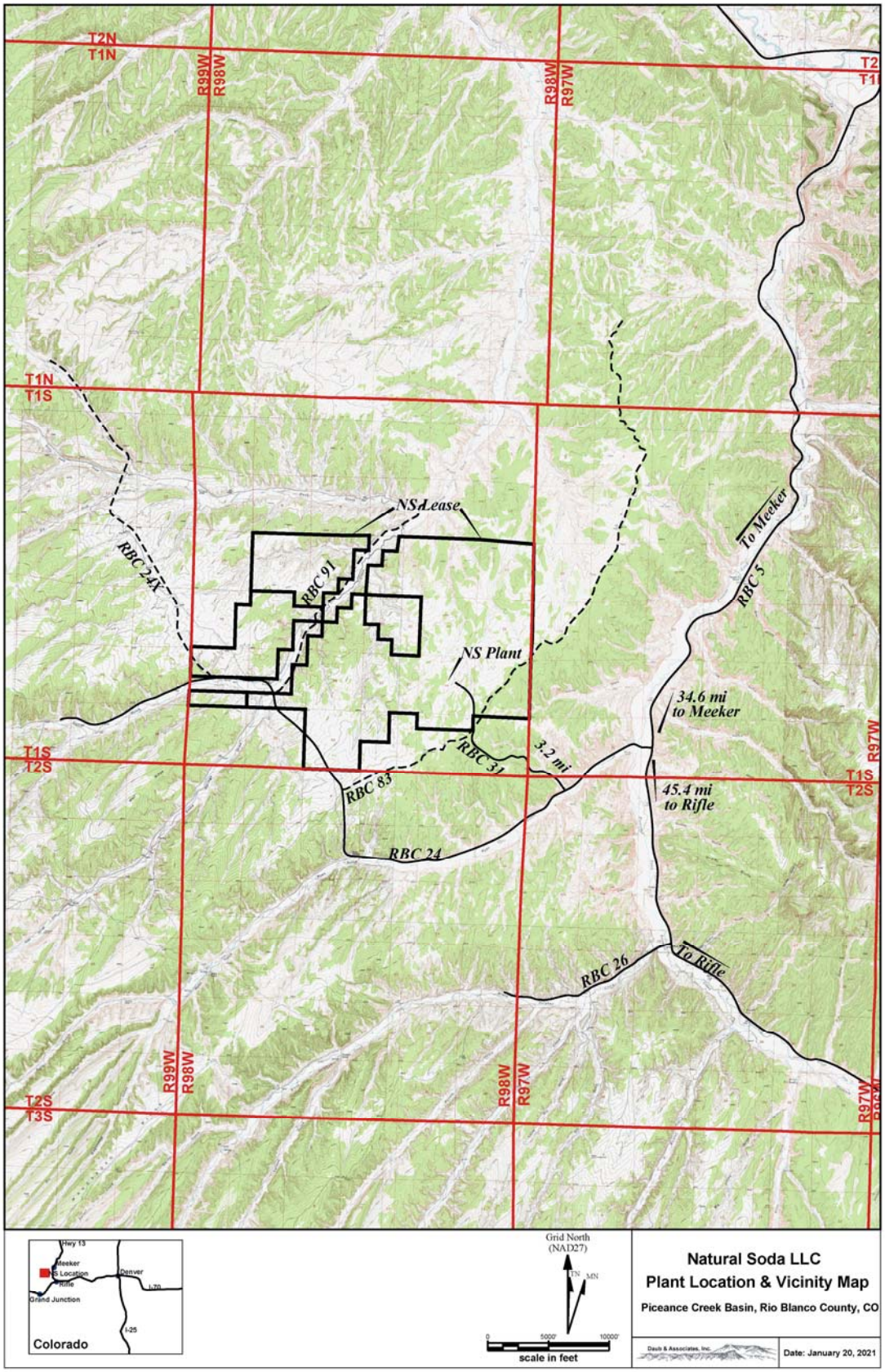


Figure 1: Natural Soda LLC Vicinity Map

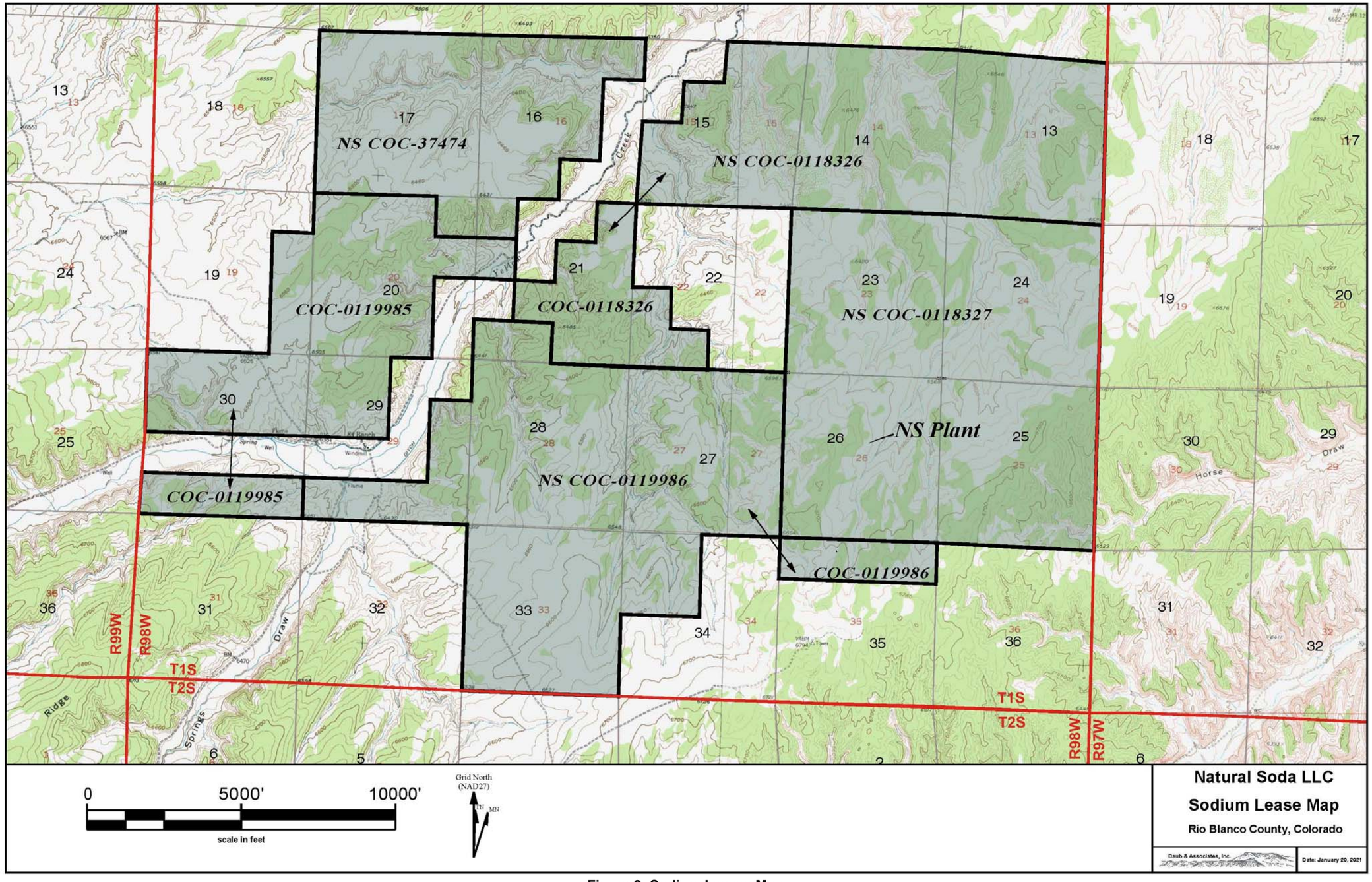


Figure 2: Sodium Leases Map

Figure 3: Plant and Well Location Map, Section 26 Detail.

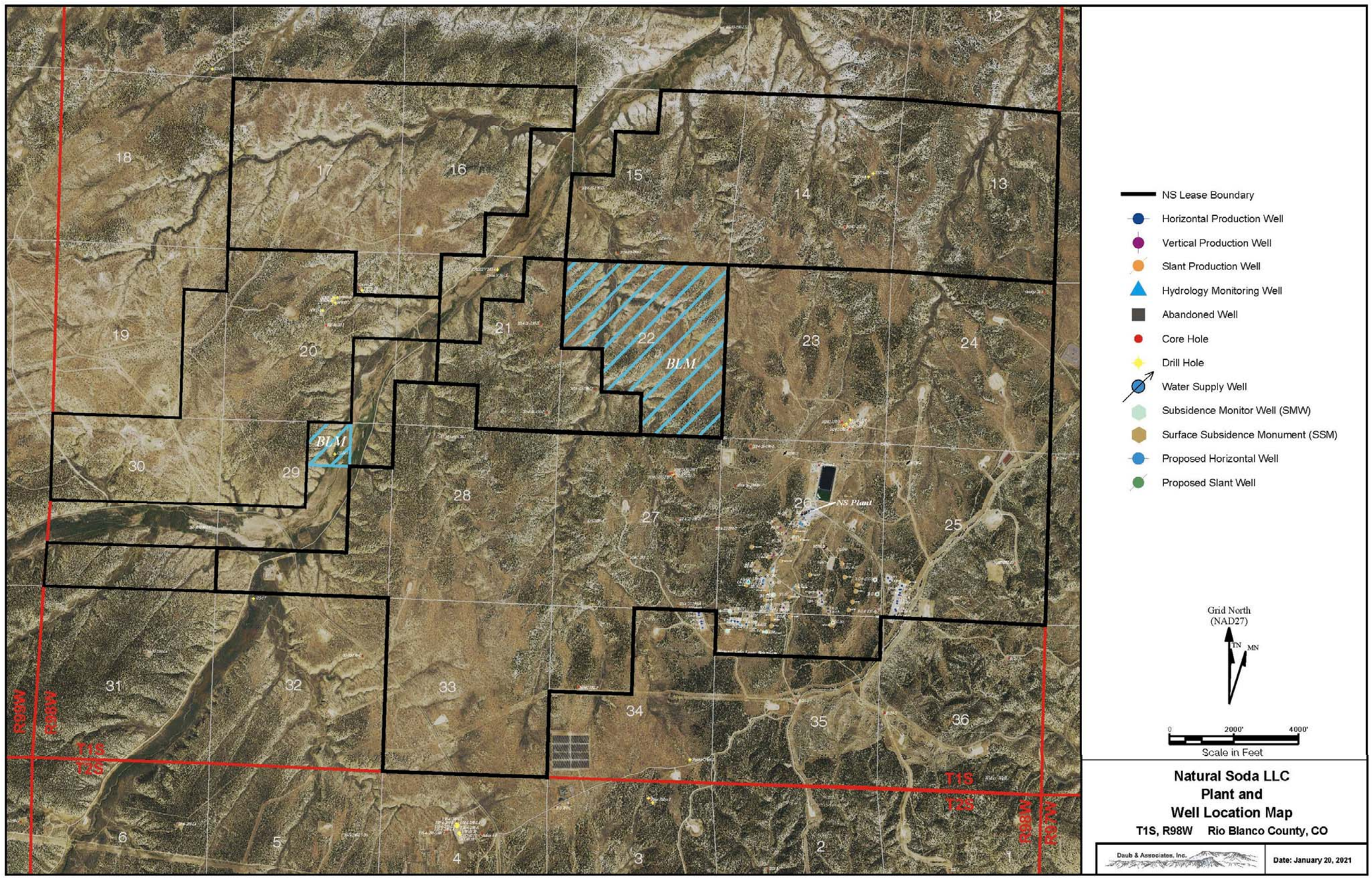


Figure 4: Plant and Well Location Map, Expanded View.

2.2 Leasehold Status

The original four sodium leases were renewed by the BLM, in 2011 for a period of ten years. Annual rental and royalty payments have been submitted to the Mineral Management Service. The NS leases comprise approximately 8,379 acres. NS will be renewing the leases again in 2021 for an additional period of ten years.

3.0 Project Status

3.1 2020 Project Activities (Confidential)

(See Figure 3 & Figure 4: Plant and Well Location Maps)

In 2020 NS produced 238,266 tons of sodium bicarbonate. This product was produced from the 12H, 13H, 14H, 15H, 16H, 17H, and DVPW mining intervals. Routine boil outs were performed in 2020. Various short shutdowns were required for routine maintenance, equipment repair and/or replacement.

3.1.1 Items of Significance (Confidential)

- Two production wells, the 16H-1V (Slant Well), and 16H-IR-E (Extended Lateral Well), were drilled and/or completed in July and August.
- The 10H-I, 10H-R, 10H-1V, and 14H-I production wells were successfully plugged and abandoned (P&A) in 2020.

3.1.2 Mining interval Production (Confidential)

Table 1: Mining Interval Production in Tons (Confidential)

Tons in 2020	Mining Interval #12H	Mining Interval #13H	Mining Interval #14H	Mining Interval #15H	Mining Interval #16H	Mining Interval #17H	Mining Interval DVPW1
	39,474	45,635	32,985	72,091	4,556	43,441	85
Total tons	246,116	199,224	265,544	227,240	114,936	116,202	1,349

3.1.3 2020 Monthly Production Tons Summary (Confidential)

Table 2: Monthly Production Summary in Tons (Confidential)

Month	Beginning Inventory	Production	Sales	Ending Inventory
January	8,266	20,599	20,167	8,698
February	8,698	19,587	19,154	9,131
March	9,131	18,152	18,677	8,494
April	8,494	21,204	20,565	9,133
May	9,133	19,683	19,001	9,815
June	9,815	19,647	18,150	11,295
July	11,295	16,598	19,260	8,633
August	8,633	20,361	19,444	9,550
September	9,550	20,182	20,030	9,672
October	9,672	20,826	20,845	9,652
November	9,652	20,207	20,800	9,059
December	9,059	21,220	23,006	7,197
TOTALS		**238,266**	**239,098**	

3.1.4 Regulatory Review (Confidential)

NS submitted routine Sundry Notices, monthly, quarterly, and annual reports to the appropriate agencies. The following summarizes other regulatory related activities:

Bureau of Land Management (BLM)

- NS submitted a Sundry Notice to BLM for WSW-2 disinfecting operations in January 2020.
- Sundry Notices for the P&A of the 10H-I, 10H-R, 10H-1V, and 14H-I production wells were submitted in September 2020. P&A completion documents for these wells were submitted in December 2020.
- NS submitted a Notice of Intent (NOI) in December 2020 for a proposal to drill three dedicated upgradient groundwater monitor wells for the Perched, A-Groove, and B-Groove Aquifers. These wells will be named PA-1, AG-2, and BG-10 respectively.
- There were no required Undesirable Event submissions to the BLM in 2020.

United States Environmental Protection Agency (EPA)

- In January 2020, the EPA issued UIC Add-a-Well (AAW) and Authorization to Inject (ATI) approvals for the 15H-IR-E production well.
- In January 2020, the EPA approved NS's 16H-R(I) AAW and Request-to-inject (RTI) submission.
- NS conducted routine, EPA mandated, MIT Part 2, temperature logging, in the 15H-IR-E injection well on March 10, 2020. External MIT (Part 2 temperature logging) in the 15H-IR-E demonstrated no indication of fluid movement into or between any underground source of drinking water (USDW) through vertical channels adjacent to the wellbore.
- Required logging and MIT work was completed and submitted for the newly constructed 16H-IR-E production well according to permit requirements.
- Mechanical Integrity Pressure Testing (MIT P1) was done in the newly constructed 16H-1V slant production wells.
- NS notified the EPA and provided completion documents for the plugging and abandonment of the 10H-I, and 14H-I production wells.
- NS conducted routine, EPA mandated, subsurface subsidence logging, in the BG-9 (DS-5, 2010-26-198-1C) subsurface subsidence monitor well (SSMW) on October 12, 2020. The BG-9 serves as the SSMW for the 13H and 14H mining intervals.
- NS submitted a UIC AAW and RTI packet to the EPA for the recently constructed 16H-IR-E production well drilled in 2020.

Colorado Division of Reclamation and Mine Safety (DRMS)

- NS submitted required annual payment fees and reports for DRMS Permits M-1983-194 and M-1999-051.
- The DRMS inspected the NS plant and well field in October, no significant issues were noted.
- The DRMS coordinated with NS on the GMW water quality issues associated with the BG-9 and BG-5 wells in November and December 2020.

Colorado Division of Water Resources (DWR)

- No activity required with DWR in 2020.

Colorado Department of Public Health & Environment (CDPHE)

- The annual CDPHE Sand and Gravel Mining and Processing Stormwater discharge Report Form was submitted August 2020.
- In June 2020 NS received a Compliance Advisory notification alleging a violation of Permit Number 15RB0259 due to the March 2020 NS submitted test report on the main Number 2 boiler NOx emission test. NS demonstrated in a response letter that the Number 2 boiler is a low NOx boiler, and that although the test data was higher than CDPHE standards, during the period of time the boiler has been run it is not consuming the fuel required to create a violation of the rule.
- In 2020 NS complied with all reporting requirements for storm water and environmental emissions.

Rio Blanco County (RBC)

- In May, the existing Special Use Permit (SUP) 12-04 was amended to include the 16H-1V, and 16H-IR-E wells and pads.
- On lease temporary living quarters were inspected and approved in July for use in support of the 2020 production well drilling program.

3.2 Proposed 2021 Activities and Schedule (Confidential)

3.2.1 Processing (Confidential)

NS anticipates increased production in 2021. Brief shut-downs for periodic boil-outs and routine maintenance are planned in 2021. In addition, Capital projects in both March and May are anticipated to require longer shutdown periods beyond normal routine maintenance.

3.2.2 Well field (Confidential)

- NS anticipates limited production from the DVPW in 2021.
- The BG-11 (B-Groove Aquifer) monitor well will be permitted, drilled, completed, in early 2021 as a replacement for the BG-9 & BG-5 GMW.
- In early 2021 NS will Plug and Abandon (P&A) the BG-5 GMW, and BG-9 GWM wells.
- The WSW-3 and WSW-4 water supply wells will be cleaned out in early 2021.
- In the third or fourth quarter 2021 NS anticipates the Plug and Abandoning (P&A) of the older GMWs MMC-IRI-8, MMC-IRI-9, and the EX-2. NS may also decide to P&A the 15H-I production well.
- NS anticipates equipping and piping the WSW-5 water supply well to be able to use it to supply water to the plant operations in late 2021.
- NS will be permitting, drilling, and equipping three new Upgradient Ground Water Monitor Wells (GMW); AG-2, BG-10, and the PA-1 to monitor multiple aquifers on a new location built south west of the NS mining operations. These wells will be beneficial in monitoring water quality of the ground water prior to it entering the NS mining operational area.

3.2.3 EPA Notification – 2021 Schedule of Planned Mechanical Integrity Test (MIT) (Confidential)

- Per EPA UIC Permit C030358-00000 Final Area Permit requirements the following MIT Part 1 and MIT Part 2 testing is planned for 2021.
    - 16H-IR-E Well – initial, routine MIT Part 2 temperature logging will be conducted in the first or second quarter of 2021.
    - 15H-I Well – 5-year anniversary, routine MIT Part 1 pressure testing, and Part 2 temperature logging is currently anticipated for the third or fourth quarter of 2021 per UIC permit requirements. NS may instead P&A this well.
    - DVPW Well – 10-year anniversary, routine MIT Part 1 pressure testing, and Part 2 temperature logging will be conducted in the third or fourth quarter of 2021 per UIC permit requirements.

3.2.4 EPA Notification – 2021 Schedule of Planned SSM Survey (Confidential)

- NS will collect biennial surface subsidence monument surveys in 2021, in accordance with UIC Permit C030358-00000 requirements.

3.2.5 EPA Notification – 2021 Schedule of Planned SSMW Logging (GR/CCL) (Confidential)

- Per EPA UIC Permit C030358-00000 requirements; the following routine subsurface subsidence monitor well (SSMW) logging (GR/CCL) is planned for 2021:
    - No routine SSMW logging is anticipated for 2021.

4.0 2020 Project Activities

4.1 On-Site Facilities and Process Description

4.1.1 General Arrangement

Figure 5 provides an overview of the process flow.

4.1.2 Lab Operation / Sanitation / ISO

In 2020, activities continued in the laboratory to provide analysis for process control, quality assurance, and regulatory requirements.

- Plant operators performed process control analyses.
- Chloride levels were monitored by both operations and laboratory personnel on all USP grades to ensure USP standards were met.
- The USP test for insoluble materials was conducted on a per lot basis by laboratory personnel and a filter test for insoluble materials was conducted on the dry product once per shift by operations.
- Pests were controlled with the use of two UV bug lights and rodent traps around the interior and exterior walls of the plant.
- GMP/ISO/Sanitation training was provided for all employees as required.
- A food safety audit for FSSC 22000 was conducted for which Natural Soda maintained GFSI certification.
- CDPHE, NSF, OMRI, Kosher, Halal, non-GMO, and ISO 9001 certifications were maintained.

4.1.3 Process, Utilities, Facilities

- In 2020 NS did not make any significant improvements to process, utilities, or facilities. Figure 5 illustrates the general process flow.

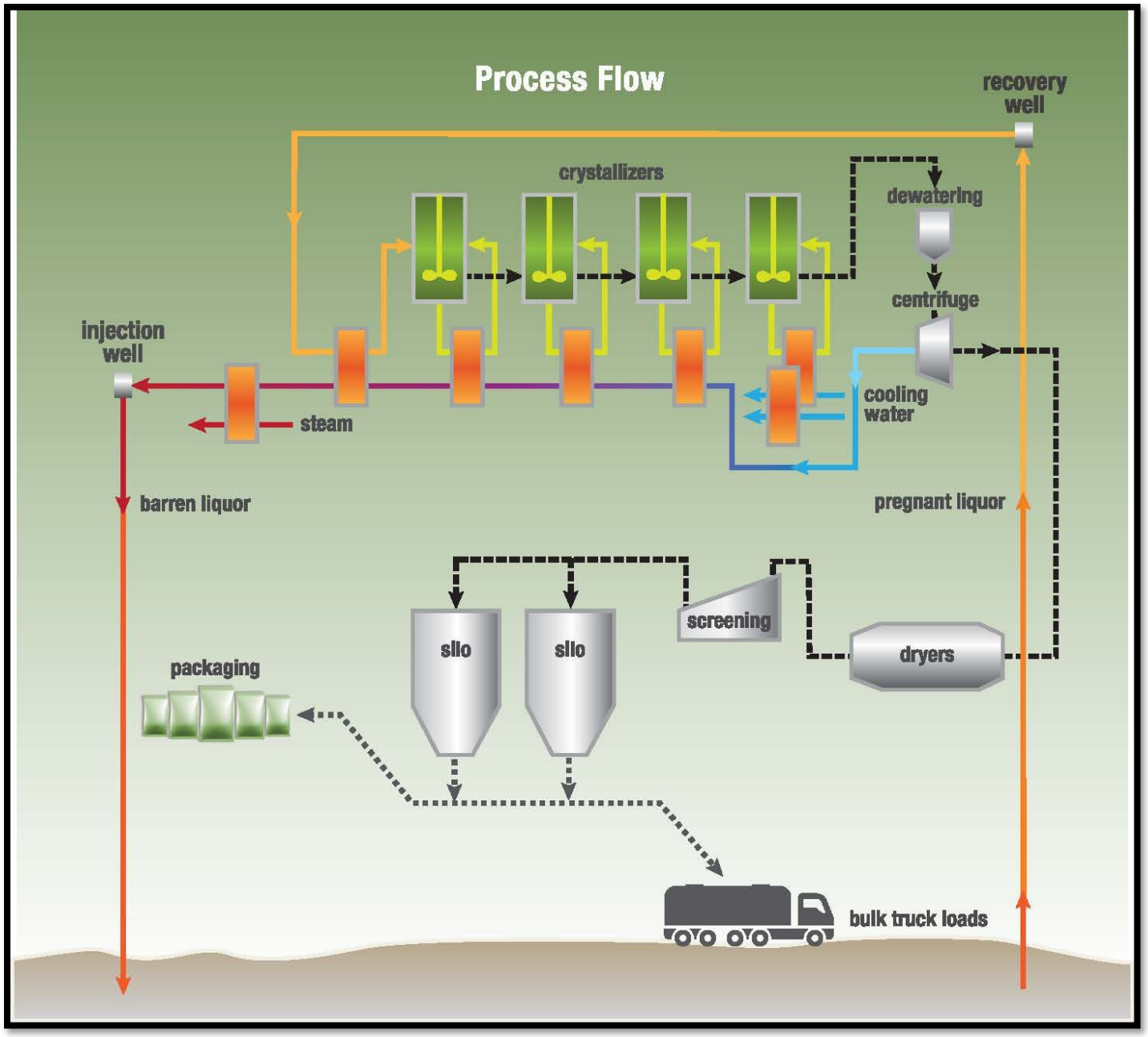


Figure 5: General Flow Process

4.1.4 Wells Associated with the NS Project (Confidential)

The following well-field related activities occurred in 2020: Refer to *Figure 3 & Figure 4 Plant and Well Location Map.*

- Four production wells were plugged and abandoned during the month of October 2020: 10H-1V (Oct 12-14), 10H-I (Oct 14-16), 10H-R (Oct 19-27) and 14H-I (Oct 27-30) production wells.
- The 16H-1V slant/production well was drilled and completed in July 2020 and began producing in December 2020. Mechanical Integrity Tests (MIT) Part 1 was completed pursuant to UIC stipulations during drilling operations. 16H-1V began producing in December 2020.
- The 16H-IR-E production well was spudded July 2020 and completed in August 2020. EPA Mechanical Integrity Test (MIT) Part 1 was completed pursuant to UIC stipulations during drilling operations. MIT Part 2 temperature logging will occur in February 2021. As of December 2020, the 16H-IR-E has been utilized as an injection well.
- Cleanout operations occurred in May 2020 on both the 89-1 (B-Groove monitoring well) and 89-2 (A-Groove monitoring well). Nitrogen lift sampling pumps and associated equipment were installed in both wells June 2020.
- The DS-2 well sampling equipment and pump were removed and replaced with a new nitrogen lift pump (NLP) system in April 2020.
- May 2020, the DS-3 nitrogen lift pump was non-functional, the pump and associated equipment was replaced in June 2020.
- BG-9 (DS-5) GMW was evaluated for a possible casing/bridge plug issue in September 2020 due to noted water quality issues. On October 5th, the downhole sampling equipment (transducer, nitrogen lift pump) was removed from the BG-9 (DS-5) monitoring well and a video log was run the following week on October 12th. The video log indicated suspected casing partings at 1,676.9, 1,760.9, 1,782.2, and 1,804.2 feet MD GL. The EPA, BLM and DRMS were notified. In November 2020, a CIBP set at a depth of 1,818' in the 4.5-inch casing, and plugback cement was added to the well bore between the depths of 1,818 and 1,654' (164' lift) to plug back the well to a depth of 1,662'. NS reinstalled the nitrogen lift pump (NLP) and associated equipment in the BG-9 (DS-5) GMW to resume sampling. In December 2020, in coordination with BLM and DRMS, it was determined that it would be best to P&A the BG-9 (DS-5). A new B-Groove Aquifer monitoring well (BG-11) will be drilled east of the BG-9 (DS-5) well on the 10-13 pad in 2021.
- The BG-5 was noted to be experiencing water quality issues in November 2020. In December 2020, NS removed the nitrogen lift sampling pump and equipment from the BG-5 GMW. On December 28th a video log inspection of the 4.5-inch casing and casing couplings showed no visible issues, aside from some expected minor surface corrosion in places. A significant fluid halocline and fluid flow was observed within the casing at 1,633.5 feet BGL. Based on this video log and water quality data it was determined in coordination with BLM and DRMS that the BG-5 well should be P&A'd.

The current status of all wells associated with the NS Project is indicated in *Table 3: List and Status of Wells Associated with NS*.

4.1.5 Other Activities

Continuous water level monitoring of proximal DS aquifer monitor wells provided real time data for the management of active production mining interval operations. Throughout the year, injection and recovery rates were adjusted to maintain monitoring well water levels near target zones.

Table 3: List and Status of Wells Associated with NS

Well Name	Initial Well Type	Current Well Status	Section	Town-ship	Range	Latitude (NAD 27)	Longitude (NAD 27)	Initial TD, (MD, ft)	Current TD, (MD, ft)	Comments
3M-TDR	Subsidence Monitoring	Subsidence Monitoring	26	1S	98W	39.928794934	108.362551397	1820	1820	
4A-5M	Hydrology/Subsidenc e Monitoring	Plugged and Abandoned	26	1S	98W	39.929813477	108.365383461	1830	0	P&A June 2012 Currently Operates as TDR Well
10H-I	Horizontal Injection	Horizontal Injection (Inactive)	25	1S	98W	39.927895622	108.349074715	4033	4033	P&A October 2020
10H-R	Horizontal Recovery	Horizontal Recovery (Inactive)	25	1S	98W	39.928427876	108.348902019	2840	2840	P&A October 2020
10H-1V	Slant Recovery	Slant Recovery (Inactive)	26	1S	98W	39.928386480	108.357515700	2038	2038	P&A October 2020
12H-I	Horizontal-Injection	Horizontal-Production	25	1S	98W	39.929304000	108.348621000	4189.0	4189	TVD TD=~1985’
12H-R	Horizontal-Recovery	Horizontal-Recovery	25	1S	98W	39.929598000	108.348538000	2623.0	2623	TVD TD=~2007'
12H-IR	Horizontal-Production (Inj/Rec)	Horizontal-Production	26	1S	98W	39.929667896	108.363801054	3464.7	3464.7	TVD TD=-1972’
13H-R(I)	Horizontal-Production (Inj/Rec)	Horizontal-Production	25	1S	98W	39.929583170	108.348684400	2549	2549	TVD TD=~2013’
13H-IR	Horizontal-Production (Inj/Rec)	Horizontal-Production	26	1S	98W	39.930014690	108.363712457	3423.7	3423.7	TVD TD=-1964’
14H-I	Horizontal Injection	Horizontal-Injection (Inactive)	25	1S	98W	39.930529000	108.349996000	3822	3822	P&A October 2020
14H-R(I)	Horizontal Production (Inj/Rec)	Horizontal-Production	25	1S	98W	39.930265288	108.349763798	2819	2819	TVD TD=~1983’
14H-1V	Slant Production (Inj/Rec)	Slant Production (Rec)	26	1S	98W	39.931733549	108.35641781	2095.5	2095.5	
15H-I	Horizontal Injection	Horizontal-Injection	27	1S	98W	39.927281590	108.370834800	5477	5477	TVD TD=~1877’
15H-R(I)	Horizontal Production (Inj/Rec)	Horizontal-Production	34	1S	98W	39.927050806	108.370714984	2698	2698	TVD TD=~1850’
15H-1V	Slant Production (Inj/Rec)	Slant Production (Rec)	26	1S	98W	39.92797980	108.36112812	2079.1	2079.1	
15H-IR-E	Horizontal Production (Inj/Rec)	Horizontal Production	25	1S	98W	39.92778393	108.34898748	4032.4	4032.4	
15H-SSMW	Subsurface Subsidence Monitoring	Subsurface Subsidence Monitoring	26	1S	98W	39.927297800	108.367304200	1760.5	1760.5	
16H-I	Horizontal Injection	Horizontal-Injection	34	1S	98W	39.926332533	108.371061443	5425	5425	TVD TD=~1910’
16H-R(I)	Horizontal Production (Inj/Rec)	Horizontal-Production	34	1S	98W	39.926848404	108.371348247	2451	2451	TVD TD=~1856’
16H-1V	Slant Production (Inj/Rec)	Slant Production (Rec)	35	1S	98W	39.925742470	108.363769248	2086	2086	TVD TD= ~1945’
16H-IR-E	Horizontal Production (Inj/Rec)	Horizontal Production	25	1S	98W	39.927419470	108.349138051	4025	4011	TVD TD= ~1959’
17H-I	Horizontal-Injection	Horizontal-Injection	34	1S	98W	39.925807900	108.370279100	5378.9	5378.9	TVD TD=-1911’
17H-R	Horizontal-Recovery	Horizontal-Recovery	34	1S	98W	39.926171184	108.370365216	2431.7	2431.7	TVD TD=-1872’
17H-SSMW	Subsurface Subsidence Monitoring	Subsurface Subsidence Monitoring	35	1S	98W	39.925620961	108.367424479	1731.0	1720.6	
89-1	Hydrology Monitoring	Hydrology Monitoring Well	26	1S	98W	39.934818008	108.359830288	1989	1570	
89-2	Hydrology Monitoring	Hydrology Monitoring Well	26	1S	98W	39.934771572	108.359655360	1409	1389	
89-3	Hydrology Monitoring	Hydrology Monitoring Well	26	1S	98W	39.934959857	108.359876003	400	390	Periodic sampling issues.
90-1	Water Supply	Hydrology Monitoring Well	26	1S	98W	39.930942569	108.362786046	1451	1451	Converted to A-Grv MW August 2015
WSW-2 (2010-26-198-2C)	Core Hole	Water Supply	26	1S	98W	39.932913043	108.357000636	1964	1402	Cored July 2010
WSW-3	Water Supply	Water Supply	26	1S	98W	39.940837450	108.361799400	1440	1440	Drilled August 2014
WSW-4	Water Supply	Water Supply	26	1S	98W	39.940358200	108.348198508	1437	1437	Drilled August 2014
90-3	Hydrology Monitoring	Hydrology Monitoring Well	26	1S	98W	39.927659529	108.363196386	1577	1556	
90-4	Hydrology Monitoring	Hydrology Monitoring Well	26	1S	98W	39.927654857	108.363040763	1392	1371	
AG-1	Core Hole 2014-25-198-J	Hydrology Monitoring Well	25	1A	98W	39.929116963	108.348465043	2061	1487	Cemented up to groundwater monitoring well level
BG-1	Hydrology Monitoring	Hydrology Monitoring	35	1S	98W	39.92620970	108.36612260	1911	1552	
BG-4	Hydrology Monitoring	Hydrology Monitoring Well	26	1S	98W	39.929278506	108.356901248	1999.5	1603	
BG-5 (12H-C)	Core Hole	Hydrology & Subsidence Monitoring Well	26	1S	98W	39.929138572	108.351120681	3005	1645	Cemented up to groundwater monitoring well level.
BG-6 (2010-26-198-6C)	Core Hole	Hydrology Subsidence Monitoring Well	26	1S	98W	39.931301816	108.354997679	1978	1577	

Table 3: List and Status of Wells Associated with NS (continued)

Well Name	Initial Well Type	Current Well Status	Section	Town-ship	Range	Latitude (NAD 27)	Longitude (NAD 27)	Initial TD, (MD, ft)	Current TD, (MD, ft)	Comments
BG-7	Core Hole 2014-25-198-K	Hydrology Monitoring Well	25	1S	98W	39.928987896	108.432905289	1967	1593.1	Cemented up to groundwater monitoring well level.
BG-9 (DS-5)	Core Hole	Hydrology Subsidence Monitoring Well	26	1S	98W	39.930335423	108.351403951	1973	1902	Previously known as DS-5, Sep 2018: CIBP; 1829', perfs: 1603-1623' for B-Grv Monitoring.
DS-2 (97 DS2)	Hydrology Monitoring	Hydrology Monitoring Well	35	1S	98W	39.926217942	108.366158755	1854	1829	
DS-3	Hydrology Monitoring	Hydrology Monitoring Well	26	1S	98W	39.929529067	108.360329121	2100	1874.5	Sample pump replaced with NLP in 2018
DVPW-1	Vertical Production	Vertical Production	26	1S	98W	39.929100000	108.357500000	2904.6	2904.6	Limited Production.
DS-6	Core Hole	Hydrology Monitoring Well	35	1S	98W	39.926942000	108.362195000	2962.6	1870	Cemented up to groundwater monitoring well level.
DS-7	Core Hole	Hydrology Subsidence Monitoring Well	26	1S	98W	39.932036903	108.362826421	1980	1875	Cemented up to groundwater monitoring well level.
DS-8	Core Hole 2014-26-198-I	Hydrology Monitoring Well	26	1S	98W	39.932738295	108.355594975	2000	1881.7	Cemented up to groundwater monitoring well level.
DS-9	Core Hole 2014-25-198-M	Hydrology Monitoring Well	25	1S	98W	39.927447860	108.340064803	1916.5	1842	Cemented up to groundwater monitoring well level
DS-10	Hydrology Subsidence Monitoring Well	Hydrology Subsidence Monitoring Well	35	1S	98W	39.92659671	108.35590409	1995	1925	
EX-2	Core Hole	Hydrology Monitoring Well	26	1S	98W	39.934857517	108.359996032	1980	1897	
MMC-IRI-1	Core Hole	Hydrology Monitoring Well	26	1S	98W	39.927580161	108.363115621	2981	397	Cemented up to groundwater monitoring well level.
MMC-IRI-4	Core Hole	Hydrology Monitoring Well	23	1S	98W	39.942950000	108.355333333	3001	1411	Cemented up to groundwater monitoring well level.
MMC-IRI-5	Core Hole	Hydrology Monitoring Well	23	1S	98W	39.943578031	108.355623039	2983	378	
MMC-IRI-6	Core Hole	Hydrology Monitoring Well	23	1S	98W	39.943733333	108.355316667	1878	1394	
MMC-IRI-7	Core Hole	Hydrology Monitoring Well	23	1S	98W	39.943516667	108.356033333	1880	1395	
MMC-IRI-8	Core Hole	Hydrology Monitoring Well	23	1S	98W	39.943450000	108.355833333	1880	489	
MMC-IRI-9	Core Hole	Hydrology Monitoring Well	34	1S	98W	39.920759982	108.383119038	2864	1710	
MMC-IRI-11	Core Hole	Hydrology Monitoring Well	25	1S	98W	39.931608050	108.336010982	2963	1550	Cemented up to groundwater monitoring well level.
MWA-2	Hydrology Monitoring	Hydrology Monitoring Well	20	1S	98W	39.952825612	108.412403600	1200	1200	
MWB-2	Hydrology Monitoring	Hydrology Monitoring Well	20	1S	98W	39.953067253	108.412206500	1398	1398	
MWD-1	Hydrology Monitoring	Hydrology Monitoring Well	20	1S	98W	39.953094778	108.411828300	1731	1731	
MWD-2	Hydrology Monitoring	Hydrology Monitoring Well	20	1S	98W	39.952635000	108.412036900	1703	1703	
MWU-2	Hydrology Monitoring	Hydrology Monitoring Well	20	1S	98W	39.933370000	108.350210000	687	687	
O-GMW-A	Core Hole 2014-27-198-O	Hydrology Monitoring Well (Inactive)	27	1S	98W	39.934483259	108.383446479	1786	1294	Cemented up to groundwater monitoring well level
TH75-6A	Hydrology Monitoring	Hydrology Monitoring Well	14	1S	98W	39.964492958	108.353578053	1260	1260	
TH75-6B	Hydrology Monitoring	Hydrology Monitoring Well	14	1S	98W	39.964807700	108.353045189	1755	1755	
TH75-11A	Hydrology Monitoring	Hydrology Monitoring Well	20	1S	98W	39.952321958	108.409207410	1080	1080	
TH75-11B	Hydrology Monitoring	Hydrology Monitoring Well	20	1S	98W	39.953286260	108.409494700	1498	1498	
RS-96-20-1	Hydrology Monitoring	Inactive	20	1S	98W	39.95037676	108.41282630	2598	1717	OH Packer at 1295'

4.2 New Findings or Developments (Confidential)

- The 10H-I, 10H-R, 10H-1V, and 14H-I wells were P&A'd in late 2020.
- The WSW-4 water supply well is currently pumping at a reduced rate. The WSW-4 and WSW-3 will undergo a clean out operation in early 2021 to increase water supply capabilities.
- The 16H-1V production well was drilled and completed in 2020 into the central portion of the existing 16H production interval, providing a recovery well nearer to the center of the 16H mining interval. The 16H-1V mining interval began production operations in December of 2020.
- The 16H-IR-E well was horizontally drilled and completed into the eastern portion of the existing 16H production interval in 2020. In conjunction with the 16H-1V slant/production well, the 16H-IR-E will serve to enhance NS production capabilities.
- In late 2020, the BG-5 and BG-9 GMW water samples were noted to deviate from baseline values. Investigations revealed the likelihood that flows within the well casing and/or wellbore allowed fluids from deeper intervals (DS Aquifer) to migrate upward. NS, in coordination with agencies, will plug and abandon (P&A) these wells. A new B-Groove Aquifer monitoring well (BG-11) will be drilled to the east of the mining operation to replace these two wells.

4.3 2020 Operation Results (Confidential)

Mining and production activities were continuous in 2020. The following table provides a summary of mining and process results:

Table 4: Mine and Process Data (Confidential)

2020	Recovery	Recovery	Assay	Assay	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Monthly
Month	*Avg GPM*	*Temp.*	*Bicarb g/l*	*NaCl g/l*	*Mining Interval #12H*	*Mining Interval #13H*	*Mining Interval #14H*	*Mining Interval #15H*	*Mining Interval #16H*	*Mining Interval #17H*	*Mining Interval DVPW1*	*Total Tons*
Jan-2020	1,837	186	206	18	5,158	4,950	2,592	4,431	0	3,468	0	20,599
Feb-2020	1,848	183	204	17	5,149	4,825	2,181	3,882	56	3,494	0	19,587
Mar-2020	1,614	182	204	17	2,909	5,517	2,595	3,509	0	3,622	0	18,152
Apr-2020	1,912	186	206	17	3,652	4,506	2,761	5,949	0	4,336	0	21,204
May-2020	1,781	184	205	18	2,894	3,730	2,461	6,425	0	4,089	85	19,683
Jun-2020	1,650	179	204	17	0	5,080	3,074	6,410	0	5,083	0	19,647
Jul-2020	1,429	183	203	18	2,160	4,178	3,119	3,274	0	3,868	0	16,598
Aug-2020	1,826	181	202	18	2,590	4,090	2,860	7,784	0	3,036	0	20,361
Sep-2020	1,877	191	201	18	3,601	2,703	3,501	7,098	0	3,280	0	20,182
Oct-2020	1,857	189	201	18	4,205	2,501	2,843	8,147	0	3,129	0	20,826
Nov-2020	1,911	186	204	18	4,210	2,684	2,615	7,990	0	2,709	0	20,207
Dec-2020	1,833	190	206	18	2,946	872	2,382	7,191	4,500	3,328	0	21,220
AVERAGE	1,781	185	204	18	3,290	3,803	2,749	6,008	380	3,620	7	19,856
TOTAL					*39,474*	*45,635*	*32,984*	*72,091*	*4,556*	*43,441*	*85*	*238,266*

Key to above headings:	
	Recovery - Monthly average house flow rate and pregnant liquor temperature during process operations
	Assay - g/L sodium bicarbonate (as total bicarbonate) and sodium chloride in the pregnant liquor
	(Total bicarbonate = bicarbonate g/L + 1.58 x carbonate g/L)
	Tons - Total monthly bicarbonate production from each mining interval.
	Temp. - Temperature in degrees F recovered at the pregnant liquor tank.
	Avg GPM - Monthly average injection flow rate during process operations.

Figure 6 illustrates 2020 pregnant liquor analytical results. Figure 7 represents monthly production for 2020. NS processed and produced their sodium bicarbonate product during all twelve months of 2020. The balance between injection and recovery rates for mining intervals 12H, 13H, 14H, 15H, 16H, 17H, and the DVPW has been continuously monitored using fluid level indicators (pressure transmitters) installed in existing Dissolution Surface aquifer monitoring wells located near the active mining intervals.

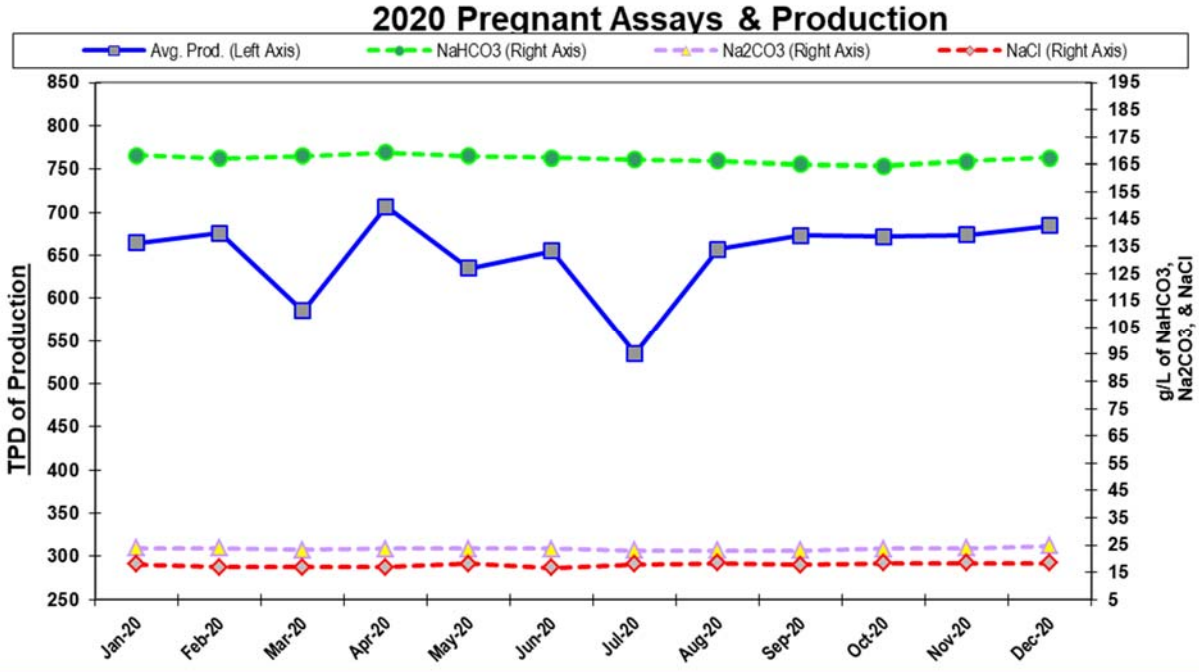


Figure 6: Pregnant Assays and Production (Confidential)

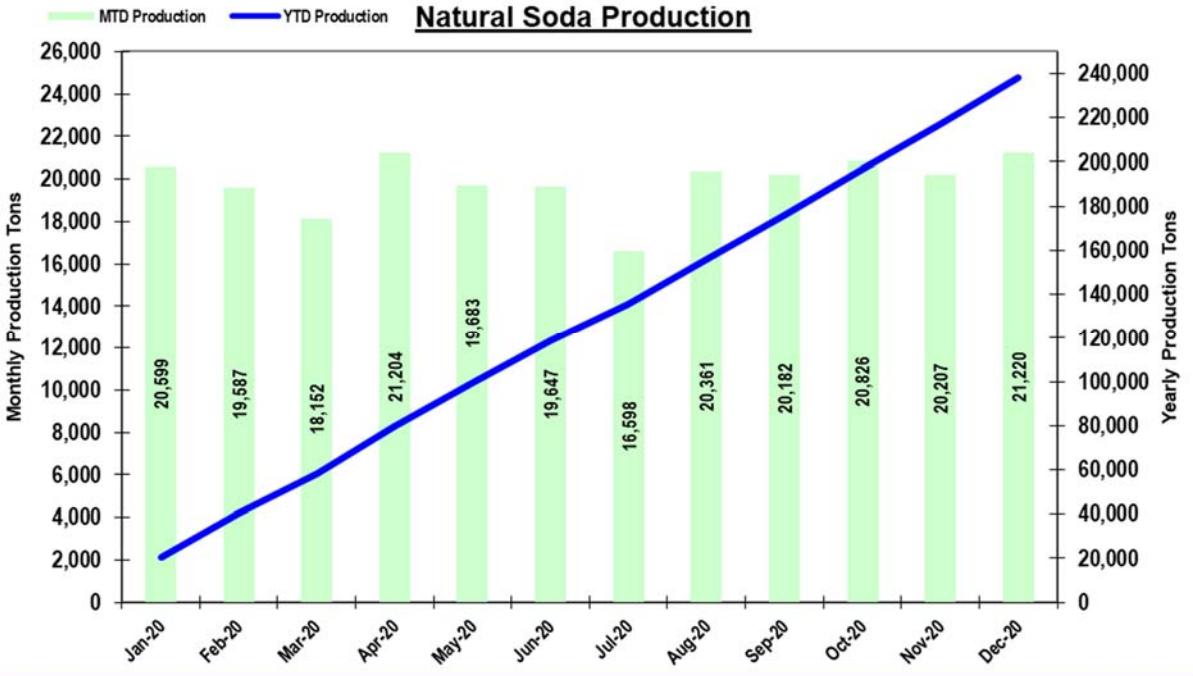


Figure 7: NS 2020 Production (Confidential)

4.4 Geotechnical Program

NS currently monitors two time-domain-reflectometry (TDR) subsurface-subsidence monitor wells, the 4A-5M and 3M-TDR. There has been no indication of surface or subsurface subsidence near the 4A-5M or 3M-TDR wells since installation. One of the TDR cables in the 4A-5M well is showing evidence of water infiltration. Two of the four TDR cables in 3M-TDR subsidence well were corrupted during installation, in 2003, and not operable. In addition to the monthly NS readings, the installation contractor also collects data quarterly.

4.4.1 Subsurface Subsidence Geophysical Logging

NS conducted the initial EPA mandated, subsurface subsidence logging, in the BG-9 (DS-5, 2010-26-198-1C) monitor well on October 12, 2020. This subsurface subsidence monitor well is associated with the 13H and 14H mining intervals.

4.4.2 Surface Subsidence Monitoring

A surface subsidence monument (SSM) survey of all SSMs above NS's area of operations was conducted in the second quarter of 2019. Results of the 2019 SSM survey are shown in Table 5 below. A planed SSM survey of all SSM's will be conducted in the second quarter of 2021.

4.5 Water Well Pumpage

In 2020, approximately 83.07 million gallons of water was pumped from water supply wells WSW-2, WSW-3, and WSW-4 with an average of 156.7 gpm. The total pumpage from WSW-2 was 579,100 gallons, WSW-3 was 46.07 million gallons, and the total pumpage from WSW-4 was 36.42 million gallons.

Table 5: Surface Subsidence Monument (SSM) Elevation Monitoring

SSM Monument	Initial Monument Elevation (ft. AMSL)	2019 Monument Elevation (ft. AMSL)	Elevation Change (ft.)
CP Soda BM	6,634.90	6,634.90	0.00
CP Center SSM	6,658.99	6,658.95	-0.04
CP North SSM	6,639.21	6,639.18	-0.02
CP East SSM	6,669.52	6,669.39	-0.13
CP South SSM	6,683.84	6,683.86	0.02
CP West SSM	6,669.77	6,669.59	-0.18
CP 6 SSM	6,682.88	6,683.06	0.18
CP 7 SSM	6,706.52	6,706.46	-0.06
CP 8 SSM	6,691.65	6,691.66	0.01
CP 10 SSM	6,687.41	6,687.39	-0.02
10H SSM	6,712.95	6,712.71	-0.25
11H SSM	6,705.81	6,705.48	-0.32
12H SSM	6,695.86	6,695.64	-0.22
13H SSM	6,684.47	6,684.22	-0.25
14H SSM	6,675.20	6,675.08	-0.12
15X SSM	6,694.41	6,694.37	-0.04
15H SSM	6,702.35	6,702.38	0.03
16H SSM	6,713.03	6,713.21	0.18
17H SSM	6,719.06	6,719.12	0.07
12HA SSM	6,661.41	6,661.39	-0.02
CP 11 SSM	6,653.71	6,653.69	-0.02
CP 12 SSM	6,702.11	6,702.11	0.00
CP 13 SSM	6,725.22	6,725.30	0.08

5.0 Environmental Monitoring and Protection

5.1 Hydrology Monitoring

5.1.1 Introduction

NS's hydrology monitoring program concentrates on groundwater, as there are no perennial streams or springs located on the NS's sodium leases. The USGS stream gauging station-monitoring program is conducted, with NS support, to provide regional surface stream flow data on Yellow and Piceance Creeks.

The hydrology-monitoring plan is designed to determine impacts of NS's solution mining operations on underground sources of drinking water, as designated by the US EPA.

Refer to Figure 3 and Figure 4 for the locations of existing monitor wells. Groundwater analytical results are presented in Appendix A.

5.1.2 Stream Gauging Stations

NS contracts with the USGS to monitor surface waters for water quality and quantity. Monitoring was performed upstream and downstream relative to the mining operations and with respect to Yellow Creek and Piceance Creek at four existing stations with extensive historical data. Historical stream gauging data is reported in this document and discharge data is complete through the 2020 water year (WY) (October 2019 – September 2020).

The USGS surface water data are available to the public from the USGS web site at http://co.water.usgs.gov. Tables 6 and 7 summarize key 2020 WY data for surface water near the NS site.

Data reported in Table 6 and Table 7 is compiled from the USGS web site. The Specific Conductance and Temp data included in the tables were generated by using USGS lab test results for each stream reported on the USGS web site during the 2020 WY.

A review of USGS stream water quality data indicated no significant change in stream water quality during 2020. The NS 2020 precipitation data showed a marked decrease at the NS location in 2020 comparatively with the last few years, 2018 (18.2"), 2019 (20.8"), through 2020 (9.79"). The WY data discharge (cfs) in this area does indicate a similar decrease in average stream discharge levels for the 6242 Corral Gulch and 6255 Yellow Creek, but the 6200 and 6222 Piceance Creek streams have increased discharge. Other reasons besides precipitation that effect stream flow discharge levels in the area could be from irrigation diversions. The USGS notes in the 2019 and 2020 year end water reports that the 6200 (Piceance Creek below Ryan Gulch) has diversions for irrigation upstream of monitor station. The 6222 (Piceance Creek at White River) has diversions for irrigation of ~5,500 acres upstream from the monitor station. The 6255 (Yellow Creek near White River) has diversions to irrigate ~300 acres upstream from the monitor station. The 6242 (Corral Gulch near Rangely) which historically has been a low flow stream is not reported as having any diversions upstream from the monitoring station.

The 2020 Specific Conductance data from USGS for all four stations was within the range values for the period of record. Two (6222 & 6255) of the four streams had increases in Max Specific Conductance from 2019 to 2020 WY. Two (6200 & 6242) of the four streams had decreases in Max Specific Conductance from 2019 to 2020 WY.

The 2020 water temperature values were within the range of historic data. Post review of the USGS data, no effect on stream water quality was noted due to the NS mining operations.

Table 6: Historical Comparison with 2020 Water Year Data

Station	Discharge P of R*	Discharge 2020 WY**	Average Total Discharge P of R	Total Discharge 2020	Specific conductance (µS/cm @ 25° C)				Temp (°C)	
					P of R	2020 WY	P of R	2020 WY	P of R	2020 WY
	cfs	cfs	ac ft/yr	ac ft/yr	Max	Max	Min	Min	Max	Max
6200	25.40 (55 yrs)	10.90	18,402	7,891	2,800	1,590	600	1,400	26.3	20.4
6222	31.40 (54 yrs)	12.40	22,540	8,977	7,240	4,160	516	2,080	30.0	11.4
6242	1.50 (45 yrs)	0.38	1,071	274	1,760	1,260	312	1,180	24.0	22.1
6255	2.36 (42 yrs)	0.85	1,706	618	5,200	4,560	460	3,900	31.0	14.9
6200 Piceance Creek below Ryan Gulch					6242 Corral Gulch near Rangely					
6222 Piceance Creek at White River					6255 Yellow Creek near White River					
* P of R = Period of Record for collection of data.					**WY = Water Year (October-September).					
cfs = cubic feet per second, average annual flow.					N/D = No data available at time of publication					

Table 7: Yellow and Piceance Creek Discharge Data up to 2020 Water Year

Project Data Comparison														
Discharge for Water Years in cfs														
Station	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
6200	15.2	27.9	16.3	13.4	36.2	17.5	11.3	10.7	15.9	17.0	11.7	7.5	9.6	10.9
6222	17.8	36.2	20.8	17.6	41.7	19.2	11.8	13.0	19.7	21.2	15.5	8.9	11.6	12.4
6242	0.5	1.3	0.4	0.3	1.1	0.3	0.2	0.5	0.5	1.9	0.6	0.1	1.0	0.4
6255	1.2	1.1	1.0	0.9	1.3	1.2	1.1	1.2	1.3	1.3	1.7	0.8	1.6	0.9
Maximum Specific Conductance (µS/cm @ 25° C)														
Station	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
6200	1,700	1,460	1,620	2,020	1,460	1,610	1,930	2,040	1,770	1,840	2,120	1,700	1,740	1,590
6222	3,500	1,950	3,130	4,800	2,290	5,350	5,100	3,190	2,790	2,020	3,550	5,350	3,300	4,160
6242	1,280	1,350	1,320	1,460	1,280	1,480	1,430	1,400	1,330	1,170	1,280	1,490	1,480	1,260
6255	4,230	3,830	4,050	4,260	4,130	4,170	4,720	4,530	4,070	4,520	3,600	3,980	4,530	4,560
* P of R = Period of Record for collection of data.					**WY = Water Year (October-September).					cfs = cubic feet per second, average annual flow.				
6200 Piceance Creek below Ryan Gulch					6242 Corral Gulch near Rangely									
6222 Piceance Creek at White River					6255 Yellow Creek near White River									
N/D No data available at time of publication.														

5.1.3 Monitoring Wells

Per regulatory requirements, dedicated groundwater monitoring wells have been constructed to monitor four water-bearing intervals identified as the Perched, A-Groove, B-Groove, and the Dissolution Surface Aquifers. These aquifers are monitored at several locations across the solution mining area: up and down-gradient, remote down-gradient, and toward the east near the southeast portion of Section 26. Refer to Figure 3 and Figure 4 for well locations.

Baseline and current groundwater monitoring data have been obtained from 1991 through present. Within NS's lease boundaries, there are four aquifers defined by US EPA as underground sources of drinking water (USDW): the Perched, A-Groove, B-Groove, and Dissolution Surface Aquifers. The Dissolution Surface Aquifer has been exempted as an underground source of drinking water in the NS lease and permit areas. The DS Aquifer monitored by NS contains total dissolved solids (TDS) values in excess of 10,000 parts per million (PPM).

The Perched Aquifer is characteristically lower in TDS, conductivity, fluoride, SAR (sodium absorption ratio) and moderate to higher in sulfate and pH. The A-Groove and B-Groove Aquifers are similar in water quality with moderate TDS, conductivity, SAR, but higher fluoride. However, the B-Groove Aquifer generally has slightly higher levels of TDS, conductivity, SAR, and fluoride. The Dissolution Surface Aquifer is characterized by very high TDS and conductivity (30,000 to >100,000 ppm), higher SAR, magnesium, potassium, moderate pH, and a generally higher fluoride.

In 2020 the results of groundwater monitoring were analyzed for potential anomalies in order to prevent or mitigate potential negative impacts to the USDW's.

Appendix A contains detailed sampling results for all groundwater monitoring wells.

5.1.4 Storage and Evaporation Ponds

The NS storage and evaporation ponds have a secondary liner and are constructed to collect and direct any condensation or leakage to tubes for removal. Weekly collection and removal of leachate continued in 2020. Pond information is reported on a monthly basis.

5.1.5 Potentiometric Surface Maps (Confidential)

Using groundwater level elevations from NS groundwater monitoring wells and other NS wells, the potentiometric surface has been plotted for the A-Groove and B-Groove Aquifers. Maps representing the potentiometric surface for the A-Groove and B-Groove Aquifers have been included with this report in Appendix C (Confidential).

6.0 Land Disturbance and Reclamation

6.1 Summary of 2020 Disturbance

NS created new disturbed acreage in 2020 by building one new pad with an access road (16/17H-1V location) and drilling the new production well 16H-1V. The 16H-IR-E production well was drilled on a location that was built by extending the existing 10H pad resulting in some new disturbance. The total disturbed acreage reported in 2019 was 103.49 acres. In 2020 the NS land disturbance is 102.59 acres as of December 2020. The total effected acreage of NS operations is 107.17, which includes 4.57 acres that have been recognized as fully reclaimed by DRMS. Table 8 lists the disturbed acreage as of December 2020.

Table 8: Disturbed Acreage

Process Area:	**Acres:**
Plant Site Disturbed	26.84
Plant Site Undergoing Interim Reclamation	4.46
Plant Site Undergoing Final Reclamation	0.00
Plant Site Successfully Reclaimed	0.00
Well Field:	
Roads Disturbed	2.47
Well Pads Disturbed	31.87
Roads/Misc. Undergoing Interim Reclamation	1.26
Well Pads Undergoing Interim Reclamation	12.66
Road/Misc. Undergoing Final Reclamation	4.18
Well Pads Undergoing Final Reclamation	18.85
Total Disturbance:	**102.59**
Road/Misc. -- Recognized as Reclaimed by Agencies	0.00
Well Pads -- Recognized as Reclaimed by Agencies	4.57
Total Effected Acreage:	**107.17**

6.2 Regulatory Compliance

6.2.1 Regulatory Activity

In 2020, all required reports were submitted in a timely manner. Required forms were submitted to the appropriate agencies regarding all activities pertaining to the new wells drilled & associated plugging and abandonment operations.

6.3 Reclamation Activity

6.3.1 Regrading & Scarification

No regrading and scarification activities occurred in 2020.

6.3.2 Seeding & Weed Control

Seeding activity in 2020 focused on multiple areas of the NS lease. These areas were reseeded with the BLM approved final seed mix. The topsoil banks for the 14H-1V, 16H-1V, and 16H-IR-E production wells were seeded. The BG-8 well pad (P&A) was seeded prior to snow cover. P&A well pads: 91-2H, 93-4H, 4A-1V, 4A-4V, MMC-IRI-10, 94-1, and 5H-1V were spot seeded at winter snow cover. The 2014 exploration well pads C, E, G, H, P, N, T, U, and Q (plus the access road to Q) were all spot seeded in late fall 2020.

Slash was placed on various well locations in 2020 for interim reclamation compliance. The slash was placed on the T, U, Q locations, and on the 14H-1V, 16H-1V and 16H-IR-E topsoil piles.

Due to the onset of Covid-19 pandemic, the NS contracted weed control company, Elder Weed Spraying, was unable to obtain a Pesticide Use Permit (PUP) for the spring 2020 noxious weed control program. NS has applied for a BLM 2021 – 2024 PUP to direct certified applicators to apply weed control measures in and around the wellfield area as recommended by agency communication and the 2020 Vegetation Monitoring report.

Annual vegetation monitoring continued in 2020 for the areas of study that are currently in final reclamation status. This report, *The 2020 Vegetation Monitoring Reclamation Status Report,* prepared by Mr. Rusty Roberts, can found in Appendix D.

6.3.3 Reclamation Fencing

Repair and maintenance were performed, as necessary, on existing fences in 2020. Fencing is utilized to keep livestock and wildlife out of the reclaimed areas.

All newly built, lined pits on the 16H-1V, and 16H-IR-E locations were fenced for safety purposes.

6.3.5 Precipitation

Perennial vegetation is an indicator of long-term precipitation, the "normal" precipitation for the NS site is 12-14 inches for the calendar year. The distribution of precipitation is important for proper reclamation. 2020 precipitation as measured at the NS plant was 9.79 inches. Table 9 provides a composite of precipitation from the NS mine site for the last 10 years.

Table 9: Annual Precipitation in inches (10 Year)

Month/Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	AVG
Jan	0.18	0.18	0.25	0.98	0.47	1.62	1.89	1.26	0.67	1.06	0.86
Feb	0.15	1.15	0.30	0.35	0.39	1.34	1.52	1.35	1.47	0.83	0.88
Mar	1.25	0.30	0.50	0.28	0.82	1.76	1.01	1.55	0.85	0.95	0.93
Apr	1.25	0.40	1.35	0.63	1.71	5.18	1.11	1.74	2.99	0.82	1.72
May	0.95	0.14	1.05	1.66	4.36	2.06	2.17	1.52	2.93	1.29	1.81
Jun	0.00	0.06	0.35	0.01	0.51	0.53	0.47	0.99	3.86	1.83	0.86
Jul	0.23	0.43	1.40	1.34	1.78	1.07	3.36	1.27	1.87	0.61	1.34
Aug	0.00	0.86	0.26	3.17	1.44	2.78	0.85	3.24	0.83	0.37	1.38
Sep	0.13	0.36	2.89	2.14	0.32	2.19	1.55	0.10	1.75	1.17	1.26
Oct	0.87	0.58	1.35	1.09	1.38	1.89	1.62	4.10	1.19	0.08	1.42
Nov	0.05	0.28	1.30	0.80	0.70	1.56	0.64	0.60	1.62	0.14	0.77
Dec	0.32	0.83	0.17	1.00	0.10	1.04	0.44	0.45	0.71	0.66	0.57
Annual Totals	5.38	5.57	11.17	13.45	13.97	23.02	16.63	18.17	20.75	9.79	13.79

6.3.6 Vegetation Monitoring Results

See Appendix D for *2020 Vegetation Monitoring Reclamation Status Report* prepared by Rusty Roberts.

6.4 Deer Roadkill Study

Per the monitoring requirement from the BLM, NS compiled deer roadkill data throughout 2020 for vehicles traveling to and from the mine site. Ten deer of unknown sex were reported as struck and killed in 2020. One male (Buck) deer was reported as struck and killed in 2020. One deer of unknown sex was reported as struck but not killed, ran off into wilderness, in 2020. One elk of unknown sex was reported as struck and killed in 2020. Roadkill increases in 2020 may be the result of increased employee traffic due to Covid-19 protocols which prevented carpooling from April 2020 through the end of 2020.

6.5 Raptor Survey

In 2019 NS conducted a raptor breeding activity survey and inventory in the pinion-juniper habitat that was proximal to the planned 2019/2020 well field development areas. The area surveyed in 2019 included the areas of the planned 2020 well field development activities. NS will coordinate with the BLM to conduct any required 2021 raptor surveys.

6.6 Other Observations

Elk, deer, coyotes, rabbits, bobcat, and fox were noted in and around the well-field throughout the year.

6.7 Waste Disposal

Common domestic solid waste was collected in containers and periodically transported to the Rio Blanco County landfill. Sewage from the plant was directed to a septic system with a leach drain field. Process water, including cooling tower blowdowns, boiler ditch, plant wash down, blow down from the boilers, and precipitation runoff, was directed to the process pond. A pump in the process storage pond allows NS to recycle the water to the barren system. The wastewater evaporation pond contains water from the cooling tower overflow and laboratory drains. Table 10 indicates hazardous waste that was generated and collected at the NS facilities. Hazardous waste was collected, contained safely, stored separately from day to day waste, and then disposed of properly by Clean Harbors, Inc., a certified hazardous waste handling/disposal company.

Table 10: Hazardous Waste Disposal

Date Shipped	# of Containers	Total Quantity	Contents / Waste	EPA Waste Code
March , 2020	450	300 lbs	NA3082, HAZARDOUS WASTE, LIQUID, N.O.S. (SILVER, CHROMIUM) , 9, PG III	D007, D011
	450	300 lbs	NA3082, HAZARDOUS WASTE, LIQUID, N.O.S. (SILVER, CHROMIUM) , 9, PG III	D007, D011
	3	5 lbs	UN1384, WASTE SODIUM HYDROSULFITE, 4.2, PG II	D001
	15	20 lbs	UN1624, WASTE MERCURIC CHLORIDE, 6.1, PG II	D009
	25	52 lbs	UN1992, WASTE FLAMMABLE LIQUIDS, TOXIC, N.O.S. (STRONTIUM CHLORIDE HEXAHYDRATE) , 3, (6.1), PG II	D001
	3	4 lbs	UN1277, WASTE PROPYLAMINE, 3, (8), PG II	D001, D002, U194
	5	10 lbs	UN1479, WASTE OXIDIZING SOLID, N.O.S. (POTASSIUMNITRATE) , 5.1, PG I	D001
	3	3 lbs	UN2570, WASTE CADMIUM COMPOUNDS (CADMIUM CHLORIDE) , 6.1, PG I	D006
	3	7 lbs	UN3288, WASTE TOXIC SOLID, INORGANIC, N.O.S. (SODIUMNITROFERRICYANIDE DIHYDRATE) , 6.1, PG I	P030
	5	5 lbs	UN1671, WASTE PHENOL, SOLID, 6.1, PG II	U188
	25	30 lbs	UN2800, BATTERIES, WET, NON-SPILLABLE, 8, NONE, (UNIVERSAL WASTE-BATTERIES)	NONE
July , 2020	10	10 lbs	UN2680, LITHIUM HYDROXIDE, SOLID, 8, PG II	NONE
	450	450 lbs	NA3082, HAZARDOUS WASTE, LIQUID, N.O.S. (SILVER, CHROMIUM) , 9, PG III	D007, D011
Reported from Natural Soda by Mr. Gerry Deschaine 01/10/2021				

Natural Soda LLC

Appendix A

Groundwater Analytical Results

Table 11: 89-3 Annual Perched Aquifer

Parameters Wet Chemistry	No. of Samples	High	Date	Low	Date	Average	Units
Bicarbonate as CaCO3	175	404.00	08/28/2013	66.00	09/14/1992	203.09	mg/l
Carbonate as CaCO3	175	138.00	12/05/2012	3.00	06/26/1990	29.85	mg/l
Total Alkalinity as	175	524.00	08/28/2013	66.00	09/14/1992	225.00	mg/l
Bromide	25	0.60	07/06/2000	0.05	10/22/1989	0.19	mg/l
Cation-Anion Balance	173	15.70	06/14/2017	-13.00	12/16/2015	0.14	%
Sum of Anions	152	12.60	08/28/2013	5.10	06/14/2017	7.55	meq/l
Sum of Cations	153	11.80	08/28/2013	5.78	09/14/1992	7.51	meq/l
Chemical Oxygen	19	300.00	09/23/2010	10.00	10/22/1989	51.82	mg/l
Chloride	175	75.30	08/28/2013	4.00	09/27/1990	15.90	mg/l
Conductivity, Lab	171	1,210.00	08/28/2013	534.00	08/06/1992	725.32	µmhos
Fluoride	175	18.00	07/31/1991	0.02	04/19/2001	0.47	mg/l
Hardness as CaCO3	174	113.00	04/11/2006	27.00	03/30/1990	79.60	mg/l
Nitrate as N, dissolved	27	0.76	07/24/2002	0.02	12/05/2012	0.14	mg/l
Nitrate/Nitrite as N,	27	0.85	07/24/2002	0.03	07/18/1995	0.15	mg/l
Nitrite as N, dissolved	27	0.10	06/26/1991	0.01	06/25/2007	0.04	mg/l
Nitrogen, Ammonia	24	13.10	09/23/2010	0.11	07/12/1996	1.52	mg/l
Nitrogen, Organic	24	13.40	06/26/1991	0.10	07/18/1995	1.93	mg/l
Nitrogen, Total Kjeldahl	24	25.40	09/23/2010	0.20	07/21/1994	3.20	mg/l
pH, lab	174	11.50	12/19/1991	6.60	09/14/1992	8.58	units
Phosphate, total	22	155.00	06/25/2007	0.03	07/02/1998	11.12	mg/l
Phosphorus, total	24	2.33	09/23/2010	0.01	06/26/1991	0.23	mg/l
SAR in Water	164	15.92	03/30/1990	4.82	09/14/1992	6.84	none
Sulfate	175	296.00	03/30/1990	1.00	12/12/2008	126.29	mg/l
Sulfide	21	4.50	09/23/2010	0.03	07/02/1998	0.49	mg/l
Total Dissolved Solids	175	659.00	08/28/2013	329.00	06/14/2017	441.37	mg/l
Conductivity, Field	192	16,000.00	07/01/1990	500.00	02/24/1993	777.19	µmhos
pH, Field	193	10.23	07/19/2009	6.90	12/12/2018	8.67	units
Temperature (°C), Field	103	21.10	07/19/2009	6.40	12/01/1990	12.10	(°C)
Water Level, Field	89	341.00	09/01/2011	315.32	09/03/2020	323.41	Ft.
Parameters Metals	**No. of Samples**	**High**	**Date**	**Low**	**Date**	**Average**	**Units**
Aluminum, dissolved	26	2.12	07/27/2001	0.03	07/07/1999	0.42	mg/l
Arsenic, dissolved	25	0.04	10/22/1989	0.00	12/05/2012	0.01	mg/l
Barium, dissolved	25	0.69	03/30/1990	0.01	10/22/1989	0.06	mg/l
Beryllium, dissolved	25	0.01	06/26/1991	0.01	06/26/1991	0.01	mg/l
Boron, dissolved	175	0.43	08/28/2013	0.02	04/24/1991	0.06	mg/l
Cadmium, dissolved	25	0.00	09/13/1995	0.00	09/13/1995	0.00	mg/l
Calcium, dissolved	175	17.00	09/27/1990	4.50	06/25/2007	11.61	mg/l
Chromium, dissolved	26	0.01	06/26/1991	0.01	06/26/1991	0.01	mg/l
Copper, dissolved	26	0.20	12/05/2012	0.01	03/30/1990	0.06	mg/l
Iron, dissolved	25	4.17	09/27/1990	0.01	07/07/1999	0.44	mg/l
Lead, dissolved	25	0.06	08/19/2009	0.02	06/26/1991	0.04	mg/l
Lithium, dissolved	25	0.05	03/30/1990	0.02	06/26/1991	0.03	mg/l
Magnesium, dissolved	175	18.40	07/24/2002	3.00	03/30/1990	12.28	mg/l
Manganese, dissolved	25	0.14	09/27/1990	0.01	07/07/1999	0.03	mg/l
Mercury, dissolved	24	0.0005	10/22/1989	0.0001	06/26/1991	0.0003	mg/l
Molybdenum, dissolved	25	0.15	06/26/1990	0.01	07/12/1996	0.07	mg/l
Nickel, dissolved	25	0.02	10/22/1989	0.02	10/22/1989	0.02	mg/l
Potassium, dissolved	175	10.00	01/31/1991	0.04	04/28/1995	1.18	mg/l
Selenium, dissolved	25	0.002	03/30/1990	0.001	09/27/1990	U	mg/l
Silica, dissolved	175	33.20	07/27/2001	4.80	01/21/1992	15.58	mg/l
Sodium, dissolved	175	236.00	08/28/2013	96.00	09/14/1992	133.81	mg/l
Strontium, dissolved	175	1.09	04/11/2006	0.17	03/30/1990	0.82	mg/l
Vanadium, dissolved	25	U	12/05/2012	U	12/05/2012	U	mg/l
Zinc, dissolved	25	0.35	03/30/1990	0.01	10/22/1989	0.05	mg/l

Table 12: IRI-1 Annual Perched Aquifer

Parameters Wet Chemistry	No. of Samples	High	Date	Low	Date	Average	Units
Bicarbonate as CaCO3	119	548.00	01/08/2015	0.00	08/01/1990	164.31	mg/l
Carbonate as CaCO3	119	300.00	10/25/1990	0.00	08/30/2008	119.48	mg/l
Total Alkalinity as	119	900.00	08/01/1990	156.00	10/13/1992	299.50	mg/l
Bromide	26	1.60	07/21/1993	0.06	06/16/2011	0.29	mg/l
Cation-Anion Balance	116	63.90	08/14/2017	-16.00	03/13/2003	0.63	%
Sum of Anions	109	24.97	08/13/1990	5.30	06/15/2014	8.97	meq/l
Sum of Cations	109	50.00	08/14/2017	5.70	06/14/2011	9.44	meq/l
Chemical Oxygen	19	300.00	09/21/2010	10.00	08/16/1994	46.25	mg/l
Chloride	119	400.00	04/24/1991	14.00	12/15/1992	52.90	mg/l
Conductivity, Lab	116	2,630.00	01/20/1992	467.00	03/23/2005	874.96	µmhos
Fluoride	119	24.00	09/02/1998	1.70	04/20/1992	6.50	mg/l
Hardness as CaCO3	119	553.00	08/01/1990	2.00	06/23/2010	37.01	mg/l
Nitrate as N, dissolved	26	2.77	06/26/2002	0.02	06/28/2006	0.38	mg/l
Nitrate/Nitrite as N,	26	2.79	06/26/2002	0.03	06/28/2006	0.35	mg/l
Nitrite as N, dissolved	26	0.13	08/16/1996	0.01	08/01/1990	0.05	mg/l
Nitrogen, Ammonia	25	2.57	07/31/1991	0.25	06/09/1999	0.76	mg/l
Nitrogen, Organic	25	3.90	07/21/1992	0.10	06/16/2011	1.03	mg/l
Nitrogen, Total Kjeldahl	25	5.90	07/31/1991	0.50	06/16/2011	1.83	mg/l
pH, lab	116	11.30	07/31/1991	6.60	08/30/2008	9.56	units
Phosphate, total	24	155.00	06/28/2006	0.10	08/13/1990	18.35	mg/l
Phosphorus, total	25	1.41	09/21/2010	0.03	07/31/1991	0.26	mg/l
SAR in Water	111	76.00	08/14/2017	5.76	08/01/1990	21.50	none
Sulfate	119	243.00	12/15/1992	40.40	09/16/2019	76.72	mg/l
Sulfide	24	4.00	06/13/2001	0.03	06/02/1998	1.08	mg/l
Total Dissolved Solids	117	1,644.00	08/01/1990	335.00	06/15/2014	590.28	mg/l
Conductivity, Field	177	3,500.00	08/01/1990	643.00	11/27/2012	1,157.10	µmhos
pH, Field	177	12.80	12/01/1990	6.04	08/30/2008	10.23	units
Temperature (°C), Field	117	20.10	05/16/2007	6.50	12/12/2008	12.24	(°C)
Water Level, Field	91	387.19	08/14/2017	308.80	06/20/2017	380.52	Ft.
Parameters Metals	**No. of Samples**	**High**	**Date**	**Low**	**Date**	**Average**	**Units**
Aluminum, dissolved	26	11.10	08/16/1996	0.06	07/29/2009	3.18	mg/l
Arsenic, dissolved	26	0.01	07/31/1991	0.0005	11/27/2012	0.0023	mg/l
Barium, dissolved	26	0.29	08/14/1995	0.01	11/27/2012	0.08	mg/l
Beryllium, dissolved	26	0.003	08/14/1995	0.003	08/14/1995	0.003	mg/l
Boron, dissolved	119	0.39	01/08/2015	U	10/25/1990	0.17	mg/l
Cadmium, dissolved	26	0.03	07/21/1993	0.03	07/21/1993	0.03	mg/l
Calcium, dissolved	119	223.00	08/01/1990	0.90	06/23/2010	11.20	mg/l
Chromium, dissolved	26	0.02	08/01/1990	0.01	08/16/1996	0.01	mg/l
Copper, dissolved	26	0.20	06/14/2000	0.01	08/01/1990	0.04	mg/l
Iron, dissolved	26	14.10	07/21/1993	0.02	07/21/1992	3.20	mg/l
Lead, dissolved	26	0.10	07/21/1993	0.05	06/16/1997	0.07	mg/l
Lithium, dissolved	26	0.19	08/13/1990	U	08/30/2008	0.05	mg/l
Magnesium, dissolved	119	31.20	03/14/2000	0.30	09/26/2001	2.57	mg/l
Manganese, dissolved	26	0.37	08/14/1995	0.01	08/30/2008	0.09	mg/l
Mercury, dissolved	26	0.0002	08/14/1995	U	08/14/1995	U	mg/l
Molybdenum, dissolved	26	0.10	08/01/1990	0.01	06/16/1997	0.04	mg/l
Nickel, dissolved	26	0.02	10/25/1990	0.01	08/16/1996	0.01	mg/l
Potassium, dissolved	119	146.00	08/01/1990	1.00	04/24/1991	7.63	mg/l
Selenium, dissolved	26	0.004	07/31/1991	0.002	08/13/1990	0.003	mg/l
Silica, dissolved	119	99.30	08/14/1995	6.90	09/04/2020	29.88	mg/l
Sodium, dissolved	119	1,110.00	08/14/2017	126.00	06/14/2011	198.59	mg/l
Strontium, dissolved	119	2.45	08/01/1990	0.02	05/24/1994	0.31	mg/l
Vanadium, dissolved	26	0.03	08/14/1995	0.01	06/16/1997	0.01	mg/l
Zinc, dissolved	26	0.24	07/21/1993	0.02	06/09/1999	0.07	mg/l

Table 13: IRI-5 Annual Perched Aquifer

Parameters Wet Chemistry	No. of Samples	High	Date	Low	Date	Average	Units
Bicarbonate as	60	327.00	06/30/2009	2.00	12/18/1991	183.48	mg/l
Carbonate as	60	284.00	12/18/1991	0.00	06/14/2008	76.58	mg/l
Total Alkalinity as	60	406.00	03/25/1992	181.00	05/29/2002	252.22	mg/l
Bromide	30	1.00	08/22/1991	U	08/12/1992	0.21	mg/l
Cation-Anion	57	17.30	06/14/2008	-10.2	05/26/2004	0.86	%
Sum of Anions	52	15.77	06/16/1992	8.43	12/19/1995	9.92	meq/l
Sum of Cations	52	15.25	06/16/1992	7.90	05/26/2004	10.14	meq/l
Chemical Oxygen	27	181.00	11/02/2015	0.00	05/29/2002	53.56	mg/l
Chloride	60	420.00	06/16/1992	9.00	12/19/1995	21.08	mg/l
Conductivity, Lab	60	1,500.00	06/16/1992	795.00	08/12/1991	976.10	µmhos
Fluoride	60	0.90	09/16/1991	U	06/30/1995	0.29	mg/l
Hardness as CaCO3	60	182.00	06/14/2008	1.00	12/20/1993	33.69	mg/l
Nitrate as N,	31	12.50	05/29/2002	U	08/12/1992	1.03	mg/l
Nitrate/Nitrite as N,	31	12.50	05/29/2002	U	08/12/1992	0.91	mg/l
Nitrite as N,	31	0.06	09/14/1992	U	08/12/1992	0.02	mg/l
Nitrogen, Ammonia	31	0.87	06/23/1994	0.08	05/21/2007	0.28	mg/l
Nitrogen, Organic	31	80.00	05/15/1998	0.20	03/09/2020	5.10	mg/l
Nitrogen, Total	31	80.00	05/15/1998	0.30	03/09/2020	4.74	mg/l
pH, lab	60	11.90	06/28/1993	2.40	06/16/1992	9.21	units
Phosphate, total	29	155.00	07/29/2009	0.06	05/29/2002	6.00	mg/l
Phosphorus, total	31	1.87	06/18/1996	0.02	05/29/2002	0.21	mg/l
SAR in Water	51	90.44	01/20/1994	7.50	06/30/2009	22.45	none
Sulfate	60	290.00	03/25/1992	148.00	03/22/1996	203.52	mg/l
Sulfide	30	6.60	03/09/2020	0.05	06/14/2008	0.56	mg/l
Total Dissolved	59	1,090	06/16/1992	504	04/21/1994	630	mg/l
Conductivity, Field	73	9,880	05/21/2007	715	12/19/1995	1,175	µmhos
pH, Field	72	12.00	08/12/1992	6.33	06/14/2008	9.87	units
Temperature (°C),	33	17	06/14/2008	9.70	11/01/2002	12	(°C)
Water Level, Field	54	248.06	06/15/2010	238.40	12/15/2015	241.07	Ft.
Parameters Metals	**No. of Samples**	**High**	**Date**	**Low**	**Date**	**Average**	**Units**
Aluminum, dissolved	30	10.00	08/22/1992	0.04	05/29/2003	1.17	mg/l
Arsenic, dissolved	30	0.01	06/18/1996	0.0003	05/26/2004	0.0018	mg/l
Barium, dissolved	30	0.27	05/21/2007	0.01	05/26/2004	0.04	mg/l
Beryllium, dissolved	30	0.01	08/22/1992	0.01	08/22/1992	0.01	mg/l
Boron, dissolved	60	0.11	11/21/2005	0.02	08/22/1997	0.07	mg/l
Cadmium, dissolved	30	0.01	08/22/1992	U	03/22/2016	U	mg/l
Calcium, dissolved	60	63.60	06/14/2008	1.00	06/16/1992	7.07	mg/l
Chromium, dissolved	30	0.02	08/22/1992	0.01	06/23/1994	0.02	mg/l
Copper, dissolved	30	0.04	06/25/2019	0.01	06/23/1994	0.02	mg/l
Iron, dissolved	30	7.30	08/22/1992	0.01	05/26/2004	0.65	mg/l
Lead, dissolved	30	0.12	03/22/2016	0.02	08/12/1991	0.05	mg/l
Lithium, dissolved	30	0.06	10/03/2012	0.02	05/26/2004	0.03	mg/l
Magnesium,	60	9.10	06/30/2009	0.30	06/30/1995	4.55	mg/l
Manganese,	34	0.07	08/22/1992	0.01	08/22/1997	0.02	mg/l
Mercury, dissolved	30	0.0001	08/22/1992	U	08/22/1992	U	mg/l
Molybdenum,	30	0.03	06/14/2008	0.01	06/18/1996	0.02	mg/l
Nickel, dissolved	30	0.04	07/29/2009	0.02	08/22/1992	0.03	mg/l
Potassium,	59	22.00	12/18/1991	0.70	06/25/2019	7.46	mg/l
Selenium, dissolved	30	0.001	08/12/1991	U	08/12/1991	U	mg/l
Silica, dissolved	59	74.00	08/22/1992	10.90	03/21/2017	18.36	mg/l
Sodium, dissolved	59	336.00	06/16/1992	166.00	05/26/2004	208.92	mg/l
Strontium, dissolved	59	1.30	06/30/2009	0.06	06/16/1992	0.49	mg/l
Vanadium, dissolved	30	0.01	08/22/1992	0.01	08/22/1992	0.01	mg/l
Zinc, dissolved	30	0.08	08/22/1992	0.02	06/23/1994	0.03	mg/l

Table 14: 89-2 Annual A-Groove Aquifer

Parameters Wet Chemistry	No. of Samples	High	Date	Low	Date	Average	Units
Bicarbonate as	183	903.00	12/12/2008	41.00	01/30/1997	517.11	mg/l
Carbonate as CaCO3	183	566.00	01/30/1997	8.00	11/28/1990	90.07	mg/l
Total Alkalinity as	183	926.00	12/12/2008	160.00	10/25/1990	605.46	mg/l
Bromide	27	3.00	06/26/1990	0.05	07/01/1997	0.44	mg/l
Cation-Anion Balance	174	63.40	04/14/2005	-28.80	08/02/2006	0.62	%
Sum of Anions	157	20.10	12/12/2008	11.66	11/28/1990	14.15	meq/l
Sum of Cations	157	67.50	04/14/2005	7.80	08/02/2006	14.46	meq/l
Chemical Oxygen	24	220.00	09/22/2010	10.00	08/02/2006	80.23	mg/l
Chloride	182	118.00	10/22/1989	2.00	04/24/1991	19.53	mg/l
Conductivity, Lab	180	1,760.00	12/12/2008	1,000.00	05/20/1993	1,257.94	µmhos
Fluoride	183	30.00	12/19/1991	1.90	06/26/1991	21.41	mg/l
Hardness as CaCO3	177	375.00	05/21/2018	0.40	10/25/1990	11.06	mg/l
Nitrate as N, dissolved	28	5.76	08/10/2008	0.02	07/18/1995	0.53	mg/l
Nitrate/Nitrite as N,	28	6.26	08/10/2008	0.02	07/18/1995	0.56	mg/l
Nitrite as N, dissolved	28	0.50	08/10/2008	0.01	03/30/1990	0.13	mg/l
Nitrogen, Ammonia	26	3.77	08/10/2008	0.54	06/15/1992	1.30	mg/l
Nitrogen, Organic	26	14.60	09/27/1990	0.10	06/15/1992	4.37	mg/l
Nitrogen, Total	26	15.40	09/27/1990	0.60	06/15/1992	5.49	mg/l
pH, lab	179	9.70	12/20/1994	8.00	07/18/1995	8.92	units
Phosphate, total	22	155.00	06/25/2007	0.06	07/02/1998	10.79	mg/l
Phosphorus, total	27	0.46	06/26/1990	0.01	08/17/1993	0.08	mg/l
SAR in Water	140	345.00	04/14/2005	0.21	05/21/2018	57.86	none
Sulfate	183	445.00	06/26/1990	2.49	05/21/2018	40.76	mg/l
Sulfide	23	2.40	07/24/2002	0.02	07/15/2004	0.45	mg/l
Total Dissolved Solids	183	2,040.00	04/14/2005	494.00	10/25/1990	786.45	mg/l
Conductivity, Field	229	1,980.00	12/12/2008	620.00	03/16/1994	1,223.27	µmhos
pH, Field	229	10.00	08/22/1991	6.80	03/10/2015	9.09	units
Temperature (°C),	109	17.40	07/01/2002	9.20	01/30/2006	12.23	(°C)
Water Level, Field	95	545.20	06/25/2014	463.95	04/01/2003	495.67	Ft.
Parameters Metals	**No. of Samples**	**High**	**Date**	**Low**	**Date**	**Average**	**Units**
Aluminum, dissolved	26	0.70	10/22/1989	0.03	07/01/1997	0.12	mg/l
Arsenic, dissolved	26	0.04	06/26/1991	0.003	06/15/1992	0.01	mg/l
Barium, dissolved	26	0.23	07/15/2004	0.01	08/02/2006	0.04	mg/l
Beryllium, dissolved	26	0.01	06/26/1990	0.01	06/26/1990	0.01	mg/l
Boron, dissolved	176	1.48	04/14/2005	0.19	08/02/2006	0.37	mg/l
Cadmium, dissolved	26	0.01	06/26/1990	0.01	06/26/1990	0.01	mg/l
Calcium, dissolved	175	141.00	05/21/2018	0.30	04/27/2004	2.32	mg/l
Chromium, dissolved	26	0.07	07/30/2003	0.01	06/26/1990	0.04	mg/l
Copper, dissolved	26	0.01	06/26/1990	0.01	06/26/1990	0.01	mg/l
Iron, dissolved	26	0.80	10/22/1989	0.01	07/18/1995	0.13	mg/l
Lead, dissolved	26	0.05	10/22/1989	0.02	06/26/1990	0.03	mg/l
Lithium, dissolved	26	0.13	07/15/2004	0.02	06/26/1990	0.05	mg/l
Magnesium, dissolved	175	9.10	12/12/2008	0.20	04/27/2004	1.23	mg/l
Manganese, dissolved	25	0.14	07/30/2003	0.01	06/26/1990	0.06	mg/l
Mercury, dissolved	26	0.0006	06/15/1992	0.0001	06/26/1990	0.0004	mg/l
Molybdenum,	26	0.13	10/22/1989	0.01	07/12/1996	0.05	mg/l
Nickel, dissolved	26	0.52	07/30/2003	0.02	10/22/1989	0.19	mg/l
Potassium, dissolved	176	12.50	05/21/2018	0.50	06/10/2020	1.37	mg/l
Selenium, dissolved	26	0.01	09/27/1990	0.001	06/26/1990	0.004	mg/l
Silica, dissolved	176	27.70	01/09/2001	2.00	12/10/2019	12.80	mg/l
Sodium, dissolved	176	1,530.00	04/14/2005	9.20	05/21/2018	322.42	mg/l
Strontium, dissolved	176	1.34	12/12/2008	0.03	04/27/2004	0.20	mg/l
Vanadium, dissolved	26	0.01	06/26/1990	0.01	06/26/1990	0.01	mg/l
Zinc, dissolved	26	0.03	07/29/2009	0.01	06/26/1990	0.02	mg/l

Table 15: 90-1 Annual A-Groove Aquifer

Parameters Wet Chemistry	No. of Samples	High	Date	Low	Date	Average	Units
Bicarbonate as	103	16,300.00	02/24/2020	170.00	06/12/1990	3,164.17	mg/l
Carbonate as CaCO3	103	6,530.00	12/13/2016	9.00	04/27/2004	487.64	mg/l
Total Alkalinity as	103	18,700.00	02/24/2020	477.00	04/16/2002	3,646.20	mg/l
Bromide	23	0.10	01/31/1991	0.08	07/31/2009	0.10	mg/l
Cation-Anion Balance	100	30.70	12/13/2016	-14.70	02/27/2017	-0.68	%
Sum of Anions	100	566.00	02/24/2020	11.49	02/24/1992	115.65	meq/l
Sum of Cations	100	481.00	02/24/2020	11.50	09/27/1990	109.81	meq/l
Chemical Oxygen	19	191.00	06/29/2016	10.00	10/22/2002	61.30	mg/l
Chloride	102	6,780.00	02/24/2020	10.00	01/31/1991	1,412.58	mg/l
Conductivity, Lab	101	38,900.00	02/24/2020	1,075.00	01/31/1991	9,580.35	µmhos
Fluoride	103	51.90	02/24/2020	1.40	04/27/2004	18.06	mg/l
Hardness as CaCO3	103	98.00	11/06/2014	4.00	09/09/2015	41.42	mg/l
Nitrate as N, dissolved	23	3.99	01/31/1991	0.02	09/27/1990	0.70	mg/l
Nitrate/Nitrite as N,	23	4.00	01/31/1991	0.02	09/27/1990	0.60	mg/l
Nitrite as N, dissolved	23	0.02	09/27/1990	0.01	01/31/1991	0.02	mg/l
Nitrogen, Ammonia	22	5.10	08/21/2015	0.08	09/27/1990	1.03	mg/l
Nitrogen, Organic	22	2.50	06/29/2016	0.10	01/31/1991	0.53	mg/l
Nitrogen, Total	22	7.10	06/29/2016	0.04	09/27/1990	1.43	mg/l
pH, lab	101	12.80	01/27/2016	6.30	07/25/2002	8.77	units
Phosphate, total	19	11.00	06/29/2016	0.06	06/28/2007	1.35	mg/l
Phosphorus, total	22	3.40	06/29/2016	0.02	06/28/2007	0.38	mg/l
SAR in Water	98	1,600.00	12/13/2016	25.30	08/04/2008	211.42	none
Sulfate	103	933.00	09/09/2015	10.00	10/04/2011	90.83	mg/l
Sulfide	23	12.00	10/19/2000	0.07	10/22/2002	4.14	mg/l
Total Dissolved Solids	103	29,100.00	02/24/2020	700.00	07/21/1994	6,120.18	mg/l
Conductivity, Field	319	37,620.00	02/24/2020	1,122.70	05/04/2010	4,032.04	µmhos
pH, Field	104	12.50	04/13/2016	7.00	12/11/2018	8.49	units
Temperature (°C),	76	24.40	07/28/2011	7.50	03/04/2013	17.99	(°C)
Water Level, Field	22	549.12	10/15/2015	531.00	04/21/2016	537.86	Ft.
Parameters Metals	**No. of Samples**	**High**	**Date**	**Low**	**Date**	**Average**	**Units**
Aluminum, dissolved	23	0.05	06/12/1990	0.04	06/28/2007	0.05	mg/l
Arsenic, dissolved	23	0.05	08/21/2015	0.0008	10/26/2004	0.01	mg/l
Barium, dissolved	23	1.77	11/06/2014	0.02	01/31/1991	0.47	mg/l
Beryllium, dissolved	23	0.01	06/12/1990	0.01	06/12/1990	0.01	mg/l
Boron, dissolved	103	16.90	02/24/2020	0.25	06/12/1990	2.63	mg/l
Cadmium, dissolved	23	0.01	06/12/1990	0.01	09/27/1990	0.01	mg/l
Calcium, dissolved	101	12.00	08/21/2015	U	05/17/2017	4.88	mg/l
Chromium, dissolved	23	0.02	09/28/2006	0.01	06/12/1990	0.01	mg/l
Copper, dissolved	23	0.01	06/12/1990	0.01	06/12/1990	0.01	mg/l
Iron, dissolved	23	3.00	08/21/2015	0.02	09/27/1990	0.23	mg/l
Lead, dissolved	23	0.02	06/12/1990	0.02	06/12/1990	0.02	mg/l
Lithium, dissolved	23	0.49	11/06/2014	0.01	06/12/1990	0.18	mg/l
Magnesium, dissolved	103	19.00	11/06/2014	2.00	06/12/1990	8.03	mg/l
Manganese, dissolved	23	0.08	10/04/2011	0.01	09/22/2010	0.02	mg/l
Mercury, dissolved	23	0.0004	10/30/2003	0.0001	06/12/1990	0.0002	mg/l
Molybdenum,	23	0.05	06/12/1990	0.02	09/15/2007	0.04	mg/l
Nickel, dissolved	23	0.02	06/12/1990	0.02	06/12/1990	0.02	mg/l
Potassium, dissolved	103	746.00	12/13/2016	0.40	07/18/2000	29.54	mg/l
Selenium, dissolved	23	0.0014	08/21/2015	0.00	06/12/1990	0.0011	mg/l
Silica, dissolved	103	40.00	09/09/2015	6.00	01/17/2018	12.86	mg/l
Sodium, dissolved	103	10,900.00	02/24/2020	259.00	06/12/1990	2,434.35	mg/l
Strontium, dissolved	103	4.93	11/06/2014	0.03	09/09/2015	1.88	mg/l
Vanadium, dissolved	23	0.01	06/12/1990	0.01	06/12/1990	0.01	mg/l
Zinc, dissolved	23	0.02	06/28/2007	0.01	06/12/1990	0.01	mg/l

Table 16: 90-4 Annual A-Groove Aquifer

Parameters Wet Chemistry	No. of Samples	High	Date	Low	Date	Average	Units
Bicarbonate as	123	1,680.00	09/24/2003	45.00	06/26/2002	778.05	mg/l
Carbonate as CaCO3	123	693.00	06/26/2002	10.00	12/16/2003	85.38	mg/l
Total Alkalinity as	123	1,740.00	09/24/2003	142.00	09/28/2006	853.70	mg/l
Bromide	30	16.00	06/16/1997	0.29	08/01/1990	5.56	mg/l
Cation-Anion Balance	120	11.90	06/23/2010	-68.80	08/15/2017	-2.25	%
Sum of Anions	120	153.40	05/24/1994	34.16	08/01/1990	84.85	meq/l
Sum of Cations	120	143.00	02/27/1997	10.00	08/15/2017	81.84	meq/l
Chemical Oxygen	22	840.00	08/16/1994	10.00	08/16/1996	192.50	mg/l
Chloride	123	4,690.00	05/24/1994	700.00	08/01/1990	2,444.71	mg/l
Conductivity, Lab	120	14,100.00	02/21/1994	309.00	05/27/2015	8,452.22	µmhos
Fluoride	123	23.70	08/01/1990	5.50	06/14/2008	12.59	mg/l
Hardness as CaCO3	123	204.00	02/21/1994	25.00	08/15/2017	86.30	mg/l
Nitrate as N, dissolved	29	0.08	06/26/2002	0.02	06/28/2006	0.05	mg/l
Nitrate/Nitrite as N,	29	0.09	06/16/2011	0.02	06/28/2006	0.06	mg/l
Nitrite as N, dissolved	29	0.04	06/16/2011	0.01	01/29/1991	0.02	mg/l
Nitrogen, Ammonia	28	3.30	08/10/2008	0.83	08/13/1990	1.88	mg/l
Nitrogen, Organic	28	10.10	03/14/2008	0.40	07/21/1993	3.39	mg/l
Nitrogen, Total	28	12.10	03/14/2008	1.30	06/14/2000	5.03	mg/l
pH, lab	120	9.00	10/09/2019	7.70	09/14/2004	8.56	units
Phosphate, total	26	155.00	06/28/2006	0.06	08/14/1995	17.00	mg/l
Phosphorus, total	28	0.11	08/13/1990	0.02	07/31/1991	0.06	mg/l
SAR in Water	120	4,950.00	06/24/2003	19.00	08/15/2017	131.68	none
Sulfate	122	2,310.00	06/15/2014	4.00	12/16/2004	70.78	mg/l
Sulfide	23	5.80	06/26/2002	0.02	08/10/2008	1.18	mg/l
Total Dissolved Solids	123	8,270.00	02/27/1997	2,110.00	08/15/2017	4,955.30	mg/l
Conductivity, Field	181	13,600.00	11/17/1993	2,900.00	08/01/1990	8,562.69	µmhos
pH, Field	176	9.53	07/29/2009	7.30	10/09/2019	8.53	units
Temperature (°C),	124	22.10	07/10/2018	7.40	12/15/2005	12.28	(°C)
Water Level, Field	101	544.21	03/01/2010	516.40	10/01/1990	538.20	Ft.
Parameters Metals	**No. of Samples**	**High**	**Date**	**Low**	**Date**	**Average**	**Units**
Aluminum, dissolved	29	0.80	06/16/2005	0.03	09/21/2010	0.28	mg/l
Arsenic, dissolved	29	0.05	01/29/1991	0.00	06/28/2006	0.01	mg/l
Barium, dissolved	29	1.56	03/14/2008	0.09	08/01/1990	0.85	mg/l
Beryllium, dissolved	29	U	05/08/2020	U	05/08/2020	U	mg/l
Boron, dissolved	123	1.29	07/21/1992	0.10	11/20/1996	0.32	mg/l
Cadmium, dissolved	29	0.03	07/21/1993	0.03	07/21/1993	0.03	mg/l
Calcium, dissolved	123	45.00	12/16/2004	3.00	11/20/1996	10.69	mg/l
Chromium, dissolved	29	U	05/08/2020	U	05/08/2020	U	mg/l
Copper, dissolved	29	0.08	06/24/2004	0.08	06/24/2004	0.08	mg/l
Iron, dissolved	29	1.67	10/25/1990	0.07	09/21/2010	0.39	mg/l
Lead, dissolved	29	U	05/08/2020	U	05/08/2020	U	mg/l
Lithium, dissolved	28	0.10	06/16/1997	0.02	08/13/1990	0.04	mg/l
Magnesium, dissolved	123	37.00	02/21/1994	3.90	08/15/2017	14.44	mg/l
Manganese, dissolved	28	0.15	10/25/1990	0.01	09/21/2010	0.05	mg/l
Mercury, dissolved	29	0.002	09/15/2007	0.0002	08/14/1995	0.0009	mg/l
Molybdenum,	29	0.37	08/13/1990	0.13	10/25/1990	0.24	mg/l
Nickel, dissolved	29	U	05/08/2020	U	05/08/2020	U	mg/l
Potassium, dissolved	123	10.00	07/31/1991	1.37	12/14/2020	3.03	mg/l
Selenium, dissolved	29	0.003	01/29/1991	0.001	08/13/1990	0.002	mg/l
Silica, dissolved	123	63.00	12/16/2004	2.10	04/20/1992	12.28	mg/l
Sodium, dissolved	123	3,180.00	02/27/1997	220.00	08/15/2017	1,876.72	mg/l
Strontium, dissolved	123	8.17	02/21/1994	0.30	08/15/2017	3.13	mg/l
Vanadium, dissolved	29	U	05/08/2020	U	05/08/2020	U	mg/l
Zinc, dissolved	29	0.10	07/31/1991	0.01	10/25/1990	0.05	mg/l

Table 17: AG-1 Annual A-Groove Aquifer

Parameters Wet Chemistry	No. of Samples	High	Date	Low	Date	Average	Units
Bicarbonate as CaCO3	10	1,410	06/03/2020	198	02/10/2015	620	mg/l
Carbonate as CaCO3	10	273	01/29/2015	53	11/04/2014	191	mg/l
Total Alkalinity as	10	1,670	06/03/2020	377	02/10/2015	811	mg/l
Bromide	10	2.38	04/22/2019	0.17	01/29/2015	1.27	mg/l
Cation-Anion Balance	10	0.00	12/15/2015	-6.70	02/10/2015	-3.18	%
Sum of Anions	10	45.00	06/11/2019	15.00	12/15/2015	24.80	meq/l
Sum of Cations	10	42.00	06/11/2019	14.00	02/10/2015	23.10	meq/l
Chemical Oxygen	10	37.00	12/15/2015	10.00	06/11/2019	18.88	mg/l
Chloride	10	435	06/11/2019	92	11/04/2014	208	mg/l
Conductivity, Lab	10	3,800	06/11/2019	1,430	11/04/2014	2,252	µmhos
Fluoride	10	17.50	06/03/2020	5.47	06/19/2018	8.99	mg/l
Hardness as CaCO3	10	80.00	06/11/2019	13.00	06/19/2018	34.83	mg/l
Nitrate as N, dissolved	10	0.02	01/29/2015	0.02	01/29/2015	0.02	mg/l
Nitrate/Nitrite as N,	10	0.03	01/29/2015	U	11/04/2014	0.02	mg/l
Nitrite as N, dissolved	10	0.01	01/29/2015	U	11/04/2014	0.01	mg/l
Nitrogen, Ammonia	10	1.51	09/28/2017	0.47	04/05/2016	0.84	mg/l
Nitrogen, Organic	10	0.50	01/29/2015	0.10	04/05/2016	0.29	mg/l
Nitrogen, Total Kjeldahl	10	1.90	09/28/2017	0.60	04/05/2016	1.04	mg/l
pH, lab	10	9.70	01/29/2015	8.70	11/04/2014	9.32	units
Phosphate, total	10	1.02	06/03/2020	0.06	06/19/2018	0.34	mg/l
Phosphorus, total	10	0.33	06/03/2020	0.02	06/19/2018	0.11	mg/l
SAR in Water	10	59	06/03/2020	20	11/04/2014	39	none
Sulfate	10	210	02/10/2015	27.40	06/03/2020	108	mg/l
Sulfide	10	6.20	06/03/2020	0.04	11/04/2014	1.85	mg/l
Total Dissolved Solids	10	2,400	06/11/2019	843	12/15/2015	1,343	mg/l
Conductivity, Field	8	4,062	04/22/2019	1,432	04/05/2016	2,487	µmhos
pH, Field	8	9.64	06/19/2018	8.44	04/22/2019	8.98	units
Temperature (°C), Field	8	22.22	06/19/2018	16.10	11/20/2018	18.61	(°C)
Water Level, Field	8	581.90	09/28/2017	572.10	01/16/2015	575.92	Ft.
Parameters **Metals**	**No. of Samples**	**High**	**Date**	**Low**	**Date**	**Average**	**Units**
Aluminum, dissolved	10	U	06/03/2020	U	11/04/2014	U	mg/l
Arsenic, dissolved	10	0.0038	11/04/2014	0.0004	02/10/2015	0.0011	mg/l
Barium, dissolved	10	0.41	04/22/2019	0.01	12/15/2015	0.12	mg/l
Beryllium, dissolved	10	U	06/03/2020	U	11/04/2014	U	mg/l
Boron, dissolved	10	1.07	06/03/2020	0.21	02/10/2015	0.47	mg/l
Cadmium, dissolved	10	U	06/03/2020	U	11/04/2014	U	mg/l
Calcium, dissolved	10	7.80	11/04/2014	1.30	04/05/2016	2.77	mg/l
Chromium, dissolved	10	U	06/03/2020	U	11/04/2014	U	mg/l
Copper, dissolved	10	U	06/03/2020	U	11/04/2014	U	mg/l
Iron, dissolved	10	0.86	09/28/2017	0.03	11/04/2014	0.25	mg/l
Lead, dissolved	10	U	06/03/2020	U	11/04/2014	U	mg/l
Lithium, dissolved	10	0.28	06/11/2019	0.12	11/04/2014	0.17	mg/l
Magnesium, dissolved	10	17.10	06/11/2019	2.40	06/19/2018	6.78	mg/l
Manganese, dissolved	10	0.08	11/04/2014	0.01	04/05/2016	0.03	mg/l
Mercury, dissolved	10	U	06/03/2020	U	11/04/2014	U	mg/l
Molybdenum, dissolved	10	0.19	06/19/2018	0.06	11/04/2014	0.13	mg/l
Nickel, dissolved	10	U	06/03/2020	U	11/04/2014	U	mg/l
Potassium, dissolved	10	11.30	06/19/2018	1.50	06/11/2019	6.57	mg/l
Selenium, dissolved	10	0.0007	06/03/2020	0.0002	09/28/2017	0.0005	mg/l
Silica, dissolved	10	13.90	11/04/2014	0.20	02/10/2015	6.18	mg/l
Sodium, dissolved	10	924	06/11/2019	303	02/10/2015	500	mg/l
Strontium, dissolved	10	1.93	06/11/2019	0.23	12/15/2015	0.79	mg/l
Vanadium, dissolved	10	U	06/03/2020	U	11/04/2014	U	mg/l
Zinc, dissolved	10	0.06	09/28/2017	0.01	11/04/2014	0.04	mg/l

Table 18: IRI-4 Annual A-Groove Aquifer

Parameters Wet Chemistry	No. of Samples	High	Date	Low	Date	Average	Units
Bicarbonate as CaCO3	59	1,250.00	03/22/1993	34.00	09/08/1993	272.41	mg/l
Carbonate as CaCO3	59	870.00	03/22/1993	24.00	06/30/2009	263.23	mg/l
Total Alkalinity as CaCO3	59	2,120.00	03/22/1993	176.00	06/14/2008	493.51	mg/l
Bromide	30	2.70	11/29/2011	0.07	05/26/2000	0.62	mg/l
Cation-Anion Balance	57	13.30	11/06/2014	-9.10	03/22/2016	1.94	%
Sum of Anions	57	19.49	09/16/1991	9.50	05/29/2003	13.17	meq/l
Sum of Cations	57	18.34	09/16/1991	9.50	05/26/2004	13.77	meq/l
Chemical Oxygen	28	1,300.00	05/29/2002	15.00	03/27/2018	450.58	mg/l
Chloride	59	252.00	06/14/2008	21.00	12/20/1993	112.79	mg/l
Conductivity, Lab	58	3,320.00	09/15/1992	1,010.00	05/29/2003	1,517.59	µmhos
Fluoride	59	27.00	12/19/1995	2.20	09/15/1992	9.10	mg/l
Hardness as CaCO3	59	962.00	03/22/1993	U	01/19/1994	34.15	mg/l
Nitrate as N, dissolved	30	3.89	06/14/2008	0.02	09/15/1992	0.43	mg/l
Nitrate/Nitrite as N,	30	3.90	06/14/2008	0.02	09/15/1992	0.33	mg/l
Nitrite as N, dissolved	30	0.05	11/06/2014	0.01	06/18/1996	0.02	mg/l
Nitrogen, Ammonia	30	21.30	09/08/1993	0.34	08/23/2017	3.73	mg/l
Nitrogen, Organic	30	104.00	05/29/2002	0.20	08/23/2017	17.81	mg/l
Nitrogen, Total Kjeldahl	30	106.00	05/29/2002	0.40	04/22/2019	19.89	mg/l
pH, lab	58	11.90	06/16/1992	8.60	06/30/2009	10.21	units
Phosphate, total	30	155.00	07/29/2009	0.03	05/26/1999	6.75	mg/l
Phosphorus, total	30	2.95	09/27/1990	0.01	05/26/1999	0.24	mg/l
SAR in Water	50	190.00	11/14/1997	3.83	03/25/1992	65.20	none
Sulfate	59	360.00	09/16/1991	0.80	02/26/1997	31.18	mg/l
Sulfide	30	29.00	03/22/2016	0.02	09/15/1992	4.60	mg/l
Total Dissolved Solids	58	2,752.00	03/22/1993	578.00	09/27/1990	848.00	mg/l
Conductivity, Field	77	3,910.00	07/29/2009	694.00	06/01/2005	1,580.81	µmhos
pH, Field	76	12.90	09/13/1995	7.78	09/16/2019	10.66	units
Temperature (°C), Field	37	22.50	06/01/2005	7.00	07/01/1991	12.52	(°C)
Water Level, Field	61	485.59	05/17/2018	409.63	11/01/1990	431.88	Ft.
Parameters Metals	**No. of Samples**	**High**	**Date**	**Low**	**Date**	**Average**	**Units**
Aluminum, dissolved	30	1.35	11/06/2014	0.03	08/23/2017	0.22	mg/l
Arsenic, dissolved	30	0.0095	08/23/2017	0.0004	04/22/2019	0.0031	mg/l
Barium, dissolved	30	0.201	07/29/2009	U	09/08/1993	0.04	mg/l
Beryllium, dissolved	30	U	03/09/2020	U	03/09/2020	U	mg/l
Boron, dissolved	59	0.47	12/20/1993	0.04	03/09/2020	0.22	mg/l
Cadmium, dissolved	30	U	03/09/2020	U	03/09/2020	U	mg/l
Calcium, dissolved	59	27.50	06/30/2009	0.20	11/14/1997	4.18	mg/l
Chromium, dissolved	30	0.02	11/06/2014	0.01	06/23/1994	0.02	mg/l
Copper, dissolved	30	0.04	07/29/2009	0.01	07/30/1991	0.03	mg/l
Iron, dissolved	30	65.10	11/06/2014	0.01	06/30/1995	3.22	mg/l
Lead, dissolved	30	0.63	09/15/2010	0.02	06/23/1994	0.14	mg/l
Lithium, dissolved	30	0.17	09/27/1990	0.02	08/23/2017	0.07	mg/l
Magnesium, dissolved	59	5.00	09/27/1990	0.00	05/24/2005	1.38	mg/l
Manganese, dissolved	30	0.59	11/06/2014	0.01	07/29/2009	0.06	mg/l
Mercury, dissolved	30	U	07/30/1991	U	09/27/1990	U	mg/l
Molybdenum, dissolved	30	0.13	05/24/2005	0.01	05/09/2001	0.05	mg/l
Nickel, dissolved	30	0.03	09/15/1992	0.01	03/22/2016	0.01	mg/l
Potassium, dissolved	59	39.00	03/22/1993	0.70	08/23/2017	5.99	mg/l
Selenium, dissolved	30	0.0010	07/30/1991	0.0004	03/27/2018	0.0008	mg/l
Silica, dissolved	59	44.60	06/16/1992	1.30	03/09/2020	15.95	mg/l
Sodium, dissolved	59	567.00	03/22/1993	153.00	03/25/1992	303.46	mg/l
Strontium, dissolved	59	5.10	03/25/1992	0.01	04/21/1994	0.32	mg/l
Vanadium, dissolved	30	0.01	06/23/1994	0.01	05/26/2000	0.01	mg/l
Zinc, dissolved	30	0.61	11/06/2014	0.01	09/27/1990	0.09	mg/l

Table 19: O-GMW-A Annual A-Groove Aquifer

Parameters Wet Chemistry	No. of Samples	High	Date	Low	Date	Average	Units
Bicarbonate as CaCO3	1	528.00	10/05/2014	528.00	10/05/2014	528.00	mg/l
Carbonate as CaCO3	1	51.40	10/05/2014	51.40	10/05/2014	51.40	mg/l
Total Alkalinity as CaCO3	1	579.00	10/05/2014	579.00	10/05/2014	579.00	mg/l
Bromide	1	U	10/05/2014	U	10/05/2014	U	mg/l
Cation-Anion Balance	1	-3.70	10/05/2014	-3.70	10/05/2014	-3.70	%
Sum of Anions	1	14.00	10/05/2014	14.00	10/05/2014	14.00	meq/l
Sum of Cations	1	13.00	10/05/2014	13.00	10/05/2014	13.00	meq/l
Chemical Oxygen	1	U	10/05/2014	U	10/05/2014	U	mg/l
Chloride	1	18.60	10/05/2014	18.60	10/05/2014	18.60	mg/l
Conductivity, Lab	1	1,270.00	10/05/2014	1,270.00	10/05/2014	1,270.00	µmhos
Fluoride	1	16.40	10/05/2014	16.40	10/05/2014	16.40	mg/l
Hardness as CaCO3	1	46.00	10/05/2014	46.00	10/05/2014	46.00	mg/l
Nitrate as N, dissolved	1	U	10/05/2014	U	10/05/2014	U	mg/l
Nitrate/Nitrite as N,	1	U	10/05/2014	U	10/05/2014	U	mg/l
Nitrite as N, dissolved	1	U	10/05/2014	U	10/05/2014	U	mg/l
Nitrogen, Ammonia	1	0.40	10/05/2014	0.40	10/05/2014	0.40	mg/l
Nitrogen, Organic	1	0.30	10/05/2014	0.30	10/05/2014	0.30	mg/l
Nitrogen, Total Kjeldahl	1	0.70	10/05/2014	0.70	10/05/2014	0.70	mg/l
pH, lab	1	8.60	10/05/2014	8.60	10/05/2014	8.60	units
Phosphate, total	1	0.06	10/05/2014	0.06	10/05/2014	0.06	mg/l
Phosphorus, total	1	0.02	10/05/2014	0.02	10/05/2014	0.02	mg/l
SAR in Water	1	17.00	10/05/2014	17.00	10/05/2014	17.00	none
Sulfate	1	60.00	10/05/2014	60.00	10/05/2014	60.00	mg/l
Sulfide	1	0.03	10/05/2014	0.03	10/05/2014	0.03	mg/l
Total Dissolved Solids	1	746.00	10/05/2014	746.00	10/05/2014	746.00	mg/l
Conductivity, Field	0	N/A	N/A	N/A	N/A	N/A	µmhos
pH, Field	0	N/A	N/A	N/A	N/A	N/A	units
Temperature (°C), Field	0	N/A	N/A	N/A	N/A	N/A	(°C)
Water Level, Field	0	N/A	N/A	N/A	N/A	N/A	Ft.
Parameters **Metals**	**No. of Samples**	**High**	**Date**	**Low**	**Date**	**Average**	**Units**
Aluminum, dissolved	1	U	10/05/2014	U	10/05/2014	U	mg/l
Arsenic, dissolved	1	0.02	10/05/2014	0.02	10/05/2014	0.02	mg/l
Barium, dissolved	1	0.13	10/05/2014	U	10/05/2014	0.13	mg/l
Beryllium, dissolved	1	U	10/05/2014	U	10/05/2014	U	mg/l
Boron, dissolved	1	0.25	10/05/2014	0.25	10/05/2014	0.25	mg/l
Cadmium, dissolved	1	U	10/05/2014	U	10/05/2014	U	mg/l
Calcium, dissolved	1	6.00	10/05/2014	U	10/05/2014	6.00	mg/l
Chromium, dissolved	1	U	10/05/2014	U	10/05/2014	U	mg/l
Copper, dissolved	1	U	10/05/2014	U	10/05/2014	U	mg/l
Iron, dissolved	1	U	10/05/2014	U	10/05/2014	U	mg/l
Lead, dissolved	1	U	10/05/2014	U	10/05/2014	U	mg/l
Lithium, dissolved	1	0.12	10/05/2014	0.12	10/05/2014	0.12	mg/l
Magnesium, dissolved	1	7.40	10/05/2014	U	10/05/2014	7.40	mg/l
Manganese, dissolved	1	0.01	10/05/2014	U	10/05/2014	0.01	mg/l
Mercury, dissolved	1	U	10/05/2014	U	10/05/2014	U	mg/l
Molybdenum, dissolved	1	U	10/05/2014	U	10/05/2014	U	mg/l
Nickel, dissolved	1	U	10/05/2014	U	10/05/2014	U	mg/l
Potassium, dissolved	1	1.30	10/05/2014	1.30	10/05/2014	1.30	mg/l
Selenium, dissolved	1	U	10/05/2014	U	10/05/2014	U	mg/l
Silica, dissolved	1	11.80	10/05/2014	11.80	10/05/2014	11.80	mg/l
Sodium, dissolved	1	267.00	10/05/2014	267.00	10/05/2014	267.00	mg/l
Strontium, dissolved	1	1.16	10/05/2014	U	10/05/2014	1.16	mg/l
Vanadium, dissolved	1	U	10/05/2014	U	10/05/2014	U	mg/l
Zinc, dissolved	1	U	10/05/2014	U	10/05/2014	U	mg/l

Table 20: WSW-2 Annual A-Groove Aquifer

Parameters Wet Chemistry	No. of Samples	High	Date	Low	Date	Average	Units
Bicarbonate as CaCO3	51	3,860.00	04/13/2020	483.00	06/16/2014	1,514.20	mg/l
Carbonate as CaCO3	50	387.00	05/14/2019	42.60	11/10/2014	132.41	mg/l
Total Alkalinity as CaCO3	51	4,100.00	04/13/2020	534.00	06/16/2014	1,644.92	mg/l
Bromide	5	0.46	07/11/2013	0.03	10/04/2011	0.18	mg/l
Cation-Anion Balance	49	3.40	06/16/2014	-13.40	06/14/2011	-3.03	%
Sum of Anions	50	135.00	07/03/2019	13.70	10/04/2011	47.39	meq/l
Sum of Cations	50	125.00	07/03/2019	12.60	06/14/2011	44.27	meq/l
Chemical Oxygen	9	40.00	04/13/2020	10.00	01/20/2011	19.89	mg/l
Chloride	50	1,910.00	07/03/2019	11.00	06/14/2011	479.98	mg/l
Conductivity, Lab	51	10,400	07/03/2019	1,250	10/04/2011	4,163	µmhos
Fluoride	50	28.10	11/14/2018	13.80	09/17/2012	20.08	mg/l
Hardness as CaCO3	50	72.00	01/24/2018	14.00	11/30/2011	32.00	mg/l
Nitrate as N, dissolved	2	0.10	11/10/2014	0.06	03/30/2011	0.08	mg/l
Nitrate/Nitrite as N,	2	0.10	11/10/2014	0.06	03/30/2011	0.08	mg/l
Nitrite as N, dissolved	13	U	04/13/2020	U	04/13/2020	U	mg/l
Nitrogen, Ammonia	13	2.08	04/13/2020	0.39	10/04/2011	0.90	mg/l
Nitrogen, Organic	11	0.90	04/03/2019	0.10	03/23/2011	0.27	mg/l
Nitrogen, Total Kjeldahl	13	2.50	04/03/2019	0.60	03/30/2011	1.13	mg/l
pH, lab	51	8.90	03/16/2014	8.50	05/14/2018	8.69	units
Phosphate, total	13	2.26	04/13/2020	0.09	03/23/2011	0.52	mg/l
Phosphorus, total	13	0.73	04/13/2020	0.03	03/23/2011	0.17	mg/l
SAR in Water	50	160.00	07/03/2019	31.30	06/14/2011	69.67	none
Sulfate	46	156.00	09/11/2019	5.41	07/17/2018	37.58	mg/l
Sulfide	13	3.90	10/04/2011	1.41	01/24/2018	2.50	mg/l
Total Dissolved Solids	50	7,230.00	07/03/2019	740.00	11/30/2011	2,528.06	mg/l
Conductivity, Field	114	10,470	07/03/2019	719	03/23/2011	4,023	µmhos
pH, Field	86	9.10	06/15/2020	7.30	05/28/2015	8.25	units
Temperature (°C), Field	86	25.00	07/13/2016	16.35	05/17/2016	21.79	(°C)
Water Level, Field	N/A	N/A	N/A	N/A	N/A	N/A	Ft.
Parameters **Metals**	**No. of Samples**	**High**	**Date**	**Low**	**Date**	**Average**	**Units**
Aluminum, dissolved	13	0.05	03/23/2011	0.03	11/05/2015	0.04	mg/l
Arsenic, dissolved	13	0.0004	03/23/2017	0.0002	11/05/2015	0.0003	mg/l
Barium, dissolved	13	1.53	04/03/2019	0.03	01/24/2018	0.32	mg/l
Beryllium, dissolved	13	0.0020	01/20/2011	U	04/13/2020	U	mg/l
Boron, dissolved	50	2.80	07/03/2019	0.36	10/04/2011	1.08	mg/l
Cadmium, dissolved	13	U	04/13/2020	U	04/13/2020	U	mg/l
Calcium, dissolved	50	14.10	01/24/2018	1.70	05/14/2019	3.20	mg/l
Chromium, dissolved	13	0.02	04/06/2016	0.02	04/06/2016	0.02	mg/l
Copper, dissolved	13	U	04/13/2020	U	04/13/2020	U	mg/l
Iron, dissolved	13	1.30	04/03/2019	0.05	03/23/2011	0.28	mg/l
Lead, dissolved	13	U	04/13/2020	U	04/13/2020	U	mg/l
Lithium, dissolved	13	0.23	04/13/2020	0.06	01/20/2011	0.10	mg/l
Magnesium, dissolved	50	13.00	04/10/2018	2.00	01/20/2011	5.84	mg/l
Manganese, dissolved	13	0.05	04/03/2019	0.01	03/23/2011	0.02	mg/l
Mercury, dissolved	13	U	04/13/2020	U	04/13/2020	U	mg/l
Molybdenum, dissolved	13	U	04/13/2020	U	04/13/2020	U	mg/l
Nickel, dissolved	13	0.02	07/11/2013	0.01	03/23/2011	0.02	mg/l
Potassium, dissolved	50	7.00	02/11/2020	0.40	11/01/2012	1.37	mg/l
Selenium, dissolved	13	U	04/13/2020	U	04/13/2020	U	mg/l
Silica, dissolved	50	12.80	11/05/2015	9.00	01/24/2018	11.50	mg/l
Sodium, dissolved	50	2,800.00	07/03/2019	279.00	06/14/2011	989.66	mg/l
Strontium, dissolved	50	2.67	01/24/2018	0.44	06/14/2011	1.27	mg/l
Vanadium, dissolved	13	U	04/13/2020	U	04/13/2020	U	mg/l
Zinc, dissolved	13	0.07	04/03/2019	0.01	11/05/2015	0.03	mg/l

Table 21: WSW-3 Annual A-Groove Aquifer

Parameters Wet Chemistry	No. of Samples	High	Date	Low	Date	Average	Units
Bicarbonate as CaCO3	29	529.00	08/22/2014	459.00	07/17/2018	489.00	mg/l
Carbonate as CaCO3	29	86.10	04/03/2019	26.70	04/06/2016	55.17	mg/l
Total Alkalinity as CaCO3	29	578.00	11/05/2015	520.00	10/18/2016	544.14	mg/l
Bromide	5	1.54	03/23/2017	0.10	08/22/2014	0.97	mg/l
Cation-Anion Balance	29	13.30	01/24/2018	-7.70	07/08/2020	-1.58	%
Sum of Anions	29	14.00	04/03/2019	12.00	10/18/2016	13.07	meq/l
Sum of Cations	29	17.00	01/24/2018	12.00	08/22/2014	12.69	meq/l
Chemical Oxygen Demand	2	196.00	04/06/2016	22.00	08/22/2014	109.00	mg/l
Chloride	29	20.90	04/06/2016	11.60	08/27/2015	14.03	mg/l
Conductivity, Lab	29	1,260	10/05/2020	1,100	08/16/2016	1,180	µmhos
Fluoride	29	19.80	08/22/2014	16.50	04/06/2016	18.36	mg/l
Hardness as CaCO3	29	238.00	01/24/2018	12.00	06/27/2017	20.91	mg/l
Nitrate as N, dissolved	1	0.09	08/22/2014	0.09	08/22/2014	0.09	mg/l
Nitrate/Nitrite as N,	1	0.25	08/22/2014	0.25	08/22/2014	0.25	mg/l
Nitrite as N, dissolved	1	0.16	08/22/2014	0.16	08/22/2014	0.16	mg/l
Nitrogen, Ammonia	7	0.52	11/05/2015	0.43	04/06/2016	0.47	mg/l
Nitrogen, Organic	3	0.40	08/22/2014	0.30	04/03/2019	0.37	mg/l
Nitrogen, Total Kjeldahl	7	0.80	08/22/2014	0.30	01/24/2018	0.60	mg/l
pH, lab	29	9.30	10/10/2019	8.50	04/13/2020	8.75	units
Phosphate, total	7	0.12	08/22/2014	0.06	04/03/2019	0.09	mg/l
Phosphorus, total	7	0.04	08/22/2014	0.02	04/03/2019	0.03	mg/l
SAR in Water	29	37.00	09/10/2019	7.60	01/24/2018	32.71	none
Sulfate	27	57.90	04/06/2016	11.60	01/27/2016	36.08	mg/l
Sulfide	7	3.30	04/13/2020	0.16	08/22/2014	1.83	mg/l
Total Dissolved Solids	29	774.00	01/24/2018	661.00	08/27/2015	696.93	mg/l
Conductivity, Field	64	1,498	10/10/2019	632	02/21/2019	1,185	µmhos
pH, Field	64	8.90	03/16/2016	7.60	04/06/2016	8.37	units
Temperature (°C), Field	64	23.40	07/17/2017	14.85	02/11/2020	21.32	(°C)
Water Level, Field	N/A	N/A	N/A	N/A	N/A	N/A	Ft.
Parameters **Metals**	**No. of Samples**	**High**	**Date**	**Low**	**Date**	**Average**	**Units**
Aluminum, dissolved	7	0.04	01/24/2018	U	08/22/2014	0.02	mg/l
Arsenic, dissolved	7	0.05	08/22/2014	U	03/23/2017	0.02	mg/l
Barium, dissolved	7	0.25	04/03/2019	0.03	01/24/2018	0.18	mg/l
Beryllium, dissolved	7	U	08/22/2014	U	08/22/2014	U	mg/l
Boron, dissolved	29	0.27	08/22/2014	0.21	04/06/2016	0.24	mg/l
Cadmium, dissolved	7	U	08/22/2014	U	08/22/2014	U	mg/l
Calcium, dissolved	29	81.30	01/24/2018	2.20	03/23/2017	5.15	mg/l
Chromium, dissolved	7	U	08/22/2014	U	08/22/2014	U	mg/l
Copper, dissolved	7	U	08/22/2014	U	08/22/2014	U	mg/l
Iron, dissolved	7	0.13	11/05/2015	0.05	03/23/2017	0.08	mg/l
Lead, dissolved	7	U	08/22/2014	U	08/22/2014	U	mg/l
Lithium, dissolved	7	0.13	04/06/2016	0.06	08/22/2014	0.07	mg/l
Magnesium, dissolved	29	8.50	01/24/2018	1.40	09/10/2019	1.92	mg/l
Manganese, dissolved	7	0.03	08/22/2014	0.01	04/06/2016	0.02	mg/l
Mercury, dissolved	7	U	08/22/2014	U	08/22/2014	U	mg/l
Molybdenum, dissolved	7	0.16	01/24/2018	0.07	08/22/2014	0.12	mg/l
Nickel, dissolved	7	0.01	04/06/2016	U	08/22/2014	0.01	mg/l
Potassium, dissolved	29	29.20	04/06/2016	0.20	10/18/2016	1.66	mg/l
Selenium, dissolved	7	U	08/22/2014	U	01/24/2018	U	mg/l
Silica, dissolved	29	13.50	07/08/2020	11.30	04/06/2016	12.48	mg/l
Sodium, dissolved	29	297.00	01/14/2019	258.00	05/14/2018	274.24	mg/l
Strontium, dissolved	29	0.57	01/14/2019	0.45	01/24/2018	0.53	mg/l
Vanadium, dissolved	7	U	08/22/2014	U	08/22/2014	U	mg/l
Zinc, dissolved	7	0.36	01/24/2018	0.02	08/22/2014	0.19	mg/l

Table 22: WSW-4 Annual A-Groove Aquifer

Parameters Wet Chemistry	No. of Samples	High	Date	Low	Date	Average	Units
Bicarbonate as CaCO3	30	523.00	09/10/2019	439.00	08/27/2015	478.70	mg/l
Carbonate as CaCO3	31	537.00	09/25/2014	46.10	01/13/2020	77.60	mg/l
Total Alkalinity as CaCO3	31	925.00	09/25/2014	511.00	06/09/2015	553.42	mg/l
Bromide	4	0.73	04/03/2019	0.09	08/25/2014	0.46	mg/l
Cation-Anion Balance	30	3.70	01/24/2018	-7.70	07/08/2020	-2.39	%
Sum of Anions	31	22.00	09/25/2014	13.00	06/09/2015	13.68	meq/l
Sum of Cations	31	19.00	09/25/2014	12.00	08/27/2015	13.03	meq/l
Chemical Oxygen	4	53.00	08/25/2014	13.00	04/06/2016	31.25	mg/l
Chloride	31	50.60	11/14/2018	7.87	10/05/2020	18.78	mg/l
Conductivity, Lab	31	2,810	09/25/2014	1,130	04/06/2016	1,270	µmhos
Fluoride	31	19.70	11/14/2018	5.11	09/25/2014	16.55	mg/l
Hardness as CaCO3	31	67.00	01/24/2018	11.00	03/05/2019	14.40	mg/l
Nitrate as N, dissolved	2	0.03	08/25/2014	U	09/25/2014	0.02	mg/l
Nitrate/Nitrite as N,	2	0.08	08/25/2014	U	09/25/2014	0.04	mg/l
Nitrite as N, dissolved	2	0.05	08/25/2014	0.01	09/25/2014	0.03	mg/l
Nitrogen, Ammonia	8	2.28	09/25/2014	0.43	04/13/2020	0.71	mg/l
Nitrogen, Organic	4	0.40	04/03/2019	0.00	09/25/2014	0.25	mg/l
Nitrogen, Total Kjeldahl	8	1.00	09/25/2014	0.30	03/23/2017	0.66	mg/l
pH, lab	31	11.70	09/25/2014	8.50	10/05/2020	8.88	units
Phosphate, total	8	0.28	09/25/2014	0.06	04/03/2019	0.11	mg/l
Phosphorus, total	8	0.09	09/25/2014	0.02	04/03/2019	0.04	mg/l
SAR in Water	31	44.00	09/25/2014	15.00	01/24/2018	34.90	none
Sulfate	31	130.00	09/25/2014	20.00	04/06/2016	55.68	mg/l
Sulfide	8	4.10	04/03/2019	0.10	09/25/2014	2.52	mg/l
Total Dissolved Solids	31	1,210.00	09/25/2014	696.00	01/13/2020	736.61	mg/l
Conductivity, Field	65	1,558	10/10/2019	1,073	04/06/2016	1,237	µmhos
pH, Field	65	9.40	01/13/2020	7.70	08/27/2015	8.46	units
Temperature (°C), Field	65	29.00	06/20/2016	13.80	04/19/2017	21.33	(°C)
Water Level, Field	N/A	N/A	N/A	N/A	N/A	N/A	Ft.
Parameters **Metals**	**No. of Samples**	**High**	**Date**	**Low**	**Date**	**Average**	**Units**
Aluminum, dissolved	8	0.42	09/25/2014	0.42	09/25/2014	0.42	mg/l
Arsenic, dissolved	8	0.01	09/25/2014	0.0004	04/06/2016	0.0032	mg/l
Barium, dissolved	8	0.23	04/06/2016	0.02	09/25/2014	0.09	mg/l
Beryllium, dissolved	8	U	04/13/2020	U	04/13/2020	U	mg/l
Boron, dissolved	31	0.44	09/25/2014	0.18	08/27/2015	0.22	mg/l
Cadmium, dissolved	8	U	04/13/2020	U	04/13/2020	U	mg/l
Calcium, dissolved	31	24.70	01/24/2018	1.90	03/23/2017	2.98	mg/l
Chromium, dissolved	8	U	04/13/2020	U	04/13/2020	U	mg/l
Copper, dissolved	8	U	04/13/2020	U	04/13/2020	U	mg/l
Iron, dissolved	8	1.63	04/03/2019	0.02	03/23/2017	0.37	mg/l
Lead, dissolved	8	U	04/13/2020	U	04/13/2020	U	mg/l
Lithium, dissolved	8	0.13	11/05/2015	0.07	04/06/2016	0.11	mg/l
Magnesium, dissolved	31	2.00	08/27/2015	0.30	09/25/2014	1.68	mg/l
Manganese, dissolved	8	0.01	01/24/2018	0.01	01/24/2018	0.01	mg/l
Mercury, dissolved	8	U	04/13/2020	U	04/13/2020	U	mg/l
Molybdenum, dissolved	8	0.04	01/24/2018	0.02	09/25/2014	0.03	mg/l
Nickel, dissolved	8	U	08/25/2014	U	08/25/2014	U	mg/l
Potassium, dissolved	31	18.30	09/25/2014	0.20	05/14/2018	1.16	mg/l
Selenium, dissolved	8	0.0004	03/23/2017	0.0003	04/03/2019	0.0004	mg/l
Silica, dissolved	31	172.00	09/25/2014	8.90	01/24/2018	16.91	mg/l
Sodium, dissolved	31	416.00	09/25/2014	262.00	07/08/2020	286.19	mg/l
Strontium, dissolved	31	7.97	01/24/2018	0.39	03/05/2019	0.66	mg/l
Vanadium, dissolved	8	U	04/13/2020	U	04/13/2020	U	mg/l
Zinc, dissolved	8	0.02	09/25/2014	0.02	09/25/2014	0.02	mg/l

Table 23: 89-1 Annual B-Groove Aquifer

Parameters Wet Chemistry	No. of Samples	High	Date	Low	Date	Average	Units
Bicarbonate as	183	762.00	03/25/1994	144.00	07/30/1990	610.15	mg/l
Carbonate as CaCO3	183	406.00	05/21/1997	25.00	07/01/1997	100.94	mg/l
Total Alkalinity as	183	830.00	07/31/1991	200.00	07/30/1990	711.25	mg/l
Bromide	28	10.00	06/26/1991	0.06	07/01/1997	1.15	mg/l
Cation-Anion Balance	178	24.10	04/16/2002	-9.10	06/14/2017	-0.05	%
Sum of Anions	177	18.00	06/14/2017	4.29	07/30/1990	15.71	meq/l
Sum of Cations	177	18.20	04/11/2006	4.38	07/30/1990	15.50	meq/l
Chemical Oxygen	30	420.00	06/25/2007	30.00	03/30/1990	81.41	mg/l
Chloride	182	70.50	06/14/2017	6.00	09/27/1990	15.42	mg/l
Conductivity, Lab	175	1,850.00	04/24/1991	1,000.00	05/20/1993	1,392.05	µmhos
Fluoride	177	38.20	02/24/1992	0.20	09/29/1994	23.82	mg/l
Hardness as CaCO3	181	65.00	09/27/1990	0.00	07/30/1990	11.11	mg/l
Nitrate as N, dissolved	30	16.50	06/25/2007	0.02	06/26/1991	1.01	mg/l
Nitrate/Nitrite as N,	30	17.00	06/25/2007	0.02	06/26/1991	1.07	mg/l
Nitrite as N, dissolved	31	0.55	06/25/2007	0.01	03/30/1990	0.13	mg/l
Nitrogen, Ammonia	30	9.23	12/26/2018	0.06	07/30/1990	1.85	mg/l
Nitrogen, Organic	29	29.10	06/26/1991	0.10	06/15/1992	5.08	mg/l
Nitrogen, Total	30	30.10	06/26/1991	0.80	06/15/1992	6.81	mg/l
pH, lab	178	9.80	12/20/1994	8.10	10/28/2002	8.89	units
Phosphate, total	26	155.00	06/25/2007	0.06	07/18/1995	13.46	mg/l
Phosphorus, total	31	2.90	09/27/1990	0.02	07/02/1998	0.17	mg/l
SAR in Water	153	158.62	06/26/1990	16.50	09/27/1990	48.77	none
Sulfate	181	140.00	10/25/1990	0.00	08/16/2017	20.10	mg/l
Sulfide	26	2.10	07/30/1990	0.02	07/27/2001	0.45	mg/l
Total Dissolved Solids	183	1,100.00	10/21/1989	446.00	07/30/1990	864.84	mg/l
Conductivity, Field	200	1,683.00	06/05/2012	925.00	08/02/2006	1,343.34	µmhos
pH, Field	200	10.12	07/29/2009	7.10	06/10/2020	9.03	units
Temperature (°C),	106	19.00	07/31/1991	7.60	04/01/2006	12.52	(°C)
Water Level, Field	90	500.70	06/25/2014	432.37	06/25/2014	473.31	Ft.
Parameters Metals	**No. of Samples**	**High**	**Date**	**Low**	**Date**	**Average**	**Units**
Aluminum, dissolved	30	1.54	03/30/1990	0.04	07/01/1997	0.24	mg/l
Arsenic, dissolved	30	0.30	10/21/1989	0.0005	12/03/2012	0.02	mg/l
Barium, dissolved	30	0.43	08/02/2006	0.02	12/26/2018	0.18	mg/l
Beryllium, dissolved	29	0.01	06/26/1991	0.01	06/26/1991	0.01	mg/l
Boron, dissolved	178	3.30	03/25/1991	0.35	01/27/2004	0.68	mg/l
Cadmium, dissolved	29	0.01	10/21/1989	0.01	10/21/1989	0.01	mg/l
Calcium, dissolved	175	13.00	09/27/1990	0.50	03/16/2010	2.29	mg/l
Chromium, dissolved	29	0.01	06/26/1991	0.01	06/26/1991	0.01	mg/l
Copper, dissolved	30	0.02	06/25/2007	0.01	03/30/1990	0.01	mg/l
Iron, dissolved	30	0.93	03/30/1990	0.01	07/07/1999	0.17	mg/l
Lead, dissolved	29	0.10	10/21/1989	0.02	06/26/1991	0.06	mg/l
Lithium, dissolved	29	0.20	12/27/1990	0.06	03/30/1990	0.13	mg/l
Magnesium, dissolved	177	8.00	09/27/1990	0.30	03/16/2010	1.37	mg/l
Manganese, dissolved	29	0.07	06/25/2007	0.01	07/01/1997	0.03	mg/l
Mercury, dissolved	30	0.0010	06/15/1992	0.0001	06/26/1991	0.0005	mg/l
Molybdenum,	29	0.60	10/21/1989	0.01	07/27/2001	0.14	mg/l
Nickel, dissolved	30	0.03	10/21/1989	0.01	12/03/2012	0.02	mg/l
Potassium, dissolved	177	13.00	03/25/1991	0.60	06/10/2020	1.30	mg/l
Selenium, dissolved	30	0.001	10/21/1989	U	10/21/1989	U	mg/l
Silica, dissolved	178	35.90	10/21/1989	1.80	06/11/2019	16.96	mg/l
Sodium, dissolved	178	408.00	04/11/2006	102.00	12/27/1990	349.54	mg/l
Strontium, dissolved	178	0.83	03/14/2012	0.06	10/21/1989	0.49	mg/l
Vanadium, dissolved	30	0.03	06/26/1991	0.01	10/21/1989	0.02	mg/l
Zinc, dissolved	30	0.07	07/29/2009	0.01	03/30/1990	0.02	mg/l

Table 24: 90-3 Annual B-Groove Aquifer

Parameters Wet Chemistry	No. of Samples	High	Date	Low	Date	Average	Units
Bicarbonate as	122	1,790.00	09/14/2004	419.00	03/23/2005	770.77	mg/l
Carbonate as CaCO3	122	419.00	03/23/2005	4.00	06/16/1997	88.21	mg/l
Total Alkalinity as	122	1,790.00	09/14/2004	680.00	06/15/2014	855.39	mg/l
Bromide	14	1.50	07/21/1992	0.10	01/29/1991	0.44	mg/l
Cation-Anion Balance	121	36.90	08/10/2008	-33.50	09/14/2004	-1.53	%
Sum of Anions	112	37.50	09/14/2004	15.00	06/26/2002	18.89	meq/l
Sum of Cations	112	39.50	08/10/2008	11.10	11/23/2010	18.21	meq/l
Chemical Oxygen	21	210.00	09/15/2007	10.00	08/14/1995	75.00	mg/l
Chloride	122	293.00	06/14/2008	9.75	01/16/2018	21.24	mg/l
Conductivity, Lab	119	2,200.00	05/16/2007	1,280.00	07/21/1992	1,590.96	µmhos
Fluoride	122	98.00	03/24/1999	9.00	12/11/2001	23.15	mg/l
Hardness as CaCO3	118	47.00	10/09/2019	1.00	10/25/1990	14.97	mg/l
Nitrate as N, dissolved	26	0.27	06/24/2004	0.04	01/29/1991	0.11	mg/l
Nitrate/Nitrite as N,	26	0.27	06/24/2004	0.05	01/29/1991	0.12	mg/l
Nitrite as N, dissolved	26	0.03	08/16/1994	0.01	01/29/1991	0.02	mg/l
Nitrogen, Ammonia	25	10.90	08/16/1996	0.83	06/28/2006	1.63	mg/l
Nitrogen, Organic	25	12.00	09/15/2007	0.20	01/29/1991	3.56	mg/l
Nitrogen, Total	25	13.00	09/15/2007	0.50	08/14/1995	4.26	mg/l
pH, lab	119	9.00	04/24/1991	7.40	06/16/1997	8.69	units
Phosphate, total	21	155.00	06/28/2006	0.06	05/08/2020	8.29	mg/l
Phosphorus, total	24	3.63	08/01/1990	0.02	06/28/2006	0.27	mg/l
SAR in Water	113	198.04	10/25/1990	0.08	04/24/1991	48.42	none
Sulfate	78	333.00	01/20/1992	0.60	09/29/1997	49.26	mg/l
Sulfide	19	6.21	08/01/1990	0.03	06/28/2006	0.76	mg/l
Total Dissolved Solids	120	1,490.00	08/10/2008	813.00	11/23/2010	1,013.06	mg/l
Conductivity, Field	180	2,200.00	05/16/2007	1,135.00	06/16/1997	1,548.97	µmhos
pH, Field	180	10.60	12/16/2002	7.00	10/09/2019	8.68	units
Temperature (°C),	121	19.70	05/01/2002	8.00	12/01/2004	12.32	(°C)
Water Level, Field	102	547.40	06/14/2011	507.30	01/15/2016	530.44	Ft.
Parameters Metals	**No. of Samples**	**High**	**Date**	**Low**	**Date**	**Average**	**Units**
Aluminum, dissolved	26	9.47	06/16/1997	0.04	06/14/2000	1.73	mg/l
Arsenic, dissolved	26	0.02	08/01/1990	0.0003	11/27/2012	0.0034	mg/l
Barium, dissolved	26	0.96	06/16/1997	0.03	08/08/1990	0.36	mg/l
Beryllium, dissolved	26	U	05/08/2020	U	05/08/2020	U	mg/l
Boron, dissolved	123	0.93	03/18/2004	0.31	02/21/1994	0.73	mg/l
Cadmium, dissolved	26	0.03	07/21/1993	0.03	07/21/1993	0.03	mg/l
Calcium, dissolved	123	15.00	10/09/2019	0.80	12/12/2008	2.50	mg/l
Chromium, dissolved	26	U	05/08/2020	U	05/08/2020	U	mg/l
Copper, dissolved	26	0.40	07/31/1991	0.01	06/24/2004	0.21	mg/l
Iron, dissolved	26	12.10	06/16/1997	0.01	06/16/2005	1.65	mg/l
Lead, dissolved	26	0.07	06/16/1997	0.04	07/21/1992	0.06	mg/l
Lithium, dissolved	25	0.15	06/09/1999	0.04	07/21/1993	0.13	mg/l
Magnesium, dissolved	123	8.00	10/30/1991	0.90	12/12/2008	2.19	mg/l
Manganese, dissolved	25	0.08	06/16/1997	0.01	06/28/2006	0.02	mg/l
Mercury, dissolved	26	0.02	07/31/1991	0.0002	08/14/1995	0.006	mg/l
Molybdenum,	26	0.14	08/01/1990	0.02	08/16/1996	0.07	mg/l
Nickel, dissolved	26	0.02	01/29/1991	0.01	09/21/2010	0.02	mg/l
Potassium, dissolved	123	12.00	07/31/1991	1.00	05/23/1994	1.68	mg/l
Selenium, dissolved	26	0.00	08/08/1990	U	08/08/1990	U	mg/l
Silica, dissolved	123	122.00	10/30/1991	0.30	04/24/1991	19.73	mg/l
Sodium, dissolved	123	882.00	08/10/2008	247.00	11/23/2010	408.17	mg/l
Strontium, dissolved	123	1.30	04/20/1992	0.06	06/14/2000	0.68	mg/l
Vanadium, dissolved	26	U	05/08/2020	U	05/08/2020	U	mg/l
Zinc, dissolved	26	0.53	07/31/1991	0.01	08/01/1990	0.09	mg/l

Table 25: BG-1 Annual B-Groove Aquifer

Parameters Wet Chemistry	No. of Samples	High	Date	Low	Date	Average	Units
Bicarbonate as	141	1,010.00	08/07/1997	283.00	02/16/2007	639.74	mg/l
Carbonate as CaCO3	141	581.00	08/21/2003	8.00	05/26/2000	133.15	mg/l
Total Alkalinity as	141	1,160.00	08/21/2003	364.00	02/16/2007	768.98	mg/l
Bromide	18	3.00	09/02/1998	0.10	05/18/2006	0.49	mg/l
Cation-Anion Balance	140	42.30	03/17/2009	-36.30	08/07/1997	-1.53	%
Sum of Anions	140	30.80	08/07/1997	9.10	02/16/2007	17.37	meq/l
Sum of Cations	140	43.20	03/17/2009	6.70	02/16/2007	16.88	meq/l
Chemical Oxygen	15	470.00	08/25/2005	10.00	09/14/2000	148.00	mg/l
Chloride	140	249.00	08/07/1997	U	09/25/2002	24.82	mg/l
Conductivity, Lab	141	3,980.00	08/07/1997	769.00	02/16/2007	1,511.33	µmhos
Fluoride	140	56.00	03/25/1998	12.80	06/14/2008	24.14	mg/l
Hardness as CaCO3	140	48.00	04/19/2001	1.00	02/16/2007	11.08	mg/l
Nitrate as N, dissolved	18	0.53	09/25/2002	0.03	08/30/2008	0.20	mg/l
Nitrate/Nitrite as N,	18	0.53	09/25/2002	0.02	05/18/2006	0.17	mg/l
Nitrite as N, dissolved	18	0.02	05/18/2006	0.02	05/18/2006	0.02	mg/l
Nitrogen, Ammonia	16	5.00	09/29/1997	0.72	09/29/2006	1.87	mg/l
Nitrogen, Organic	16	28.00	09/25/2002	0.30	09/22/1999	8.02	mg/l
Nitrogen, Total	16	28.00	09/25/2002	1.40	09/15/1997	9.79	mg/l
pH, lab	140	22.10	05/01/2020	7.00	12/12/2008	9.04	units
Phosphate, total	14	155.00	05/18/2006	0.08	09/15/1997	24.26	mg/l
Phosphorus, total	16	0.51	09/24/2003	0.03	09/15/1997	0.13	mg/l
SAR in Water	139	148.00	11/23/2010	19.80	04/19/2001	58.28	none
Sulfate	138	70.00	10/30/2003	0.07	11/20/2000	12.83	mg/l
Sulfide	14	1.50	09/24/2003	0.03	09/29/2006	0.33	mg/l
Total Dissolved Solids	140	1,510.00	03/17/2009	453.00	02/16/2007	936.41	mg/l
Conductivity, Field	153	3,980.00	08/07/1997	1,310.00	02/08/2000	1,528.25	µmhos
pH, Field	153	10.69	07/29/2009	6.35	08/30/2008	8.91	units
Temperature (°C),	105	16.20	06/01/2007	8.60	12/01/2003	12.58	(°C)
Water Level, Field	104	540.70	10/05/2020	493.67	07/01/2001	521.86	Ft.
Parameters Metals	**No. of Samples**	**High**	**Date**	**Low**	**Date**	**Average**	**Units**
Aluminum, dissolved	18	7.96	09/25/2002	0.03	11/16/2007	1.06	mg/l
Arsenic, dissolved	18	0.002	09/29/1997	0.0002	11/27/2012	0.0009	mg/l
Barium, dissolved	18	1.26	09/25/2002	0.13	09/29/2006	0.31	mg/l
Beryllium, dissolved	18	U	11/27/2012	U	11/27/2012	U	mg/l
Boron, dissolved	139	1.67	03/17/2009	0.22	04/19/2001	0.82	mg/l
Cadmium, dissolved	18	U	11/27/2012	U	11/27/2012	U	mg/l
Calcium, dissolved	138	8.80	12/12/2008	0.20	11/23/2010	2.26	mg/l
Chromium, dissolved	18	0.02	09/29/1997	0.02	09/29/1997	0.02	mg/l
Copper, dissolved	18	0.38	09/25/2002	0.01	09/24/2003	0.09	mg/l
Iron, dissolved	18	29.40	09/25/2002	0.03	03/14/2008	2.66	mg/l
Lead, dissolved	18	0.88	09/25/2002	0.05	09/21/2010	0.36	mg/l
Lithium, dissolved	18	0.20	09/02/1998	0.12	08/30/2008	0.16	mg/l
Magnesium, dissolved	138	9.40	04/19/2001	0.20	09/29/2006	1.33	mg/l
Manganese, dissolved	17	0.18	09/25/2002	0.01	09/14/2000	0.04	mg/l
Mercury, dissolved	18	0.0006	09/02/1998	U	09/02/1998	U	mg/l
Molybdenum,	18	0.06	09/29/1997	0.01	09/14/2004	0.03	mg/l
Nickel, dissolved	18	0.05	09/29/2006	0.02	09/25/2002	0.03	mg/l
Potassium, dissolved	140	12.00	08/07/1997	1.20	06/14/2001	3.09	mg/l
Selenium, dissolved	18	U	11/27/2012	U	11/27/2012	U	mg/l
Silica, dissolved	140	50.20	09/25/2002	1.40	10/26/2004	9.70	mg/l
Sodium, dissolved	140	973.00	03/17/2009	152.00	02/16/2007	375.26	mg/l
Strontium, dissolved	139	1.58	09/25/2002	0.14	02/16/2007	0.53	mg/l
Vanadium, dissolved	18	U	11/27/2012	U	11/27/2012	U	mg/l
Zinc, dissolved	18	0.80	09/25/2002	0.01	09/29/1997	0.11	mg/l

Table 26: BG-4 Annual B-Groove Aquifer

Parameters Wet Chemistry	No. of Samples	High	Date	Low	Date	Average	Units
Bicarbonate as CaCO3	214	899.00	10/28/2002	524.00	09/14/2004	691.42	mg/l
Carbonate as CaCO3	214	210.00	07/30/2003	16.00	11/21/2008	93.30	mg/l
Total Alkalinity as CaCO3	214	984.00	05/07/2018	612.00	04/17/2002	781.69	mg/l
Bromide	29	0.10	08/12/2004	0.10	08/12/2004	0.10	mg/l
Cation-Anion Balance	213	13.40	08/02/2006	-12.80	05/07/2018	-2.31	%
Sum of Anions	213	22.00	05/07/2018	12.60	08/02/2006	17.53	meq/l
Sum of Cations	213	20.00	05/14/2020	13.60	04/29/2010	16.74	meq/l
Chemical Oxygen	29	400.00	08/22/2002	10.00	08/02/2006	78.22	mg/l
Chloride	213	116.00	11/03/2020	2.00	08/02/2006	24.25	mg/l
Conductivity, Lab	213	1,920	05/07/2018	1,160	08/02/2006	1,545	µmhos
Fluoride	213	26.90	12/16/2003	2.09	06/06/2017	22.27	mg/l
Hardness as CaCO3	212	47.00	09/30/2008	5.00	11/27/2002	15.23	mg/l
Nitrate as N, dissolved	28	2.06	09/28/2006	0.03	11/06/2014	1.05	mg/l
Nitrate/Nitrite as N,	28	2.08	09/28/2006	0.02	05/18/2006	0.59	mg/l
Nitrite as N, dissolved	28	0.21	08/02/2006	0.01	05/18/2006	0.07	mg/l
Nitrogen, Ammonia	29	1.61	09/30/2008	0.43	05/14/2020	0.88	mg/l
Nitrogen, Organic	27	27.00	08/22/2002	0.50	08/02/2006	4.75	mg/l
Nitrogen, Total Kjeldahl	29	28.00	08/22/2002	1.00	04/13/2016	5.16	mg/l
pH, lab	214	9.20	05/21/2009	7.50	08/30/2008	8.78	units
Phosphate, total	25	155.00	05/18/2006	0.12	08/18/2010	42.19	mg/l
Phosphorus, total	29	0.32	05/14/2020	0.03	08/02/2006	0.08	mg/l
SAR in Water	212	73.30	12/16/2002	23.40	09/30/2008	42.85	none
Sulfate	211	50.00	09/28/2006	0.00	09/02/2015	12.06	mg/l
Sulfide	21	0.80	08/22/2002	0.03	09/28/2006	0.28	mg/l
Total Dissolved Solids	213	1,110	10/06/2020	789	08/02/2006	928	mg/l
Conductivity, Field	230	2,874	02/10/2016	1,101	10/05/2006	1,538	µmhos
pH, Field	229	10.01	07/29/2009	6.90	11/04/2019	8.52	units
Temperature (°C), Field	226	22.70	08/02/2016	5.80	01/26/2010	12.06	(°C)
Water Level, Field	222	547.26	11/10/2010	468.30	07/01/2002	506.49	Ft.
Parameters **Metals**	**No. of Samples**	**High**	**Date**	**Low**	**Date**	**Average**	**Units**
Aluminum, dissolved	31	1.26	05/14/2020	0.03	05/18/2006	0.20	mg/l
Arsenic, dissolved	31	0.0009	09/30/2008	0.0003	12/20/2018	0.0006	mg/l
Barium, dissolved	31	0.14	05/14/2020	0.00	07/06/2017	0.02	mg/l
Beryllium, dissolved	31	U	05/14/2020	U	05/14/2020	U	mg/l
Boron, dissolved	214	0.97	07/12/2007	0.34	08/21/2003	0.72	mg/l
Cadmium, dissolved	31	U	05/14/2020	U	05/14/2020	U	mg/l
Calcium, dissolved	215	11.70	09/30/2008	1.10	12/16/2002	2.92	mg/l
Chromium, dissolved	31	0.02	09/28/2006	0.02	09/28/2006	0.02	mg/l
Copper, dissolved	31	U	05/14/2020	U	05/14/2020	U	mg/l
Iron, dissolved	31	2.08	05/14/2020	0.01	08/12/2004	0.20	mg/l
Lead, dissolved	31	0.04	05/06/2019	0.04	05/06/2019	0.04	mg/l
Lithium, dissolved	31	0.17	05/14/2020	0.08	08/21/2003	0.14	mg/l
Magnesium, dissolved	214	4.40	09/30/2008	0.60	11/27/2002	1.92	mg/l
Manganese, dissolved	29	0.19	09/30/2008	0.01	03/14/2008	0.03	mg/l
Mercury, dissolved	31	0.0004	09/28/2006	U	09/28/2006	U	mg/l
Molybdenum, dissolved	31	0.12	08/22/2002	0.01	08/18/2010	0.04	mg/l
Nickel, dissolved	31	0.03	09/30/2008	0.01	12/03/2012	0.02	mg/l
Potassium, dissolved	215	6.20	07/24/2002	0.60	11/21/2008	1.59	mg/l
Selenium, dissolved	31	0.0001	05/06/2019	U	05/06/2019	U	mg/l
Silica, dissolved	214	29.30	04/17/2002	5.50	08/21/2003	14.61	mg/l
Sodium, dissolved	215	439.00	10/06/2020	302.00	09/11/2013	371.21	mg/l
Strontium, dissolved	214	0.93	11/03/2020	0.06	04/27/2004	0.50	mg/l
Vanadium, dissolved	31	U	05/14/2020	U	05/14/2020	U	mg/l
Zinc, dissolved	31	0.13	08/30/2008	0.01	08/22/2002	0.03	mg/l

Table 27: BG-5 Annual B-Groove Aquifer

Parameters Wet Chemistry	No. of Samples	High	Date	Low	Date	Average	Units
Bicarbonate as CaCO3	138	5,090.00	12/01/2020	447.00	03/22/2011	1,150.93	mg/l
Carbonate as CaCO3	138	2,120.00	11/03/2020	43.10	02/10/2016	189.36	mg/l
Total Alkalinity as CaCO3	138	7,210.00	11/03/2020	670.00	05/14/2014	1,340.49	mg/l
Bromide	14	0.94	07/10/2013	0.00	11/10/2014	0.47	mg/l
Cation-Anion Balance	138	7.90	10/28/2010	-11.80	07/07/2020	-3.09	%
Sum of Anions	138	191.00	12/01/2020	15.00	05/14/2014	36.84	meq/l
Sum of Cations	138	188.00	11/03/2020	14.90	05/06/2013	34.57	meq/l
Chemical Oxygen	14	320.00	09/22/2010	16.00	10/12/2015	66.50	mg/l
Chloride	138	1,630.00	12/01/2020	14.20	11/30/2015	314.59	mg/l
Conductivity, Lab	138	15,000	11/03/2020	1,420	01/11/2016	3,241	µmhos
Fluoride	138	34.80	12/01/2020	9.80	02/23/2010	22.86	mg/l
Hardness as CaCO3	138	44.00	10/28/2010	4.00	12/01/2020	18.03	mg/l
Nitrate as N, dissolved	15	0.07	11/10/2014	0.02	10/07/2009	0.04	mg/l
Nitrate/Nitrite as N,	15	0.07	11/10/2014	0.02	10/07/2009	0.04	mg/l
Nitrite as N, dissolved	15	0.00	11/10/2014	0.00	11/10/2014	0.00	mg/l
Nitrogen, Ammonia	15	2.32	05/07/2020	0.56	10/07/2009	1.05	mg/l
Nitrogen, Organic	15	3.90	09/22/2010	0.20	12/13/2012	1.07	mg/l
Nitrogen, Total Kjeldahl	15	5.10	09/22/2010	0.80	10/12/2015	2.04	mg/l
pH, lab	138	9.60	03/22/2011	6.10	04/02/2019	8.87	units
Phosphate, total	15	155.00	10/07/2009	0.06	10/12/2015	18.38	mg/l
Phosphorus, total	15	0.70	05/07/2020	0.02	10/12/2015	0.16	mg/l
SAR in Water	138	820.00	12/01/2020	39.20	11/10/2010	81.14	none
Sulfate	138	110.00	11/10/2010	0.00	11/22/2011	29.94	mg/l
Sulfide	15	1.33	08/11/2011	0.00	11/10/2014	0.47	mg/l
Total Dissolved Solids	138	10,200	11/03/2020	829	05/14/2014	1,964	mg/l
Conductivity, Field	165	27,480	12/15/2020	1,232	06/05/2017	3,236	µmhos
pH, Field	163	9.66	02/04/2011	6.70	11/04/2019	8.61	units
Temperature (°C), Field	165	21.00	08/18/2010	7.10	02/05/2014	12.38	(°C)
Water Level, Field	157	541.00	10/05/2020	511.95	02/10/2020	529.55	Ft.
Parameters **Metals**	**No. of Samples**	**High**	**Date**	**Low**	**Date**	**Average**	**Units**
Aluminum, dissolved	14	0.10	08/18/2010	0.04	08/11/2011	0.06	mg/l
Arsenic, dissolved	14	0.01	11/10/2010	0.0003	11/10/2014	0.0027	mg/l
Barium, dissolved	14	3.06	05/07/2020	0.04	10/07/2009	0.76	mg/l
Beryllium, dissolved	14	U	05/07/2020	U	05/07/2020	U	mg/l
Boron, dissolved	138	8.32	11/03/2020	0.45	11/19/2009	1.12	mg/l
Cadmium, dissolved	14	U	05/07/2020	U	05/07/2020	U	mg/l
Calcium, dissolved	138	7.70	10/28/2010	1.60	06/04/2018	3.00	mg/l
Chromium, dissolved	14	U	05/07/2020	U	05/07/2020	U	mg/l
Copper, dissolved	14	0.07	07/05/2017	0.02	10/07/2009	0.05	mg/l
Iron, dissolved	14	0.90	10/07/2009	0.03	12/04/2012	0.16	mg/l
Lead, dissolved	14	U	05/07/2020	U	05/07/2020	U	mg/l
Lithium, dissolved	14	0.36	05/07/2020	0.17	10/07/2009	0.21	mg/l
Magnesium, dissolved	138	5.90	10/28/2010	1.30	03/09/2014	2.56	mg/l
Manganese, dissolved	14	0.03	10/07/2009	0.01	07/10/2013	0.01	mg/l
Mercury, dissolved	14	U	05/07/2020	U	05/07/2020	U	mg/l
Molybdenum, dissolved	14	1.31	11/10/2010	0.01	10/07/2009	0.30	mg/l
Nickel, dissolved	14	0.05	05/07/2019	0.02	07/10/2013	0.04	mg/l
Potassium, dissolved	138	34.80	08/02/2010	0.60	11/01/2016	2.08	mg/l
Selenium, dissolved	14	0.01	11/10/2010	0.00	08/11/2011	0.00	mg/l
Silica, dissolved	138	16.00	11/03/2020	0.50	02/17/2011	12.62	mg/l
Sodium, dissolved	138	4250	11/03/2020	332.00	05/06/2013	774.84	mg/l
Strontium, dissolved	138	3.16	03/04/2020	0.48	08/02/2010	1.07	mg/l
Vanadium, dissolved	14	U	05/07/2020	U	05/07/2020	U	mg/l
Zinc, dissolved	14	0.17	12/20/2018	U	10/07/2009	0.0525	mg/l

Table 28: BG-6 Annual B-Groove Aquifer

Parameters Wet Chemistry	No. of Samples	High	Date	Low	Date	Average	Units
Bicarbonate as CaCO3	125	869.00	12/18/2013	541.00	12/08/2010	673.06	mg/l
Carbonate as CaCO3	125	219.00	12/08/2010	48.10	02/10/2020	89.30	mg/l
Total Alkalinity as CaCO3	125	1,040.00	12/18/2013	633.00	06/11/2014	762.39	mg/l
Bromide	13	U	05/14/2020	U	05/14/2020	U	mg/l
Cation-Anion Balance	124	5.90	04/09/2014	-9.30	04/11/2011	-2.54	%
Sum of Anions	124	23.00	12/18/2013	14.30	06/11/2014	16.93	meq/l
Sum of Cations	124	20.00	12/18/2013	13.10	04/11/2011	16.09	meq/l
Chemical Oxygen	12	800.00	01/13/2011	21.00	12/31/2018	232.73	mg/l
Chloride	106	70.00	12/08/2010	10.00	01/20/2011	16.12	mg/l
Conductivity, Lab	125	8,820	06/03/2019	1,320	07/05/2017	1,575	µmhos
Fluoride	124	27.80	06/03/2019	14.60	09/17/2012	23.44	mg/l
Hardness as CaCO3	124	16.00	09/05/2017	10.00	09/11/2013	12.61	mg/l
Nitrate as N, dissolved	13	0.03	12/27/2012	0.03	12/27/2012	0.03	mg/l
Nitrate/Nitrite as N,	13	0.03	12/27/2012	0.03	12/27/2012	0.03	mg/l
Nitrite as N, dissolved	13	U	05/14/2020	U	05/14/2020	U	mg/l
Nitrogen, Ammonia	13	0.95	10/12/2015	0.71	01/20/2011	0.82	mg/l
Nitrogen, Organic	13	8.30	01/13/2011	0.80	10/12/2015	2.49	mg/l
Nitrogen, Total Kjeldahl	13	9.00	01/13/2011	1.00	05/14/2020	3.11	mg/l
pH, lab	125	9.40	12/08/2010	8.50	04/08/2020	8.83	units
Phosphate, total	13	77.50	08/11/2011	0.09	01/13/2011	6.58	mg/l
Phosphorus, total	13	0.09	07/10/2013	0.03	01/13/2011	0.04	mg/l
SAR in Water	124	56.60	12/18/2013	37.80	04/11/2011	44.47	none
Sulfate	124	20.00	01/13/2011	3.45.00	11/02/2016	12.06	mg/l
Sulfide	13	0.10	01/20/2011	0.03	07/10/2013	0.05	mg/l
Total Dissolved Solids	124	1,130	12/18/2013	799	05/14/2014	884	mg/l
Conductivity, Field	122	2,413	09/17/2012	1,232	06/05/2017	1,498	µmhos
pH, Field	120	9.58	03/05/2012	6.60	11/04/2019	8.35	units
Temperature (°C), Field	122	23.00	09/05/2017	4.62	11/22/2011	11.69	(°C)
Water Level, Field	121	517.10	08/07/2017	493.95	10/12/2015	507.68	Ft.
Parameters **Metals**	**No. of Samples**	**High**	**Date**	**Low**	**Date**	**Average**	**Units**
Aluminum, dissolved	13	0.04	01/13/2011	0.04	01/13/2011	0.04	mg/l
Arsenic, dissolved	13	0.06	01/13/2011	0.00	04/12/2016	0.01	mg/l
Barium, dissolved	13	0.39	01/13/2011	0.31	07/05/2017	0.34	mg/l
Beryllium, dissolved	13	U	11/10/2014	U	05/14/2020	U	mg/l
Boron, dissolved	124	0.91	12/18/2013	0.62	12/08/2010	0.72	mg/l
Cadmium, dissolved	13	U	05/14/2020	U	05/14/2020	U	mg/l
Calcium, dissolved	124	3.40	09/05/2017	2.00	09/11/2013	2.42	mg/l
Chromium, dissolved	13	0.01	12/31/2018	0.01	12/31/2018	U	mg/l
Copper, dissolved	13	0.04	05/06/2019	0.04	05/06/2019	U	mg/l
Iron, dissolved	10	0.19	12/31/2018	0.02	12/04/2012	0.07	mg/l
Lead, dissolved	13	0.05	12/04/2012	0.05	12/04/2012	U	mg/l
Lithium, dissolved	13	0.13	01/13/2011	0.11	07/05/2017	0.12	mg/l
Magnesium, dissolved	124	1.90	03/09/2011	1.30	12/08/2010	1.58	mg/l
Manganese, dissolved	13	0.01	01/13/2011	0.01	01/13/2011	0.01	mg/l
Mercury, dissolved	13	U	05/14/2020	U	05/14/2020	U	mg/l
Molybdenum, dissolved	1	0.06	01/13/2011	0.06	01/13/2011	0.06	mg/l
Nickel, dissolved	0	U	05/14/2020	U	05/14/2020	U	mg/l
Potassium, dissolved	124	2.10	12/08/2010	0.60	11/02/2016	0.98	mg/l
Selenium, dissolved	13	U	05/14/2020	U	05/14/2020	U	mg/l
Silica, dissolved	124	17.60	10/01/2018	1.10	12/08/2010	15.40	mg/l
Sodium, dissolved	124	439.00	12/18/2013	292.00	04/11/2011	357.33	mg/l
Strontium, dissolved	124	0.83	09/07/2014	0.38	12/08/2010	0.70	mg/l
Vanadium, dissolved	13	U	05/14/2020	U	05/14/2020	U	mg/l
Zinc, dissolved	13	0.03	07/05/2017	0.01	12/04/2012	U	mg/l

Table 29: BG-7 Annual B-Groove Aquifer

Parameters Wet Chemistry	No. of Samples	High	Date	Low	Date	Average	Units
Bicarbonate as CaCO3	7	912	06/02/2020	501	12/15/2015	673	mg/l
Carbonate as CaCO3	7	307	12/15/2015	80	06/02/2020	206	mg/l
Total Alkalinity as	7	992	06/02/2020	808	12/15/2015	879	mg/l
Bromide	7	0.14	10/18/2014	0.13	09/28/2017	0.13	mg/l
Cation-Anion Balance	7	2.40	06/25/2019	-4.80	06/02/2020	-0.94	%
Sum of Anions	7	24.00	10/18/2014	20.00	06/25/2019	22.71	meq/l
Sum of Cations	7	24.00	10/18/2014	20.00	06/02/2020	22.29	meq/l
Chemical Oxygen	7	30.00	06/25/2019	10.00	06/02/2020	20.86	mg/l
Chloride	7	201	12/15/2015	19	06/02/2020	136	mg/l
Conductivity, Lab	7	2,340	10/18/2014	1,770	06/02/2020	2,106	µmhos
Fluoride	7	23.40	06/02/2020	18.20	12/15/2015	20.27	mg/l
Hardness as CaCO3	7	13.00	10/18/2014	11.00	04/05/2016	11.84	mg/l
Nitrate as N, dissolved	7	0.02	10/18/2014	0.02	10/18/2014	0.02	mg/l
Nitrate/Nitrite as N,	7	0.02	10/18/2014	0.02	10/18/2014	0.02	mg/l
Nitrite as N, dissolved	7	0.01	12/15/2015	0.00	10/18/2014	0.01	mg/l
Nitrogen, Ammonia	7	1.22	10/18/2014	0.81	06/20/2018	1.07	mg/l
Nitrogen, Organic	7	1.20	06/20/2018	0.20	10/18/2014	0.63	mg/l
Nitrogen, Total Kjeldahl	7	2.00	09/28/2017	1.30	06/02/2020	1.61	mg/l
pH, lab	7	9.60	12/15/2015	8.70	06/02/2020	9.21	units
Phosphate, total	7	0.40	12/15/2015	0.06	06/02/2020	0.16	mg/l
Phosphorus, total	7	0.13	12/15/2015	0.02	06/02/2020	0.05	mg/l
SAR in Water	7	66	04/05/2016	54.00	06/02/2020	62	none
Sulfate	7	40	10/18/2014	5.58	06/20/2018	16	mg/l
Sulfide	7	0.15	06/25/2019	0.02	06/02/2020	0.10	mg/l
Total Dissolved Solids	7	1,350	10/18/2014	1,090	06/25/2019	1,216	mg/l
Conductivity, Field	8	2,575	12/15/2015	1,594	10/25/2018	2,072	µmhos
pH, Field	8	9.40	06/20/2018	8.00	06/02/2020	8.74	units
Temperature (°C), Field	8	22.50	10/18/2014	11.49	10/25/2018	15.11	(°C)
Water Level, Field	8	480.10	09/28/2017	470.30	10/25/2018	476.74	Ft.
Parameters Metals	**No. of Samples**	**High**	**Date**	**Low**	**Date**	**Average**	**Units**
Aluminum, dissolved	7	0.08	10/18/2014	U	04/05/2016	0.07	mg/l
Arsenic, dissolved	7	0.03	10/18/2014	U	09/28/2017	0.01	mg/l
Barium, dissolved	7	0.40	06/25/2019	0.02	12/15/2015	0.14	mg/l
Beryllium, dissolved	7	U	06/02/2020	U	06/02/2020	U	mg/l
Boron, dissolved	7	0.80	06/02/2020	0.56	12/15/2015	0.67	mg/l
Cadmium, dissolved	7	U	06/02/2020	U	06/02/2020	U	mg/l
Calcium, dissolved	7	3.60	10/18/2014	U	06/20/2018	2.14	mg/l
Chromium, dissolved	7	U	06/02/2020	U	06/02/2020	U	mg/l
Copper, dissolved	7	U	06/02/2020	U	06/02/2020	U	mg/l
Iron, dissolved	7	0.36	09/28/2017	0.06	12/15/2015	0.17	mg/l
Lead, dissolved	7	U	06/02/2020	U	06/02/2020	U	mg/l
Lithium, dissolved	7	0.17	04/05/2016	0.09	06/02/2020	0.14	mg/l
Magnesium, dissolved	7	1.90	09/28/2017	U	10/18/2014	1.61	mg/l
Manganese, dissolved	7	1.90	09/28/2017	1.00	10/18/2014	1.61	mg/l
Mercury, dissolved	7	U	06/02/2020	U	06/02/2020	U	mg/l
Molybdenum, dissolved	7	0.14	10/18/2014	0.05	06/20/2018	0.09	mg/l
Nickel, dissolved	7	U	06/02/2020	U	06/02/2020	U	mg/l
Potassium, dissolved	7	14.50	10/18/2014	0.90	06/25/2019	8.57	mg/l
Selenium, dissolved	7	U	06/02/2020	U	06/02/2020	U	mg/l
Silica, dissolved	7	18.90	10/18/2014	0.90	12/15/2015	7.20	mg/l
Sodium, dissolved	7	536	10/18/2014	435	06/02/2020	490	mg/l
Strontium, dissolved	7	0.66	06/25/2019	U	12/15/2015	0.35	mg/l
Vanadium, dissolved	7	0.01	10/18/2014	U	06/02/2020	U	mg/l
Zinc, dissolved	7	0.04	12/15/2015	U	12/15/2015	0.04	mg/l

Table 30: BG-9 (DS-5) Annual B-Groove Aquifer

Parameters Wet Chemistry	No. of Samples	High	Date	Low	Date	Average	Units
Bicarbonate as CaCO3	27	11,000	12/10/2020	529	08/05/2019	1,426	mg/l
Carbonate as CaCO3	27	3,800	12/10/2020	185	10/10/2018	979	mg/l
Total Alkalinity as	27	14,800	12/10/2020	793	08/05/2019	2,404	mg/l
Bromide	4	U	05/14/2020	U	05/14/2020	U	mg/l
Cation-Anion Balance	26	2.30	08/05/2019	-24.50	05/07/2019	-3.89	%
Sum of Anions	26	422.00	12/10/2020	20.00	10/10/2018	68.04	meq/l
Sum of Cations	26	382.00	12/10/2020	19.00	10/10/2018	61.15	meq/l
Chemical Oxygen	4	50.00	05/14/2020	23.00	05/07/2019	36.50	mg/l
Chloride	26	4,420	12/10/2020	101	10/10/2018	674	mg/l
Conductivity, Lab	27	31,300	12/10/2020	1,840	10/10/2018	5,627	µmhos
Fluoride	26	43.00	12/10/2020	18.90	10/07/2019	24.72	mg/l
Hardness as CaCO3	26	24.00	12/10/2020	3.00	09/03/2020	9.50	mg/l
Nitrate as N, dissolved	4	U	05/14/2020	U	05/14/2020	U	mg/l
Nitrate/Nitrite as N,	4	U	05/14/2020	U	05/14/2020	U	mg/l
Nitrite as N, dissolved	4	U	05/14/2020	U	05/14/2020	U	mg/l
Nitrogen, Ammonia	4	3.21	05/14/2020	1.37	10/10/2018	1.85	mg/l
Nitrogen, Organic	4	1.00	05/14/2020	0.30	10/03/2018	0.57	mg/l
Nitrogen, Total Kjeldahl	4	4.20	05/14/2020	1.70	10/03/2018	2.57	mg/l
pH, lab	27	9.80	11/04/2019	9.00	12/10/2020	9.53	units
Phosphate, total	4	4.40	05/14/2020	0.09	10/03/2018	1.26	mg/l
Phosphorus, total	4	1.42	05/14/2020	0.03	10/03/2018	0.41	mg/l
SAR in Water	26	1,100	09/03/2020	50.00	10/03/2018	208	none
Sulfate	26	59	07/07/2020	2.41	12/04/2018	20	mg/l
Sulfide	4	2.40	05/14/2020	0.08	10/03/2018	0.86	mg/l
Total Dissolved Solids	26	22,200	12/10/2020	1,060	10/10/2018	3,554	mg/l
Conductivity, Field	29	35,790	01/07/2021	1,560	09/09/2019	9,383	µmhos
pH, Field	28	9.59	02/10/2020	7.60	11/04/2019	9.04	units
Temperature (°C), Field	29	16.20	06/01/2020	8.07	02/11/2019	12.09	(°C)
Water Level, Field	28	532.50	12/10/2020	493.55	03/04/2020	513.14	Ft.
Parameters Metals	**No. of Samples**	**High**	**Date**	**Low**	**Date**	**Average**	**Units**
Aluminum, dissolved	4	U	05/14/2020	U	05/14/2020	U	mg/l
Arsenic, dissolved	4	0.003	05/14/2020	0.0002	10/10/2018	0.42	mg/l
Barium, dissolved	4	1.14	05/14/2020	0.10	05/07/2019	0.42	mg/l
Beryllium, dissolved	4	U	05/14/2020	U	05/14/2020	U	mg/l
Boron, dissolved	26	12.30	12/10/2020	0.67	10/10/2018	2.48	mg/l
Cadmium, dissolved	4	U	05/14/2020	U	05/14/2020	U	mg/l
Calcium, dissolved	26	5.50	10/07/2019	1.01	09/03/2020	1.78	mg/l
Chromium, dissolved	4	U	05/14/2020	U	05/14/2020	U	mg/l
Copper, dissolved	4	0.01	10/03/2018	0.01	10/03/2018	0.01	mg/l
Iron, dissolved	4	2.40	10/03/2018	0.10	05/07/2019	1.27	mg/l
Lead, dissolved	4	U	05/14/2020	U	05/14/2020	U	mg/l
Lithium, dissolved	4	0.41	05/14/2020	0.14	10/10/2018	0.21	mg/l
Magnesium, dissolved	26	5.93	12/10/2020	0.50	09/09/2019	1.38	mg/l
Manganese, dissolved	4	0.03	10/03/2018	0.02	10/10/2018	0.02	mg/l
Mercury, dissolved	4	U	05/14/2020	U	05/14/2020	U	mg/l
Molybdenum, dissolved	4	0.17	10/03/2018	0.10	05/14/2020	0.14	mg/l
Nickel, dissolved	4	U	05/14/2020	U	05/14/2020	U	mg/l
Potassium, dissolved	26	35.40	09/03/2020	2.40	10/10/2018	10.07	mg/l
Selenium, dissolved	4	0.00	10/03/2018	0.00	10/10/2018	0.00	mg/l
Silica, dissolved	26	15.00	12/10/2020	1.80	06/03/2019	5.15	mg/l
Sodium, dissolved	26	8,660	12/10/2020	420	12/04/2018	1,379	mg/l
Strontium, dissolved	26	1.76	12/10/2020	0.35	08/05/2019	0.66	mg/l
Vanadium, dissolved	4	U	05/14/2020	U	05/14/2020	U	mg/l
Zinc, dissolved	4	U	05/14/2020	U	05/14/2020	U	mg/l

Table 31: IRI-6 Annual B-Groove Aquifer

Parameters Wet Chemistry	No. of Samples	High	Date	Low	Date	Average	Units
Bicarbonate as CaCO3	63	806.00	12/16/1992	356.00	02/26/1991	635.33	mg/l
Carbonate as CaCO3	63	754.00	09/27/1990	10.00	06/16/1992	102.62	mg/l
Total Alkalinity as CaCO3	63	1,064.00	09/27/1990	375.00	09/07/1990	714.90	mg/l
Bromide	33	2.60	09/07/1990	0.06	05/26/2000	0.74	mg/l
Cation-Anion Balance	61	11.10	05/29/2002	-9.40	07/29/2009	0.42	%
Sum of Anions	55	24.21	09/27/1990	12.00	05/26/2004	16.39	meq/l
Sum of Cations	55	23.84	09/27/1990	13.00	05/26/2004	16.46	meq/l
Chemical Oxygen	25	550.00	07/29/2009	11.00	08/24/2017	156.21	mg/l
Chloride	62	524.00	09/07/1990	11.00	06/30/1995	41.50	mg/l
Conductivity, Lab	61	1,660.00	09/08/1993	1,050.00	03/22/1993	1,436.97	µmhos
Fluoride	63	32.00	09/28/1994	2.80	05/28/1991	21.62	mg/l
Hardness as CaCO3	61	59.00	09/27/1990	3.00	06/30/2009	10.80	mg/l
Nitrate as N, dissolved	32	1.99	06/14/2008	0.02	06/30/1995	0.23	mg/l
Nitrate/Nitrite as N,	32	2.13	06/14/2008	0.02	09/28/1994	0.24	mg/l
Nitrite as N, dissolved	32	0.14	06/14/2008	0.01	10/03/2012	0.08	mg/l
Nitrogen, Ammonia	32	5.70	05/09/2001	0.58	05/21/2007	1.14	mg/l
Nitrogen, Organic	32	34.70	07/29/2009	0.50	03/09/2020	8.81	mg/l
Nitrogen, Total Kjeldahl	32	35.50	07/29/2009	1.30	03/09/2020	9.92	mg/l
pH, lab	61	11.60	12/20/1993	8.40	12/30/1996	8.87	units
Phosphate, total	32	0.90	09/07/1990	0.03	05/26/2000	0.14	mg/l
Phosphorus, total	32	0.30	09/07/1990	0.01	06/18/1996	0.05	mg/l
SAR in Water	51	92.00	11/27/2002	29.17	09/27/1990	53.04	none
Sulfate	63	140.00	06/14/2008	2.00	05/28/1991	17.55	mg/l
Sulfide	32	0.80	09/07/1990	0.01	05/26/2004	0.13	mg/l
Total Dissolved Solids	62	1,428.00	09/27/1990	690.00	05/29/2003	915.94	mg/l
Conductivity, Field	87	3,803.00	09/01/2009	982.00	11/21/2005	1,539.62	µmhos
pH, Field	86	12.00	09/27/1990	7.60	09/16/2019	9.29	units
Temperature (°C), Field	44	16.20	06/14/2008	8.00	12/01/1990	12.23	(°C)
Water Level, Field	61	435.60	08/24/2017	398.45	11/01/1990	411.90	Ft.
Parameters **Metals**	**No. of Samples**	**High**	**Date**	**Low**	**Date**	**Average**	**Units**
Aluminum, dissolved	31	3.79	09/27/1990	U	05/26/2004	0.65	mg/l
Arsenic, dissolved	31	0.03	09/27/1990	U	05/26/2004	0.01	mg/l
Barium, dissolved	31	0.43	03/27/2018	U	09/07/1990	0.22	mg/l
Beryllium, dissolved	31	U	03/09/2020	U	03/09/2020	U	mg/l
Boron, dissolved	63	0.72	01/31/1991	0.19	12/20/1993	0.57	mg/l
Cadmium, dissolved	31	U	03/09/2020	U	03/09/2020	U	mg/l
Calcium, dissolved	63	12.00	09/27/1990	0.00	02/26/1991	2.26	mg/l
Chromium, dissolved	31	0.01	09/07/1990	U	09/07/1990	0.01	mg/l
Copper, dissolved	31	U	03/09/2020	U	03/09/2020	U	mg/l
Iron, dissolved	31	0.24	11/06/2014	U	05/26/1999	0.05	mg/l
Lead, dissolved	31	0.32	03/22/2016	U	06/23/1994	0.15	mg/l
Lithium, dissolved	31	0.13	09/07/1990	0.06	09/15/1992	0.08	mg/l
Magnesium, dissolved	63	7.00	09/27/1990	U	02/26/1991	1.20	mg/l
Manganese, dissolved	31	0.02	03/27/2018	U	07/31/1991	0.01	mg/l
Mercury, dissolved	31	U	03/09/2020	U	03/09/2020	U	mg/l
Molybdenum, dissolved	31	U	03/09/2020	U	03/09/2020	U	mg/l
Nickel, dissolved	31	0.02	06/23/1994	U	06/23/1994	0.02	mg/l
Potassium, dissolved	63	13.00	09/07/1990	0.90	11/16/2004	1.77	mg/l
Selenium, dissolved	31	U	03/09/2020	U	03/09/2020	U	mg/l
Silica, dissolved	63	63.00	09/27/1990	9.50	12/20/1993	17.43	mg/l
Sodium, dissolved	63	508.00	09/27/1990	287.00	12/20/1993	368.38	mg/l
Strontium, dissolved	63	0.76	08/24/2017	U	12/20/1993	0.46	mg/l
Vanadium, dissolved	31	0.01	09/07/1990	U	06/18/1996	0.01	mg/l
Zinc, dissolved	31	0.13	10/22/2013	U	05/09/2001	0.03	mg/l

Table 32: DS-2 Monthly Dissolution Surface Aquifer

Parameters Wet Chemistry	No. of Samples	High	Date	Low	Date	Average	Units
Bicarbonate as	165	66,300.00	08/21/2003	3,970.00	11/18/2006	42,087.01	mg/l
Carbonate as	165	33,400.00	08/05/1999	130.00	11/18/2006	3,910.70	mg/l
Total Alkalinity as	165	68,800.00	08/21/2003	4,100.00	11/18/2006	45,712.20	mg/l
Bromide	20	3.00	05/18/2006	2.70	11/05/2019	2.85	mg/l
Cation-Anion	164	80.00	11/18/2006	-67.20	09/15/2007	-2.00	%
Sum of Anions	164	1,430.00	05/13/2020	105.00	11/18/2006	973.90	meq/l
Sum of Cations	164	1,320.00	01/15/2019	193.00	09/15/2007	939.45	meq/l
Chemical Oxygen	19	1,100.00	07/29/2009	100.00	09/14/2000	283.13	mg/l
Chloride	164	15,000.00	12/09/2019	105.00	04/11/2006	2,071.90	mg/l
Conductivity, Lab	165	75,100.00	05/13/2020	5,220.00	02/08/2000	51,275.79	µmhos
Fluoride	164	123.00	03/25/1998	8.60	04/11/2006	50.36	mg/l
Hardness as	164	150.00	11/16/2007	1.00	03/25/1998	36.99	mg/l
Nitrate as N,	20	0.96	09/25/2002	0.00	09/24/2003	0.10	mg/l
Nitrate/Nitrite as N,	20	1.65	09/25/2002	0.00	09/24/2003	0.16	mg/l
Nitrite as N,	20	0.87	09/25/2002	0.00	09/24/2003	0.11	mg/l
Nitrogen, Ammonia	19	20.30	05/13/2020	3.75	09/14/2000	12.42	mg/l
Nitrogen, Organic	19	16.40	07/29/2009	1.90	09/24/2003	6.80	mg/l
Nitrogen, Total	19	27.00	11/05/2019	1.70	09/14/2000	15.38	mg/l
pH, lab	165	9.10	10/14/2008	8.20	06/09/1999	8.49	units
Phosphate, total	19	77.50	05/18/2006	1.55	10/14/2008	35.07	mg/l
Phosphorus, total	19	18.80	09/15/2007	3.00	10/14/2008	10.97	mg/l
SAR in Water	136	7,600.00	03/25/1998	801.00	11/16/2007	2,273.04	none
Sulfate	164	1,040.00	12/16/2002	10.00	09/27/2005	127.34	mg/l
Sulfide	19	18.60	11/05/2019	0.05	08/25/2005	2.94	mg/l
Total Dissolved	164	71,400.00	05/13/2020	20,800.00	12/08/2000	51,626.99	mg/l
Conductivity, Field	167	82,870.00	12/09/2019	26,900.00	12/01/2008	54,072.10	µmhos
pH, Field	166	10.29	06/01/2009	7.00	03/04/2015	8.48	units
Temperature (°C),	121	23.77	06/15/2011	6.30	03/04/2013	13.03	(°C)
Water Level, Field	178	573.42	02/24/2020	471.20	09/03/2020	549.51	Ft.
Parameters Metals	**No. of Samples**	**High**	**Date**	**Low**	**Date**	**Average**	**Units**
Aluminum,	20	1.60	09/23/2010	U	03/14/2008	1.09	mg/l
Arsenic, dissolved	20	U	05/13/2020	U	05/13/2020	U	mg/l
Barium, dissolved	20	3.85	03/14/2008	0.06	10/14/2008	1.76	mg/l
Beryllium, dissolved	20	U	05/13/2020	U	05/13/2020	U	mg/l
Boron, dissolved	163	43.40	01/28/2003	6.60	09/15/2007	31.44	mg/l
Cadmium, dissolved	20	U	05/13/2020	U	05/13/2020	U	mg/l
Calcium, dissolved	163	60.00	11/16/2007	U	08/12/2004	13.40	mg/l
Chromium,	20	0.40	09/23/2010	U	09/23/2010	0.40	mg/l
Copper, dissolved	20	0.60	09/14/2004	U	09/02/1998	0.45	mg/l
Iron, dissolved	20	1.20	09/02/1998	0.24	10/14/2008	0.64	mg/l
Lead, dissolved	20	0.28	03/14/2008	U	03/14/2008	0.28	mg/l
Lithium, dissolved	20	12.70	03/14/2008	1.00	09/15/2007	4.61	mg/l
Magnesium,	163	10.00	09/08/2015	U	03/14/2008	5.56	mg/l
Manganese,	20	0.01	10/14/2008	U	10/14/2008	0.01	mg/l
Mercury, dissolved	20	U	05/13/2020	U	05/13/2020	U	mg/l
Molybdenum,	20	0.50	09/23/2010	U	03/14/2008	0.40	mg/l
Nickel, dissolved	20	0.23	03/14/2008	U	03/14/2008	0.23	mg/l
Potassium,	163	340.00	10/10/2018	11.40	10/14/2008	48.20	mg/l
Selenium, dissolved	20	U	05/13/2020	U	05/13/2020	U	mg/l
Silica, dissolved	163	50.00	06/02/1998	3.60	04/11/2006	26.71	mg/l
Sodium, dissolved	163	29,800.00	04/19/2001	4,370.00	09/15/2007	21,363.01	mg/l
Strontium, dissolved	163	0.60	08/04/1997	U	10/14/2008	0.26	mg/l
Vanadium,	20	0.20	09/23/2010	U	03/14/2008	0.10	mg/l
Zinc, dissolved	20	3.00	11/16/2007	U	03/14/2008	1.51	mg/l

Table 33: DS-3 Monthly Dissolution Surface Aquifer

Parameters Wet Chemistry	No. of Samples	High	Date	Low	Date	Average	Units
Bicarbonate as	204	43,000	05/24/2005	17,400	11/27/2002	27,078	mg/l
Carbonate as	204	23,900	05/03/2008	419	06/26/2002	3,783	mg/l
Total Alkalinity as	204	60,100	03/14/2008	21,900	06/11/2014	30,684	mg/l
Bromide	30	5.00	05/03/2008	0.70	08/02/2006	2.18	mg/l
Cation-Anion	204	13.50	10/28/2002	-98.8	04/10/2013	-4.77	%
Sum of Anions	204	1,440.00	04/07/2020	511.00	04/29/2003	773.57	meq/l
Sum of Cations	204	1,730.00	03/14/2008	20.70	04/10/2013	719.07	meq/l
Chemical Oxygen	30	1,100.00	07/30/2009	140.00	08/21/2003	414.89	mg/l
Chloride	204	17,200.00	12/19/2018	39.00	05/24/2005	5,589.66	mg/l
Conductivity, Lab	204	81,800	02/13/2019	27,200	09/28/2006	46,830	µmhos
Fluoride	204	329.00	11/07/2018	2.80	05/24/2005	60.73	mg/l
Hardness as	204	49.00	03/08/2011	1.00	01/28/2003	15.29	mg/l
Nitrate as N,	30	0.10	08/12/2004	0.02	09/28/2006	0.05	mg/l
Nitrate/Nitrite as	30	0.14	11/10/2014	0.02	09/28/2006	0.05	mg/l
Nitrite as N,	30	0.05	11/10/2014	0.01	07/11/2013	0.03	mg/l
Nitrogen,	30	34.20	12/19/2018	6.11	07/10/2017	13.13	mg/l
Nitrogen, Organic	30	28.00	08/22/2002	0.80	09/30/2008	7.93	mg/l
Nitrogen, Total	30	50.00	12/19/2018	3.50	09/23/2010	18.89	mg/l
pH, lab	204	9.20	04/10/2008	7.90	10/28/2002	8.60	units
Phosphate, total	30	155.00	07/30/2009	3.10	08/16/2011	31.76	mg/l
Phosphorus, total	30	183.00	09/30/2008	3.20	06/26/2007	14.14	mg/l
SAR in Water	150	8,450	05/18/2006	0.00	12/09/2014	2,477	none
Sulfate	204	1,860	09/23/2010	0.00	09/02/2015	206	mg/l
Sulfide	30	18.10	06/10/2020	0.04	08/25/2005	2.91	mg/l
Total Dissolved	204	88,500	03/14/2008	18,500	05/29/2003	41,128	mg/l
Conductivity,	226	86,810	02/13/2019	30,600	04/29/2003	50,340	µmhos
pH, Field	225	9.91	06/30/2009	7.00	03/09/2016	8.42	units
Temperature	225	24.40	07/05/2016	5.30	02/09/2012	12.86	(°C)
Water Level,	226	543.10	09/07/2014	484.10	02/04/2016	521.75	Ft.
Parameters Metals	**No. of Samples**	**High**	**Date**	**Low**	**Date**	**Average**	**Units**
Aluminum,	31	79.90	08/12/2004	U	03/14/2008	17.00	mg/l
Arsenic,	31	0.02	06/10/2020	U	11/05/2019	U	mg/l
Barium, dissolved	31	3.32	08/25/2005	0.19	08/19/2007	1.83	mg/l
Beryllium,	31	U	06/10/2020	U	06/10/2020	U	mg/l
Boron, dissolved	205	74.70	02/13/2019	3.69	05/29/2003	18.44	mg/l
Cadmium,	31	U	06/10/2020	U	06/10/2020	U	mg/l
Calcium,	205	14.00	07/10/2017	U	05/29/2003	4.11	mg/l
Chromium,	31	0.01	05/18/2006	U	05/18/2006	0.01	mg/l
Copper,	31	1.20	08/16/2011	U	08/12/2004	0.85	mg/l
Iron, dissolved	31	3.70	09/15/2007	U	05/18/2006	1.49	mg/l
Lead, dissolved	31	1.40	08/22/2002	U	03/14/2008	0.81	mg/l
Lithium, dissolved	31	8.48	03/14/2008	2.70	12/19/2018	3.38	mg/l
Magnesium,	205	10.00	01/08/2008	U	09/02/2015	3.99	mg/l
Manganese,	31	U	06/10/2020	U	06/10/2020	U	mg/l
Mercury,	31	U	06/10/2020	U	06/10/2020	U	mg/l
Molybdenum,	31	0.70	08/19/2007	U	08/18/2010	0.45	mg/l
Nickel, dissolved	31	0.20	09/23/2010	U	05/18/2006	0.13	mg/l
Potassium,	205	150.00	02/13/2019	0.00	11/21/2008	35.33	mg/l
Selenium,	31	0.01	08/22/2002	U	07/12/2007	0.01	mg/l
Silica, dissolved	205	79.00	04/11/2006	8.90	05/29/2003	25.67	mg/l
Sodium,	205	39,200	03/14/2008	450	04/10/2013	16,435	mg/l
Strontium,	205	0.70	02/21/2005	U	05/29/2003	0.22	mg/l
Vanadium,	31	0.20	06/26/2007	U	05/18/2006	0.08	mg/l
Zinc, dissolved	31	1.80	07/10/2017	U	03/14/2008	0.68	mg/l

Table 34: DS-6 Annual Dissolution Surface Aquifer

Parameters Wet Chemistry	No. of Samples	High	Date	Low	Date	Average	Units
Bicarbonate as CaCO3	65	9,560	07/06/2020	5,770	12/07/2017	7,069	mg/l
Carbonate as CaCO3	65	5,060	03/07/2018	2,110	07/06/2020	3,790	mg/l
Total Alkalinity as	65	12,400	03/05/2020	9,650	08/09/2016	10,856	mg/l
Bromide	9	U	05/13/2020	U	05/13/2020	U	mg/l
Cation-Anion Balance	64	2.60	02/11/2020	-13.30	07/06/2020	-4.36	%
Sum of Anions	64	272.00	03/05/2020	219.00	11/03/2020	241.02	meq/l
Sum of Cations	64	255.00	02/11/2020	188.00	12/01/2020	220.97	meq/l
Chemical Oxygen	9	167.00	12/09/2014	44.00	04/05/2016	80.50	mg/l
Chloride	64	1,330	12/09/2014	448	11/03/2020	721	mg/l
Conductivity, Lab	65	19,800	12/09/2014	14,900	12/01/2020	16,952	µmhos
Fluoride	64	51.00	04/07/2020	26.80	09/08/2015	35.94	mg/l
Hardness as CaCO3	64	30.00	09/22/2016	U	01/03/2017	6.95	mg/l
Nitrate as N, dissolved	9	UH	05/13/2020	UH	05/13/2020	UH	mg/l
Nitrate/Nitrite as N,	9	0.02	12/09/2014	0.02	12/09/2014	0.02	mg/l
Nitrite as N, dissolved	9	0.03	12/09/2014	0.03	12/09/2014	0.03	mg/l
Nitrogen, Ammonia	9	4.39	05/13/2020	3.30	12/09/2014	3.80	mg/l
Nitrogen, Organic	9	5.60	05/07/2019	0.80	07/11/2017	2.93	mg/l
Nitrogen, Total Kjeldahl	9	9.30	05/07/2019	4.70	07/11/2017	6.72	mg/l
pH, lab	65	9.50	03/01/2017	9.00	08/10/2020	9.25	units
Phosphate, total	9	7.00	09/27/2016	0.71	12/09/2014	4.77	mg/l
Phosphorus, total	9	2.20	09/27/2016	0.23	12/09/2014	1.54	mg/l
SAR in Water	44	1,600	02/11/2020	410.00	09/22/2016	1,036	none
Sulfate	64	370	12/09/2014	20.60	09/04/2020	90	mg/l
Sulfide	9	3.00	07/11/2017	0.30	04/05/2016	1.59	mg/l
Total Dissolved Solids	64	14,100	12/09/2014	11,200	12/01/2020	12,514	mg/l
Conductivity, Field	60	19,680	05/07/2019	13,820	05/01/2020	16,960	µmhos
pH, Field	60	9.70	08/09/2016	7.30	12/10/2018	8.94	units
Temperature (°C), Field	60	16.70	09/06/2017	8.00	01/14/2020	12.13	(°C)
Water Level, Field	60	540.85	02/11/2020	489.40	10/06/2020	517.94	Ft.
Parameters **Metals**	**No. of Samples**	**High**	**Date**	**Low**	**Date**	**Average**	**Units**
Aluminum, dissolved	9	U	05/13/2020	U	05/13/2020	U	mg/l
Arsenic, dissolved	9	0.01	12/09/2014	U	12/09/2014	0.01	mg/l
Barium, dissolved	9	0.46	10/04/2016	0.05	04/05/2016	0.29	mg/l
Beryllium, dissolved	9	U	05/13/2020	U	05/13/2020	U	mg/l
Boron, dissolved	63	8.40	04/07/2020	6.20	10/04/2017	7.48	mg/l
Cadmium, dissolved	9	U	05/13/2020	U	05/13/2020	U	mg/l
Calcium, dissolved	63	7.00	09/22/2016	U	03/25/2015	1.91	mg/l
Chromium, dissolved	9	U	05/13/2020	U	05/13/2020	U	mg/l
Copper, dissolved	9	U	05/13/2020	U	05/13/2020	U	mg/l
Iron, dissolved	9	0.60	12/09/2014	0.20	09/22/2016	0.38	mg/l
Lead, dissolved	9	0.30	05/07/2019	Y	05/13/2020	U	mg/l
Lithium, dissolved	9	2.31	05/13/2020	1.94	09/27/2016	2.11	mg/l
Magnesium, dissolved	63	4.00	03/25/2015	U	09/08/2015	2.71	mg/l
Manganese, dissolved	9	U	05/13/2020	U	05/13/2020	U	mg/l
Mercury, dissolved	9	U	05/13/2020	U	05/13/2020	U	mg/l
Molybdenum, dissolved	9	U	05/13/2020	U	05/13/2020	U	mg/l
Nickel, dissolved	9	U	05/13/2020	U	05/13/2020	U	mg/l
Potassium, dissolved	63	113.00	12/09/2014	45.20	12/01/2020	74.56	mg/l
Selenium, dissolved	9	U	05/13/2020	U	05/13/2020	U	mg/l
Silica, dissolved	63	34.00	07/11/2017	7.00	01/27/2016	25.98	mg/l
Sodium, dissolved	63	5,750	02/11/2020	4,240	12/01/2020	4,974	mg/l
Strontium, dissolved	63	0.27	08/07/2018	U	12/29/2015	0.18	mg/l
Vanadium, dissolved	9	U	05/13/2020	U	05/13/2020	U	mg/l
Zinc, dissolved	9	0.40	09/22/2016	U	07/11/2017	0.28	mg/l

Table 35: DS-7 Annual Dissolution Surface Aquifer

Parameters Wet Chemistry	No. of Samples	High	Date	Low	Date	Average	Units
Bicarbonate as CaCO3	71	33,500	04/08/2019	9,000	12/07/2020	25,923	mg/l
Carbonate as CaCO3	71	16,600	08/02/2016	63	12/07/2020	5,435	mg/l
Total Alkalinity as CaCO3	71	41,300	07/07/2016	9,060	12/07/2020	31,280	mg/l
Bromide	8	U	05/07/2020	U	05/07/2020	U	mg/l
Cation-Anion Balance	71	21.30	03/05/2020	-15.70	10/06/2020	-2.97	%
Sum of Anions	71	3,360.00	12/17/2014	302.00	12/07/2020	1,386.38	meq/l
Sum of Cations	71	3,230.00	12/17/2014	345.00	12/07/2020	1,305.86	meq/l
Chemical Oxygen	8	3,630.00	11/05/2015	344.00	05/07/2019	1,693.14	mg/l
Chloride	71	96,000	12/30/2014	4,240	12/07/2020	27,023	mg/l
Conductivity, Lab	71	207,000	12/17/2014	24,000	11/02/2020	81,310	µmhos
Fluoride	71	106.00	12/10/2019	38.50	10/06/2020	66.30	mg/l
Hardness as CaCO3	71	82.40	12/16/2015	0.00	12/30/2014	39.38	mg/l
Nitrate as N, dissolved	8	0.03	05/07/2020	0.03	05/07/2020	0.03	mg/l
Nitrate/Nitrite as N,	8	0.03	05/07/2020	0.03	05/07/2020	0.03	mg/l
Nitrite as N, dissolved	8	UH	05/07/2020	UH	05/07/2020	UH	mg/l
Nitrogen, Ammonia	8	40.40	12/17/2014	3.96	05/07/2020	16.64	mg/l
Nitrogen, Organic	8	7.00	05/07/2019	4.00	12/30/2014	5.30	mg/l
Nitrogen, Total Kjeldahl	8	33.00	12/30/2014	1.10	11/05/2015	12.99	mg/l
pH, lab	71	9.10	05/06/2015	8.30	04/08/2020	8.64	units
Phosphate, total	8	71.00	11/05/2015	16.00	05/07/2020	41.38	mg/l
Phosphorus, total	8	23.00	11/05/2015	5.30	05/07/2020	13.39	mg/l
SAR in Water	22	7,600	06/08/2016	1,500.00	02/12/2019	2,907	none
Sulfate	71	480	12/30/2014	110.00	07/11/2017	350	mg/l
Sulfide	8	4.80	05/07/2019	1.30	12/17/2014	2.63	mg/l
Total Dissolved Solids	71	189,676	12/17/2014	17,700	12/07/2020	75,850	mg/l
Conductivity, Field	69	186,700	12/17/2014	27,670	03/05/2020	82,844	µmhos
pH, Field	69	9.20	03/10/2016	7.10	12/17/2014	8.33	units
Temperature (°C), Field	69	17.40	07/11/2018	8.20	12/07/2020	13.01	(°C)
Water Level, Field	70	643.10	12/12/2014	478.76	11/09/2016	499.93	Ft.
Parameters Metals	**No. of Samples**	**High**	**Date**	**Low**	**Date**	**Average**	**Units**
Aluminum, dissolved	8	U	05/07/2020	U	05/07/2020	U	mg/l
Arsenic, dissolved	8	U	05/07/2020	U	05/07/2020	U	mg/l
Barium, dissolved	8	1.90	07/11/2017	0.40	11/05/2015	1.10	mg/l
Beryllium, dissolved	8	U	05/07/2020	U	05/07/2020	U	mg/l
Boron, dissolved	71	66.00	09/09/2015	7.10	01/09/2018	25.70	mg/l
Cadmium, dissolved	8	U	05/07/2020	U	05/07/2020	U	mg/l
Calcium, dissolved	71	30.00	05/06/2015	U	12/30/2014	10.32	mg/l
Chromium, dissolved	8	U	05/07/2020	U	05/07/2020	U	mg/l
Copper, dissolved	8	U	05/07/2020	U	05/07/2020	U	mg/l
Iron, dissolved	8	5.00	12/30/2014	3.00	12/17/2014	4.00	mg/l
Lead, dissolved	8	U	05/07/2020	U	05/07/2020	U	mg/l
Lithium, dissolved	8	2.70	07/11/2017	1.00	12/30/2014	1.94	mg/l
Magnesium, dissolved	71	20.00	06/17/2015	U	02/12/2019	18.00	mg/l
Manganese, dissolved	8	U	12/07/2020	U	12/07/2020	U	mg/l
Mercury, dissolved	8	U	05/07/2020	U	05/07/2020	U	mg/l
Molybdenum, dissolved	8	2.00	04/05/2016	2.00	04/05/2016	2.00	mg/l
Nickel, dissolved	8	U	05/07/2020	U	05/07/2020	U	mg/l
Potassium, dissolved	71	140.00	09/09/2015	14.80	12/07/2020	50.10	mg/l
Selenium, dissolved	8	U	05/07/2020	U	05/07/2020	U	mg/l
Silica, dissolved	71	30.00	06/17/2015	16.00	09/11/2017	21.86	mg/l
Sodium, dissolved	71	73,200	12/17/2014	7,840	12/07/2020	29,640	mg/l
Strontium, dissolved	71	1.00	08/12/2015	U	06/08/2016	0.34	mg/l
Vanadium, dissolved	8	U	05/07/2020	U	05/07/2020	U	mg/l
Zinc, dissolved	8	0.50	07/11/2017	U	07/11/2017	0.50	mg/l

Table 36: DS-8 Annual Dissolution Surface Aquifer

Parameters Wet Chemistry	No. of Samples	High	Date	Low	Date	Average	Units
Bicarbonate as CaCO3	8	23,300	01/15/2015	16,700	06/25/2019	19,563	mg/l
Carbonate as CaCO3	8	9,590	06/25/2019	4,200	01/15/2015	7,084	mg/l
Total Alkalinity as CaCO3	8	27,500	01/15/2015	25,300	09/28/2017	26,650	mg/l
Bromide	8	U	06/03/2020	U	06/03/2020	U	mg/l
Cation-Anion Balance	8	-1.40	06/25/2019	-9.50	01/08/2015	-4.49	%
Sum of Anions	8	586.00	06/03/2020	542.00	09/28/2017	568.13	meq/l
Sum of Cations	8	552.00	06/25/2019	477.00	01/08/2015	519.63	meq/l
Chemical Oxygen	8	731.00	01/15/2015	95.00	09/28/2017	223.14	mg/l
Chloride	8	1,080	06/25/2019	900	01/15/2015	989	mg/l
Conductivity, Lab	8	37,100	06/19/2018	33,200	12/15/2015	35,000	µmhos
Fluoride	8	79.90	06/03/2020	61.80	06/19/2018	67.48	mg/l
Hardness as CaCO3	8	U	06/03/2020	U	06/03/2020	U	mg/l
Nitrate as N, dissolved	8	0.03	01/15/2015	0.00	01/08/2015	0.02	mg/l
Nitrate/Nitrite as N,	8	0.03	01/15/2015	0.00	01/08/2015	0.02	mg/l
Nitrite as N, dissolved	8	0.01	06/25/2019	0.00	01/08/2015	0.00	mg/l
Nitrogen, Ammonia	8	10.50	01/15/2015	6.23	06/19/2018	8.22	mg/l
Nitrogen, Organic	8	6.60	04/05/2016	1.30	06/19/2018	4.63	mg/l
Nitrogen, Total Kjeldahl	8	14.80	01/15/2015	6.80	06/03/2020	11.98	mg/l
pH, lab	8	9.20	04/05/2016	8.70	01/08/2015	9.04	units
Phosphate, total	8	25.00	06/25/2019	15.00	12/15/2015	19.50	mg/l
Phosphorus, total	8	8.20	06/25/2019	4.90	12/15/2015	6.29	mg/l
SAR in Water	0	U	06/03/2020	U	06/03/2020	U	none
Sulfate	8	368	06/25/2019	100.00	01/08/2015	202	mg/l
Sulfide	8	2.00	06/25/2019	0.60	04/05/2016	1.25	mg/l
Total Dissolved Solids	8	30,100	06/25/2019	28,400	09/28/2017	29,263	mg/l
Conductivity, Field	8	39,750	12/15/2015	31,210	04/05/2016	34,748	µmhos
pH, Field	8	9.23	06/19/2018	8.20	10/06/2014	8.89	units
Temperature (°C), Field	8	14.58	06/19/2018	11.20	10/06/2014	13.21	(°C)
Water Level, Field	8	497.50	06/19/2018	81.00	01/08/2015	444.19	Ft.
Parameters **Metals**	**No. of Samples**	**High**	**Date**	**Low**	**Date**	**Average**	**Units**
Aluminum, dissolved	8	U	06/03/2020	U	06/03/2020	U	mg/l
Arsenic, dissolved	8	0.07	01/15/2015	U	04/05/2016	0.03	mg/l
Barium, dissolved	8	1.00	01/15/2015	0.30	06/03/2020	0.60	mg/l
Beryllium, dissolved	8	U	06/03/2020	U	06/03/2020	U	mg/l
Boron, dissolved	8	14.00	06/25/2019	12.70	04/05/2016	13.34	mg/l
Cadmium, dissolved	8	U	06/03/2020	U	06/03/2020	U	mg/l
Calcium, dissolved	8	U	06/03/2020	U	06/03/2020	U	mg/l
Chromium, dissolved	8	U	06/03/2020	U	06/03/2020	U	mg/l
Copper, dissolved	8	U	06/03/2020	U	06/03/2020	U	mg/l
Iron, dissolved	8	2.70	01/15/2015	0.40	09/28/2017	1.44	mg/l
Lead, dissolved	8	U	06/03/2020	U	06/03/2020	U	mg/l
Lithium, dissolved	8	4.70	04/05/2016	4.20	01/08/2015	4.45	mg/l
Magnesium, dissolved	8	U	06/03/2020	U	06/03/2020	U	mg/l
Manganese, dissolved	8	U	06/03/2020	U	06/03/2020	U	mg/l
Mercury, dissolved	8	U	06/03/2020	U	06/03/2020	U	mg/l
Molybdenum, dissolved	8	0.50	01/15/2015	0.50	01/15/2015	0.50	mg/l
Nickel, dissolved	8	0.30	01/15/2015	U	06/03/2020	U	mg/l
Potassium, dissolved	8	68.00	04/05/2016	43.00	01/08/2015	59.38	mg/l
Selenium, dissolved	8	U	06/03/2020	U	06/03/2020	U	mg/l
Silica, dissolved	8	59.00	06/03/2020	18.00	01/08/2015	32.63	mg/l
Sodium, dissolved	8	12,500	06/25/2019	10,800	01/08/2015	11,763	mg/l
Strontium, dissolved	8	0.10	01/15/2015	U	01/08/2015	0.07	mg/l
Vanadium, dissolved	8	0.10	06/25/2019	U	06/03/2020	U	mg/l
Zinc, dissolved	8	0.70	12/15/2015	U	12/15/2015	0.70	mg/l

Table 37: DS-9 Annual Dissolution Surface Aquifer

Parameters Wet Chemistry	No. of Samples	High	Date	Low	Date	Average	Units
Bicarbonate as	9	20,200	06/02/2020	11,900	06/20/2018	13,711	mg/l
Carbonate as CaCO3	9	4,570	04/22/2019	1,880	09/28/2017	2,713	mg/l
Total Alkalinity as	9	22,200	06/02/2020	14,300	09/28/2017	16,422	mg/l
Bromide	9	U	06/02/2020	U	06/02/2020	U	mg/l
Cation-Anion Balance	9	-1.90	09/28/2017	-83.70	06/02/2020	-13.43	%
Sum of Anions	9	474.00	06/02/2020	341.00	06/20/2018	394.11	meq/l
Sum of Cations	9	424.00	04/22/2019	42.00	06/02/2020	315.22	meq/l
Chemical Oxygen	9	132.00	09/28/2017	90.00	06/02/2020	113.22	mg/l
Chloride	9	2,470	02/04/2015	940	06/02/2020	1,857	mg/l
Conductivity, Lab	9	28,700	06/02/2020	24,300	12/15/2015	26,222	µmhos
Fluoride	9	62.50	04/22/2019	41.40	06/20/2018	48.23	mg/l
Hardness as CaCO3	9	36.00	01/28/2015	0.00	12/15/2015	23.80	mg/l
Nitrate as N, dissolved	9	0.03	01/28/2015	0.03	01/28/2015	0.03	mg/l
Nitrate/Nitrite as N,	9	0.04	01/28/2015	0.04	01/28/2015	0.04	mg/l
Nitrite as N, dissolved	9	0.01	01/28/2015	0.01	01/28/2015	0.01	mg/l
Nitrogen, Ammonia	9	7.40	01/28/2015	3.43	06/20/2018	5.24	mg/l
Nitrogen, Organic	9	4.60	04/22/2019	1.80	01/28/2015	3.70	mg/l
Nitrogen, Total	9	9.70	11/04/2014	2.30	06/02/2020	7.81	mg/l
pH, lab	9	9.00	04/22/2019	8.70	06/02/2020	8.84	units
Phosphate, total	9	12.00	06/02/2020	3.70	02/04/2015	6.88	mg/l
Phosphorus, total	9	3.70	06/02/2020	1.20	02/04/2015	2.20	mg/l
SAR in Water	4	660	02/04/2015	83.00	06/02/2020	483	none
Sulfate	9	2,870	02/04/2015	10.80	04/22/2019	588	mg/l
Sulfide	9	U	06/02/2020	U	06/02/2020	U	mg/l
Total Dissolved Solids	9	23,500	04/22/2019	15,500	06/02/2020	19,611	mg/l
Conductivity, Field	8	29,450	04/22/2019	23,740	04/05/2016	26,793	µmhos
pH, Field	8	8.93	06/20/2018	7.20	01/29/2015	8.33	units
Temperature (°C),	8	14.35	06/20/2018	11.90	04/22/2019	13.00	(°C)
Water Level, Field	9	470.10	10/29/2014	453.17	10/18/2018	457.09	Ft.
Parameters Metals	**No. of Samples**	**High**	**Date**	**Low**	**Date**	**Average**	**Units**
Aluminum, dissolved	9	U	06/02/2020	U	06/02/2020	U	mg/l
Arsenic, dissolved	9	0.01	11/04/2014	U	02/04/2015	0.01	mg/l
Barium, dissolved	9	1.87	11/04/2014	0.12	02/04/2015	0.55	mg/l
Beryllium, dissolved	9	U	06/02/2020	U	06/02/2020	U	mg/l
Boron, dissolved	9	12.90	04/22/2019	1.20	06/02/2020	8.70	mg/l
Cadmium, dissolved	9	U	06/02/2020	U	06/02/2020	U	mg/l
Calcium, dissolved	9	6.00	11/04/2014	U	02/04/2015	3.67	mg/l
Chromium, dissolved	9	U	06/02/2020	U	06/02/2020	U	mg/l
Copper, dissolved	9	U	06/02/2020	U	06/02/2020	U	mg/l
Iron, dissolved	9	1.20	11/04/2014	0.20	12/15/2015	0.58	mg/l
Lead, dissolved	9	U	06/02/2020	U	06/02/2020	U	mg/l
Lithium, dissolved	9	3.80	04/22/2019	0.20	06/02/2020	2.72	mg/l
Magnesium, dissolved	9	7.00	01/28/2015	U	11/04/2014	5.50	mg/l
Manganese, dissolved	9	U	06/02/2020	U	06/02/2020	U	mg/l
Mercury, dissolved	9	U	06/02/2020	U	06/02/2020	U	mg/l
Molybdenum,	9	0.30	02/04/2015	0.20	12/15/2015	0.25	mg/l
Nickel, dissolved	9	U	06/02/2020	U	06/02/2020	U	mg/l
Potassium, dissolved	9	30.00	04/22/2019	21.00	06/20/2018	23.50	mg/l
Selenium, dissolved	9	U	06/02/2020	U	06/02/2020	U	mg/l
Silica, dissolved	9	29.00	04/22/2019	12.00	06/02/2020	19.67	mg/l
Sodium, dissolved	9	9,610	04/22/2019	940	06/02/2020	7,138	mg/l
Strontium, dissolved	9	1.10	06/02/2020	U	09/28/2017	0.30	mg/l
Vanadium, dissolved	9	U	06/02/2020	U	06/02/2020	U	mg/l
Zinc, dissolved	9	1.90	12/15/2015	U	09/28/2017	0.83	mg/l

Table 38: DS-10 Annual Dissolution Surface Aquifer

Parameters Wet Chemistry	No. of Samples	High	Date	Low	Date	Average	Units
Bicarbonate as CaCO3	19	38,000	03/03/2020	17,200	12/01/2020	21,758	mg/l
Carbonate as CaCO3	19	9,450	04/07/2020	566	09/03/2020	3,208	mg/l
Total Alkalinity as	19	47,300	03/03/2020	19,400	11/02/2020	24,968	mg/l
Bromide	3	U	05/13/2020	U	05/13/2020	U	mg/l
Cation-Anion Balance	18	13.50	05/13/2020	-33.30	04/07/2020	-5.06	%
Sum of Anions	18	1,220.00	03/03/2020	447.00	11/02/2020	774.06	meq/l
Sum of Cations	18	1,130.00	03/03/2020	353.00	12/01/2020	706.44	meq/l
Chemical Oxygen	3	400.00	08/14/2019	400.00	08/14/2019	400.00	mg/l
Chloride	18	19,800	09/10/2019	2,040	11/02/2020	9,531	mg/l
Conductivity, Lab	19	74,500	09/10/2019	25,000	12/01/2020	49,795	µmhos
Fluoride	18	97.70	04/07/2020	29.00	09/10/2019	58.83	mg/l
Hardness as CaCO3	18	18.00	10/07/2019	12.00	11/02/2020	15.00	mg/l
Nitrate as N, dissolved	3	UH	05/13/2020	UH	05/13/2020	U	mg/l
Nitrate/Nitrite as N,	3	UH	05/13/2020	UH	05/13/2020	U	mg/l
Nitrite as N, dissolved	3	UH	05/13/2020	UH	05/13/2020	U	mg/l
Nitrogen, Ammonia	3	11.80	08/20/2019	10.50	08/14/2019	11.07	mg/l
Nitrogen, Organic	3	6.00	08/20/2019	5.00	08/14/2019	5.50	mg/l
Nitrogen, Total	3	18.00	08/20/2019	2.10	05/13/2020	11.70	mg/l
pH, lab	19	8.90	04/07/2020	8.50	06/02/2020	8.66	units
Phosphate, total	3	25.00	05/13/2020	22.00	08/14/2019	23.33	mg/l
Phosphorus, total	3	8.10	05/13/2020	7.10	08/14/2019	7.50	mg/l
SAR in Water	3	2,100	10/07/2019	1,200.00	11/02/2020	1,650	none
Sulfate	18	U	05/13/2020	U	05/13/2020	U	mg/l
Sulfide	3	10.00	05/13/2020	1.38	08/14/2019	4.86	mg/l
Total Dissolved Solids	18	64,300	03/03/2020	22,700	12/01/2020	41,178	mg/l
Conductivity, Field	18	70,540	08/20/2019	28,730	12/01/2020	49,557	µmhos
pH, Field	17	8.84	02/10/2020	8.20	12/01/2020	8.52	units
Temperature (°C),	18	15.10	08/20/2020	9.32	02/10/2020	12.10	(°C)
Water Level, Field	18	627.80	04/07/2020	566.10	02/24/2020	602.16	Ft.
Parameters **Metals**	**No. of Samples**	**High**	**Date**	**Low**	**Date**	**Average**	**Units**
Aluminum, dissolved	3	U	05/13/2020	U	05/13/2020	U	mg/l
Arsenic, dissolved	3	0.01	08/14/2019	0.01	08/14/2019	0.01	mg/l
Barium, dissolved	3	1.90	08/20/2019	1.80	08/14/2019	1.87	mg/l
Beryllium, dissolved	3	U	05/13/2020	U	05/13/2020	U	mg/l
Boron, dissolved	18	46.00	03/03/2020	11.50	12/01/2020	19.13	mg/l
Cadmium, dissolved	3	U	05/13/2020	U	05/13/2020	U	mg/l
Calcium, dissolved	18	7.00	10/07/2019	4.87	11/02/2020	5.94	mg/l
Chromium, dissolved	3	U	05/13/2020	U	05/13/2020	U	mg/l
Copper, dissolved	3	U	05/13/2020	U	05/13/2020	U	mg/l
Iron, dissolved	3	U	05/13/2020	U	05/13/2020	U	mg/l
Lead, dissolved	3	U	05/13/2020	U	05/13/2020	U	mg/l
Lithium, dissolved	3	3.70	05/13/2020	3.50	08/14/2019	3.57	mg/l
Magnesium, dissolved	18	U	05/13/2020	U	05/13/2020	U	mg/l
Manganese, dissolved	3	U	05/13/2020	U	05/13/2020	U	mg/l
Mercury, dissolved	3	U	05/13/2020	U	05/13/2020	U	mg/l
Molybdenum,	3	U	05/13/2020	U	05/13/2020	U	mg/l
Nickel, dissolved	3	U	05/13/2020	U	05/13/2020	U	mg/l
Potassium, dissolved	18	U	05/13/2020	U	05/13/2020	U	mg/l
Selenium, dissolved	3	U	05/13/2020	U	05/13/2020	U	mg/l
Silica, dissolved	18	31.00	12/09/2019	15.00	12/01/2020	22.17	mg/l
Sodium, dissolved	18	25,600	03/03/2020	7,990	12/01/2020	15,861	mg/l
Strontium, dissolved	18	0.40	12/09/2019	0.20	01/14/2020	0.24	mg/l
Vanadium, dissolved	3	U	05/13/2020	U	05/13/2020	U	mg/l
Zinc, dissolved	3	U	05/13/2020	U	05/13/2020	U	mg/l

Table 39: IRI-7 Annual Dissolution Surface Aquifer

Parameters Wet Chemistry	No. of Samples	High	Date	Low	Date	Average	Units
Bicarbonate as CaCO3	62	30,400	06/25/2019	294	09/16/1991	8,387	mg/l
Carbonate as CaCO3	62	4,730	11/02/2015	10.00	06/30/1995	1,082	mg/l
Total Alkalinity as	62	32,000	06/25/2019	294	09/16/1991	9,364	mg/l
Bromide	31	33.00	08/30/1990	0.10	05/21/2007	7.54	mg/l
Cation-Anion Balance	62	6.10	03/28/2018	-26.90	06/25/2019	-2.06	%
Sum of Anions	59	663.00	06/25/2019	30.69	03/25/1992	221.94	meq/l
Sum of Cations	59	409.00	03/09/2020	31.56	05/28/1991	203.46	meq/l
Chemical Oxygen	28	960.00	06/14/2008	37.00	09/27/2017	154.79	mg/l
Chloride	61	735.00	06/25/2019	21.00	08/30/1990	343.72	mg/l
Conductivity, Lab	60	37,300	06/25/2019	2,500	06/16/1992	13,369	µmhos
Fluoride	62	47.70	03/09/2020	1.30	05/28/1991	26.88	mg/l
Hardness as CaCO3	62	135.00	06/14/2008	6.00	08/30/1990	25.47	mg/l
Nitrate as N, dissolved	31	3.22	10/22/2013	0.02	05/24/2005	0.51	mg/l
Nitrate/Nitrite as N,	31	4.14	10/22/2013	0.02	09/27/2017	0.61	mg/l
Nitrite as N, dissolved	31	0.92	10/22/2013	0.00	05/21/2007	0.15	mg/l
Nitrogen, Ammonia	31	7.90	11/06/2014	1.17	09/15/1992	4.05	mg/l
Nitrogen, Organic	31	46.00	06/14/2008	0.50	08/22/1990	7.50	mg/l
Nitrogen, Total Kjeldahl	31	51.00	06/14/2008	1.90	08/22/1990	11.06	mg/l
pH, lab	62	9.20	06/16/1992	8.30	06/30/1995	8.65	units
Phosphate, total	29	155.00	05/21/2007	0.17	09/15/1992	15.92	mg/l
Phosphorus, total	32	4.70	09/15/2010	0.05	09/15/1992	1.78	mg/l
SAR in Water	57	1,020.00	05/21/2007	88.89	03/25/1992	398.48	none
Sulfate	61	2,031.00	09/16/1991	2.50	06/18/1996	169.18	mg/l
Sulfide	31	3.31	08/30/1990	0.00	07/31/1991	0.57	mg/l
Total Dissolved Solids	61	29,000	06/25/2019	1,708	09/15/1992	10,612	mg/l
Conductivity, Field	79	36,320	03/09/2020	1,800	06/01/1991	13,167	µmhos
pH, Field	78	12.20	09/01/1990	7.86	11/07/2015	8.91	units
Temperature (°C), Field	43	19.40	08/01/1990	7.50	12/01/1990	12.41	(°C)
Water Level, Field	56	422.84	08/01/2018	405.03	04/01/2001	410.43	Ft.
Parameters **Metals**	**No. of Samples**	**High**	**Date**	**Low**	**Date**	**Average**	**Units**
Aluminum, dissolved	31	1.40	09/15/2010	0.05	06/23/1994	0.61	mg/l
Arsenic, dissolved	31	0.01	08/22/1990	U	09/15/1992	U	mg/l
Barium, dissolved	31	6.65	09/15/2010	0.08	09/15/1992	4.03	mg/l
Beryllium, dissolved	31	U	03/09/2020	U	03/09/2020	U	mg/l
Boron, dissolved	62	8.70	03/09/2020	0.03	02/26/1991	3.09	mg/l
Cadmium, dissolved	31	U	03/09/2020	U	03/09/2020	U	mg/l
Calcium, dissolved	62	44.00	06/14/2008	1.00	05/28/1991	3.47	mg/l
Chromium, dissolved	31	0.20	11/02/2015	0.01	06/23/1994	0.11	mg/l
Copper, dissolved	31	0.10	07/29/2009	0.10	07/29/2009	0.10	mg/l
Iron, dissolved	31	1.82	07/31/1991	0.04	06/23/1994	0.30	mg/l
Lead, dissolved	31	0.04	07/31/1991	0.02	06/23/1994	0.03	mg/l
Lithium, dissolved	31	4.10	03/09/2020	0.32	09/15/1992	2.14	mg/l
Magnesium, dissolved	62	10.00	12/30/1996	1.00	06/16/1992	4.58	mg/l
Manganese, dissolved	31	0.07	05/26/1999	0.01	06/23/1994	0.04	mg/l
Mercury, dissolved	31	U	03/09/2020	U	03/09/2020	U	mg/l
Molybdenum, dissolved	31	0.10	06/23/1994	0.10	06/23/1994	0.10	mg/l
Nickel, dissolved	31	0.02	06/23/1994	0.02	06/23/1994	0.02	mg/l
Potassium, dissolved	62	26.00	06/30/2009	3.00	08/30/1990	9.21	mg/l
Selenium, dissolved	31	U	07/31/1991	U	08/30/1990	U	mg/l
Silica, dissolved	62	34.00	11/20/2001	1.50	02/26/1991	17.29	mg/l
Sodium, dissolved	62	9,280	03/09/2020	710	05/28/1991	4,163	mg/l
Strontium, dissolved	62	2.58	03/26/1997	0.18	06/16/1992	1.24	mg/l
Vanadium, dissolved	31	0.06	05/26/2004	0.05	11/02/2015	0.06	mg/l
Zinc, dissolved	31	0.30	03/09/2020	0.01	06/23/1994	0.10	mg/l

Table 40: Summary of 2020 Annual Remote Water Levels

For Remote Wells (all levels taken from top of casing)						
Well / Ground Level (ft)	Depth to Water Level ft.					
	2015	2016	2017	2018	2019	2020
IRI-8 / 6573.6	317.70	318.08	317.80	320.79	321.40	322.10
IRI-9 / 6666.3	469.95	469.68	469.50	470.61	471.40	469.60
IRI-10 / 6440.7	134.58	135.54	P&A	P&A	P&A	P&A
IRI-11 / 6613.6	527.44	466.95	466.90	467.60	468.00	468.30
*MWU-2 / 6441.0	194.36	195.00	195.40	195.38	197.50	195.90
*MWA-2 / 6441.0	199.05	199.80	199.60	199.60	199.40	199.40
*MWB-2 / 6441.0	253.28	253.05	254.80	256.13	255.40	256.00
*MWD-1 / 6467.0	328.59	328.83	329.30	329.60	329.50	329.90
*MWD-2 / 6641.0	252.58	247.82	253.50	254.54	254.30	254.80
TH75-6A	293.18	298.16	298.10	297.21	296.40	298.56
TH75-6B	291.46	294.82	295.50	295.28	294.30	295.93
TH75-11A	415.76	414.94	413.70	413.80	413.80	413.03
TH75-11B	500.17	497.28	494.80	495.00	494.80	495.55
EX-2 (WL collected quarterly)	481.56	471.75	472.80	476.15	479.70	481.70

Appendix B

Subsidence Monitoring

QUARTERLY 3M-TDR READING FOR DECEMBER 14, 2020

Prepared for

NATURAL SODA, INC.

December 2020

Prepared by

AGAPITO ASSOCIATES, INC.
715 Horizon Drive, Suite 340
Grand Junction, CO 81506

1536 Cole Blvd., Bldg. 4, Suite 310
Golden, CO 80401

QUARTERLY 3M-TDR READING FOR DECEMBER 14, 2020

TABLE OF CONTENTS

LIST OF FIGURES

1.0 INTRODUCTION

Natural Soda, Inc. (Natural Soda) commissioned Agapito Associates, Inc. (AAI) to take quarterly logs of its time domain reflectometry (TDR) surveys for monitoring subsidence from monitoring well (SMW) 3M TDR. This report presents the TDR surveys logged on December 14, 2020, for Cables #2 (Kyle) and #3 (Matt) from SMW 3M TDR. The completion diagram of SMW 3M TDR is shown in Figure 1 for reference.

2.0 TDR READINGS

The surveys were taken with AAI's Campbell Scientific, Inc. TDR 100 instrument. A propagation velocity factor (v_p) of 0.87 was used in the data processing and 2,048 data points were recorded along each cable. A waveform average of 64 points was used to eliminate background noise. Cables #1 (Blank) and #4 (Kyle2) were corrupted during installation and are not used for monitoring. No readings were taken in these cables.

3.0 WAVEFORM ANALYSIS AND RESULTS

TDR waveform histories for Cables #2 and #3 are shown in Figures 2 and 3, starting with the original waveforms from December 10, 2003. Expanded waveforms are shown in Figures 4 and 5 for Cables #2 and #3, respectively. The close-up figures highlight the zone of interest between 800 and 1,960 ft deep, including the B Groove aquifer located between 1,566 and 1,589 ft.

The December 14, 2020, survey indicates that no significant ground movement has occurred around SWM 3M TDR since the cables were originally installed. This is evidenced by the constant waveform history in Cable #3 (Figure 3).

Cable #2, parallel to Cable #3, shows evidence of water infiltration into the cable starting soon after installation. This is evident in the February 17, 2004, waveform, which shows the first signs of a distorted signal beyond a depth of approximately 1,745 ft. Water causes distortion by changing the dielectric constant of the insulation material in the cable and, thus, the propagation velocity of the reflected signal. Subsequent surveys in Cable #2 show a gradual rise in the distortion elevation, symptomatic of water propagating up the cable under hydraulic pressure from a leak originating at or near the end of the cable. Similar to the most recent results, the December 14, 2020, survey indicates that water has infiltrated the cable up to a depth of about 1,438 ft.

If the cable is not mechanically deformed by ground movement, the signal distortion caused by water infiltration superimposes on the original waveform. This appears to be the process occurring in Cable #2. Cable deformation, including shearing or breakage, normally produces a sharp "spike" in the waveform, which is expected to be recognizable even through the distortion caused by water infiltration. Cable #2 shows no obvious signs of localized damage, suggesting that significant ground movement is not occurring. This is consistent with the results of Cable #3. Water infiltration is likely to continue in Cable #2 and may eventually render the cable inoperative.

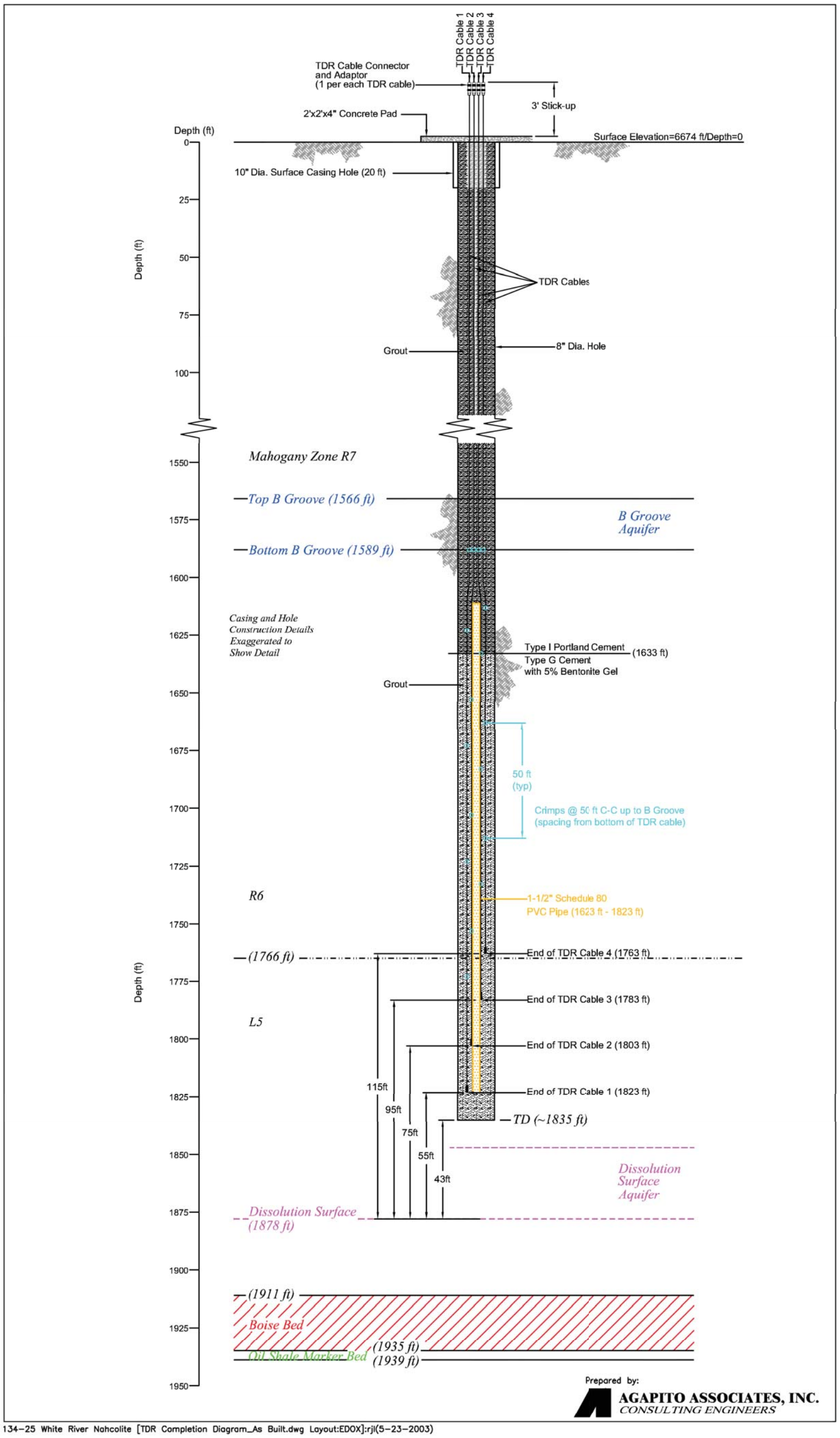


Figure 1. Draft TDR String, Crimp and End Locations Relative to Dissolution Surface and R6-L5 Interface—As Built

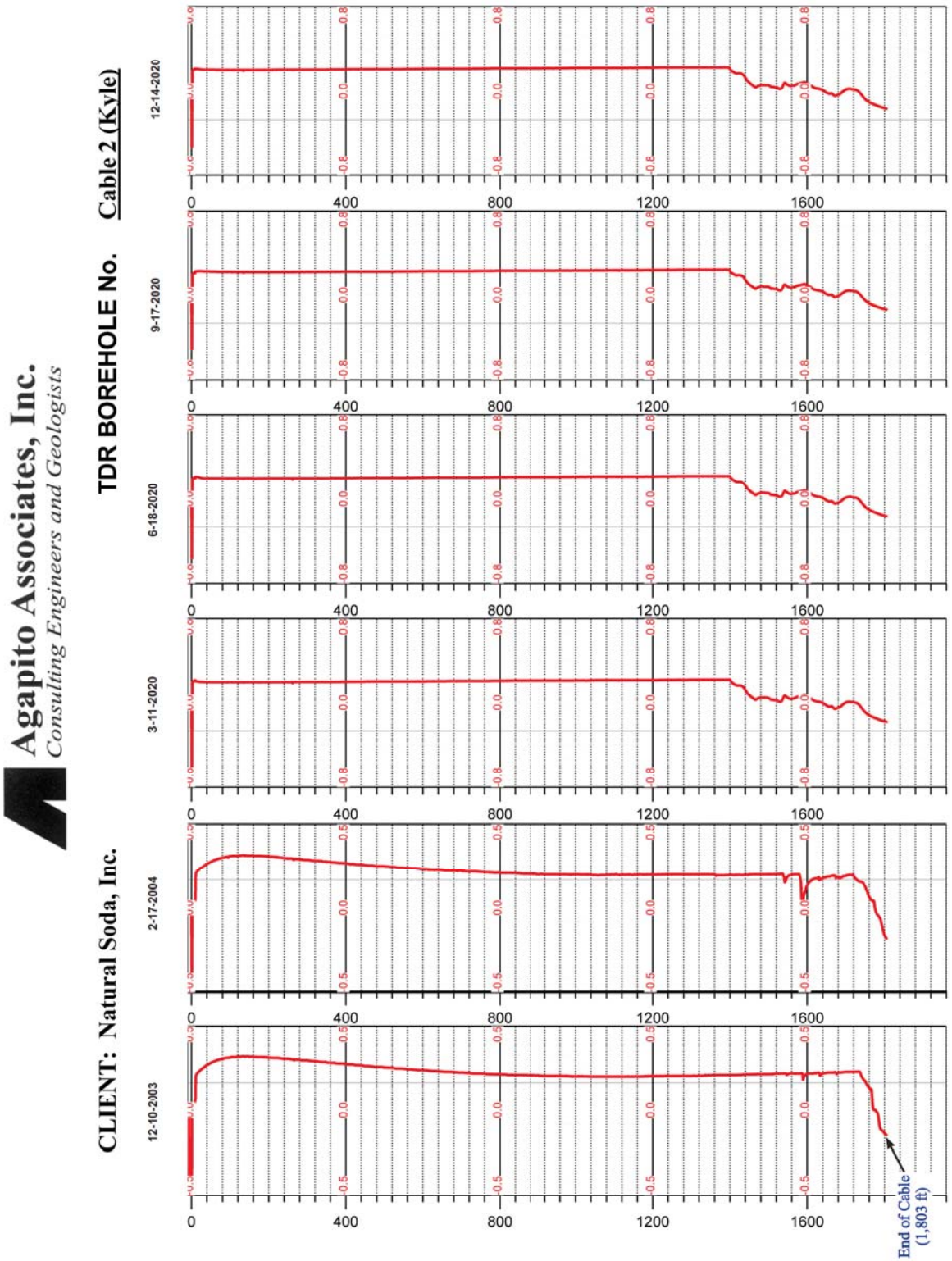


Figure 2. Comparison of Waveforms (December 10, 2003; February 17, 2004; March 11, June 18, September 17, and December 14, 2020) **for 3M-TDR Cable #2** (Kyle)

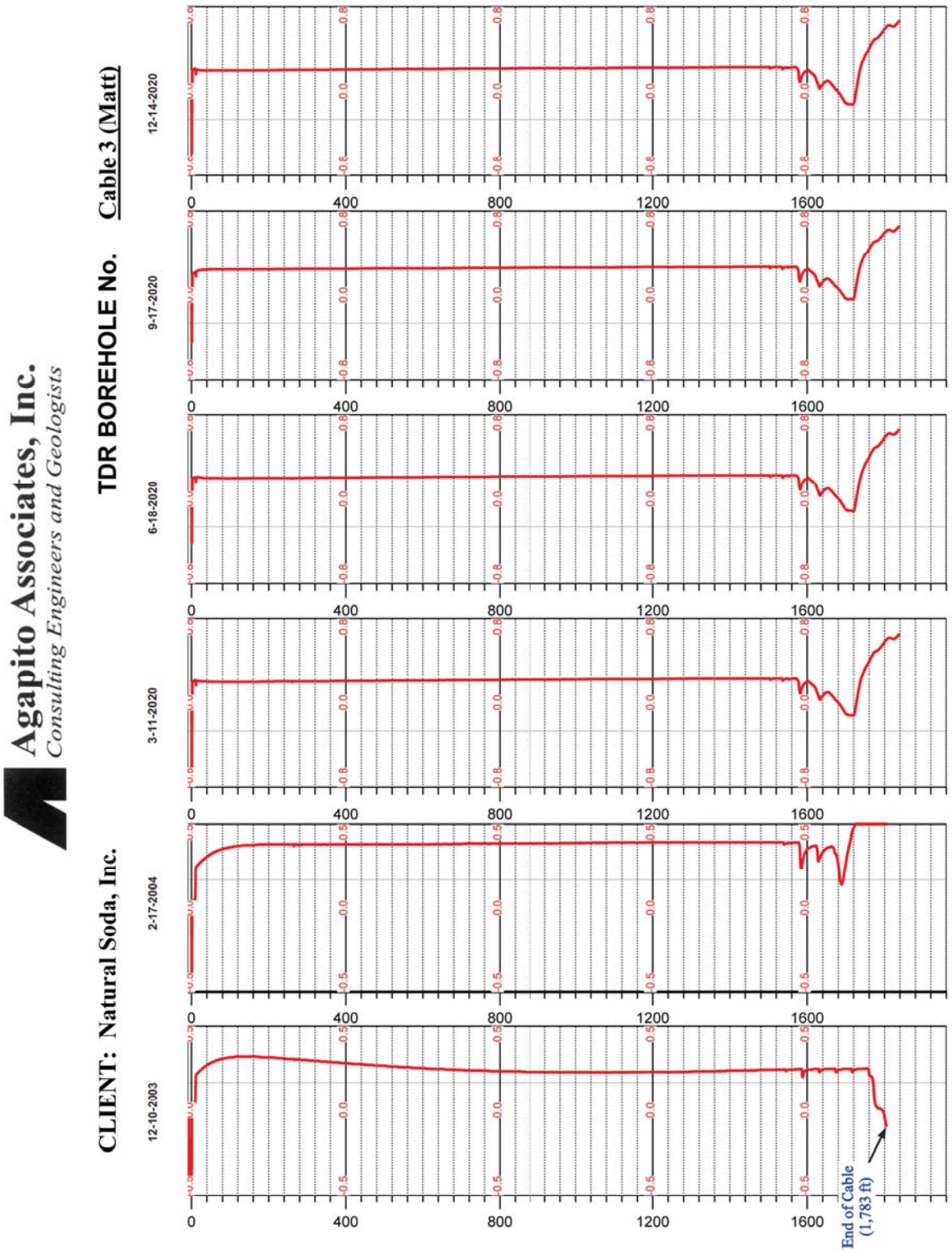


Figure 3. Comparison of Waveforms (December 10, 2003; February 17, 2004; March 11, June 18, September 17, and December 14, 2020) **for 3M-TDR Cable #3** (Matt)

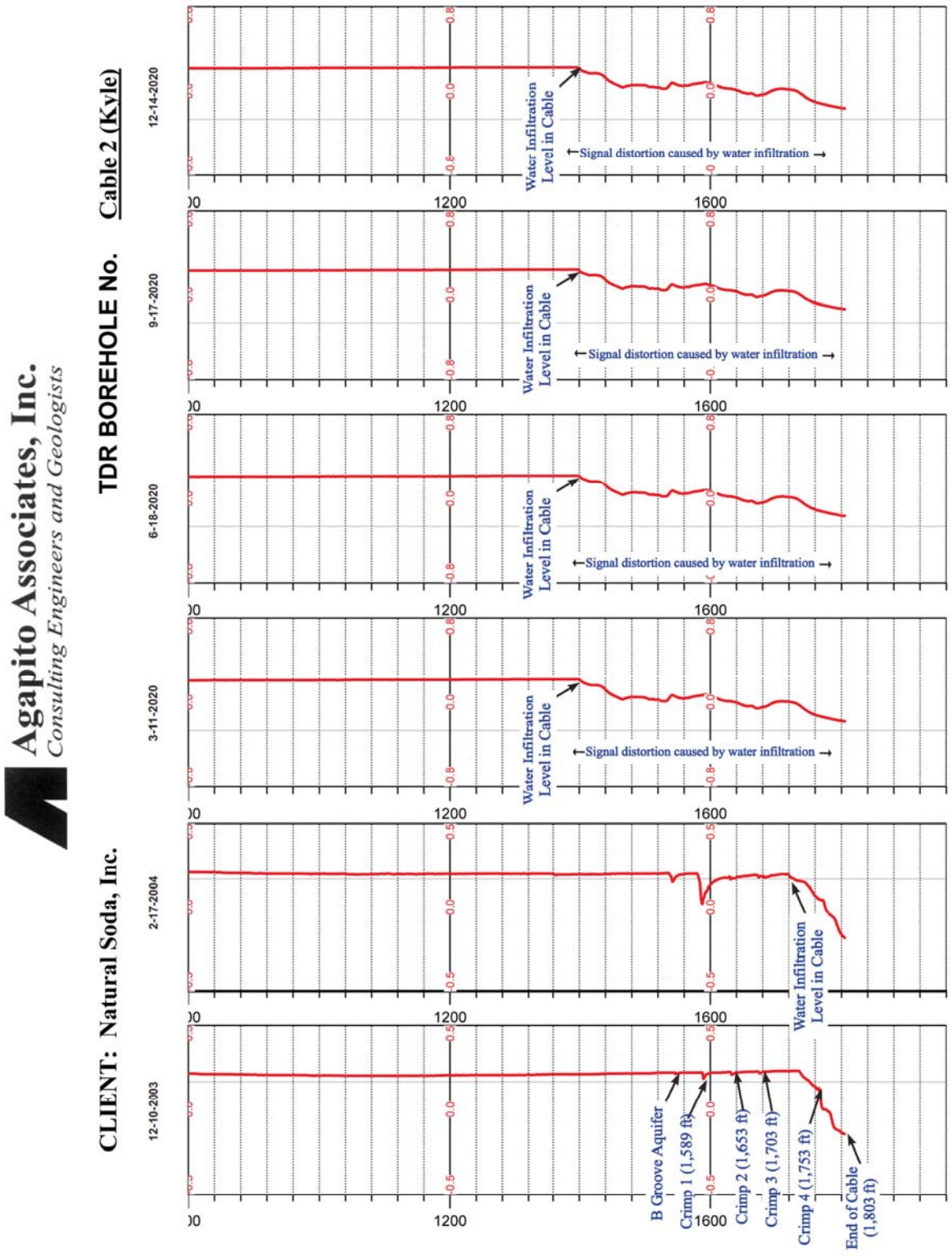


Figure 4. Comparison of Close-Up Waveforms (December 10, 2003; February 17, 2004; March 11, June 18, September 17, and December 14, 2020) **for 3M-TDR Cable #2** (Kyle)

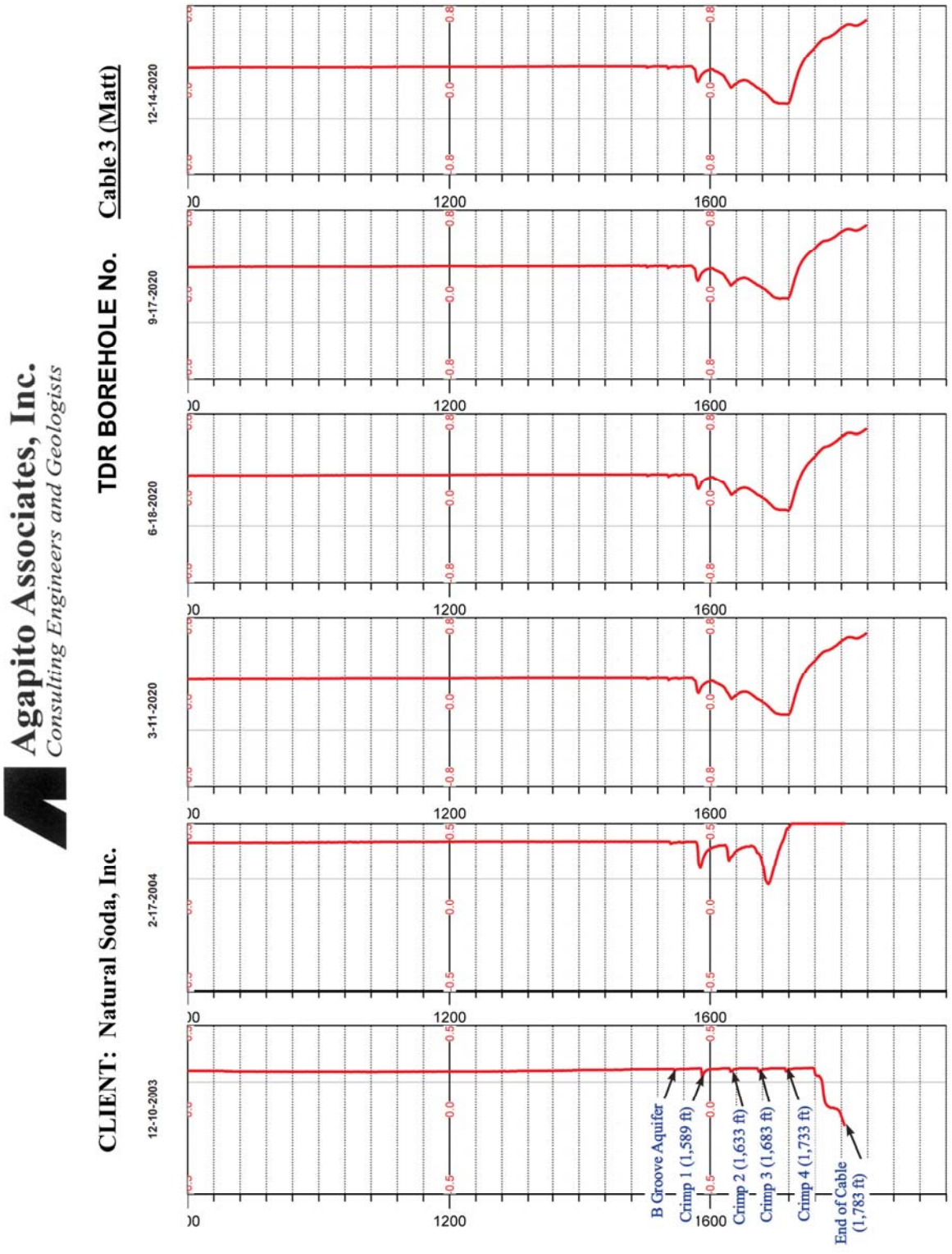
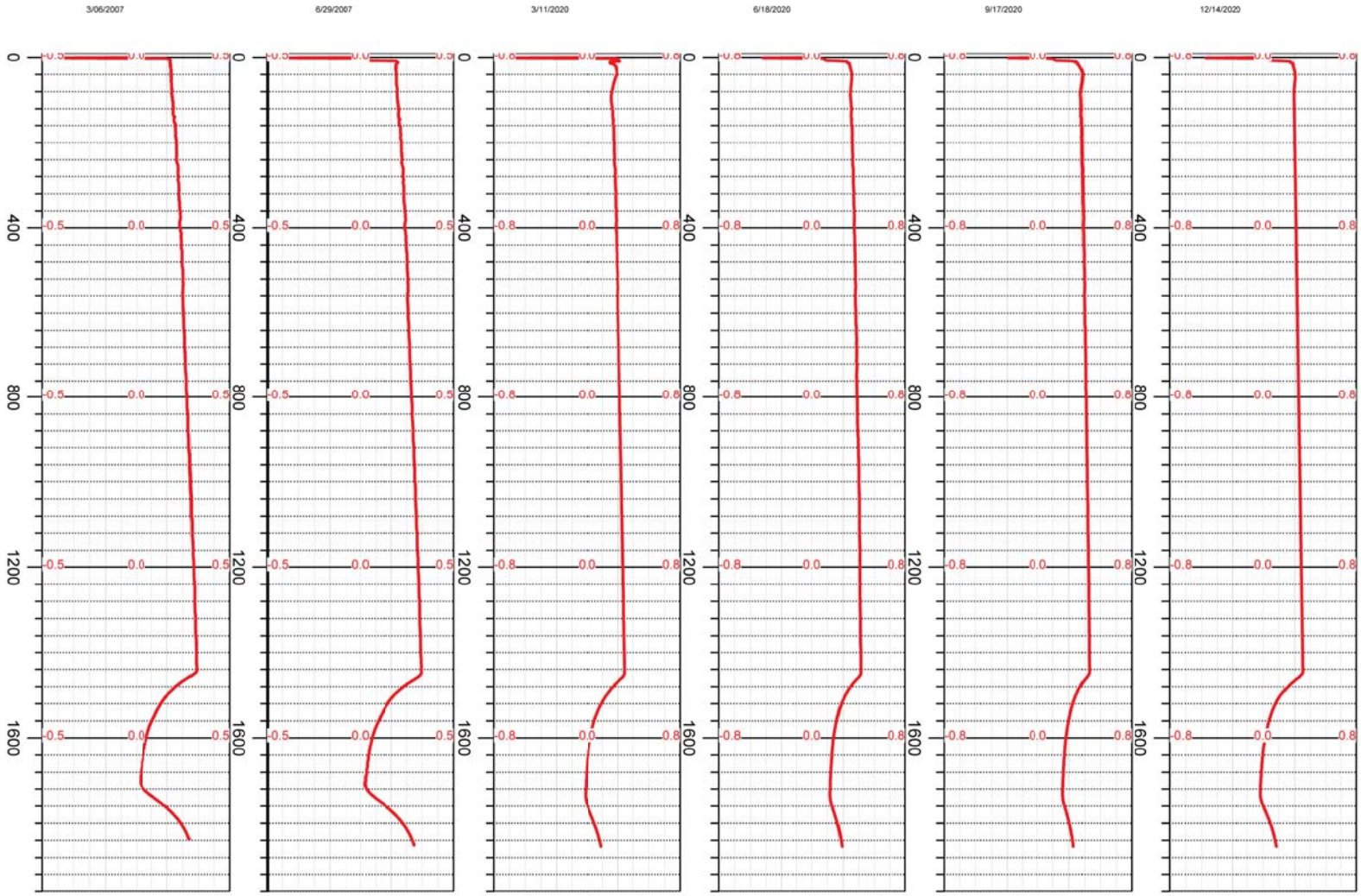


Figure 5. Comparison of Close-Up Waveforms (December 10, 2003; February 17, 2004; March 11, June 18, September 17, and December 14, 2020) **for 3M-TDR Cable #3** (Matt)

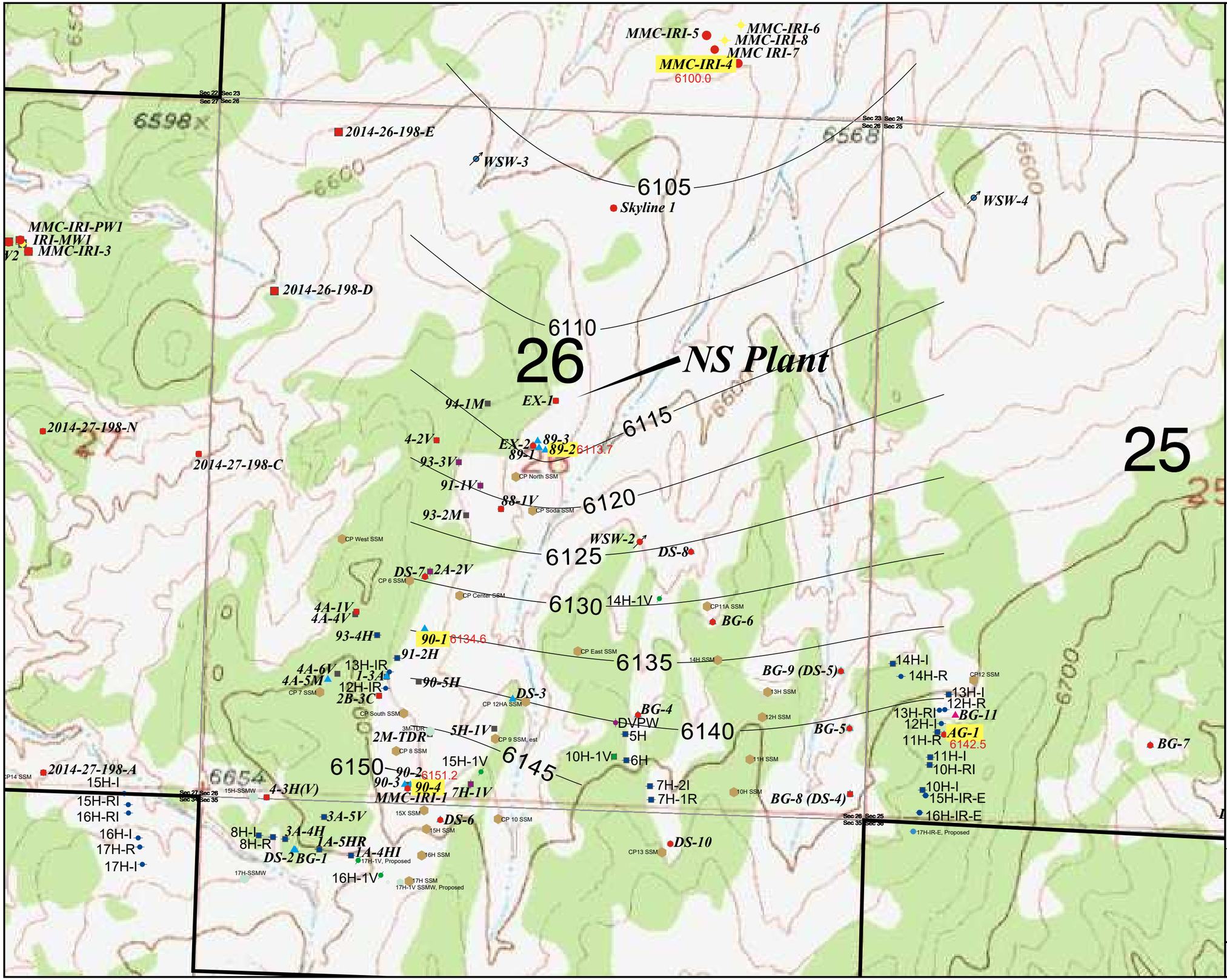
Agapito Associates, Inc.
Consulting Engineers and Geologists

CLIENT: Natural Soda, Inc. **TDR BOREHOLE No. 4A 5M (Cable A)**



Appendix C

Potentiometric Surface Maps
(Confidential)



Horizontal Well
Vertical Well
Slant Well
Hydrology Monitoring Well
Abandoned Well
Core Hole
Water Supply Well
Subsidence Monitor Well (SMW)
Surface Subsidence Monument (SSM)
Horizontal Well - Proposed
Slant Well - Proposed
AG-1 6100.0 A-Groove Aquifer Well & Water Level
NS Lease Boundary

CONFIDENTIAL

Contour Interval: 5 feet

Grid North
(NAD27)

TN MN

0 500' 1000'

Scale in Feet

Natural Soda LLC
2020 Average Potentiometric Surface
A-Groove Aquifer

T1S, R98W Rio Blanco County, CO

Daub & Associates, Inc.

Date: January 20, 2021

MMC-IRI-5
MMC-IRI-6
MMC-IRI-8 6184.5
MMC IRI-7
MMC-IRI-4
Sec 22 Sec 23 Sec 27 Sec 26
Sec 23 Sec 24 Sec 26 Sec 25
6180
6598
6568
2014-26-198-E
WSW-3
WSW-4
Skyline 1
IRI-MW1
6175
6170
2014-26-198-D
6165
26
25
NS Plant
94-1M
EX-1
4-2V
EX-2
89-3
89-1
89-2
6159.7
93-3V
CP North SSM
91-1V
88-1V
CP Soda SSM
93-2M
6160
2014-27-198-C
CP West SSM
WSW-2
DS-8
DS-7
2A-2V
CP 6 SSM
CP Center SSM
14H-1V
CP11A SSM
BG-6
6153.2
4A-1V
4A-4V
90-1
93-4H
CP East SSM
14H SSM
BG-9 (DS-5)
6184.5
14H-I
14H-RI
CP12 SSM
4A-6V
13H-IR
91-2H
1-3A
4A-5M
12H-IR
90-5H
CP 7 SSM
2B-3C
DS-3
CP 12HA SSM
13H SSM
13H-I
13H-RI
12H-R
CP South SSM
6164.7
BG-4
DVPW
12H SSM
12H-I
AG-1
3M-TDR
5H-1V
5H
BG-5
6152.3
11H-R
2M-TDR
CP 9 SSM, est
11H-I
CP 8 SSM
10H-1V
6H
11H SSM
10H-RI
BG-7
6149.8
98-A
6161.5
90-2
90-3
90-4
15H-1V
7H-1V
7H-2I
10H-I
15H-I
15H-SSMW
4-3H(V)
MMC-1RI-1
7H-1R
10H SSM
BG-8 (DS-4)
15H-IR-E
15H-RI
16H-RI
15X SSM
3A-5V
DS-6
CP 10 SSM
16H-IR-E
8H-I
15H SSM
3A-4H
1A-5HR
16H-I
8H-R
1A-4HI
17H-R
DS-2
BG-1
6166.0
16H SSM
17H-1V, Proposed
17H-I
17H-SSMW
16H-1V
17H-1V, SSMW, Proposed
17H SSM
DS-10
CP13 SSM
17H-IR-E, Proposed
Sec 26 Sec 25
Sec 35 Sec 36
Sec 27 Sec 26
Sec 34 Sec 35

Legend

- Horizontal Production Well
- Vertical Production Well
- Slant Production Well
- Hydrology Monitoring Well
- Abandoned Well
- Core Hole
- Drillhole
- Water Supply Well
- Subsurface Subsidence Monitor Well (SSMW)
- Surface Subsidence Monument (SSM)
- Horizontal Well - Proposed
- Slant Well - Proposed
- BG-1 6164.7 — B-Groove Aquifer Water Level
- NS Lease Boundary

CONFIDENTIAL

Contour Interval: 5 feet

Grid North (NAD27)

TN MN

0 500' 1000'

scale in feet

Natural Soda LLC

Average 2020 Potentiometric Surface B-Groove Aquifer

Rio Blanco County, Colorado

Daub & Associates, Inc.

Date: January 17, 2020

Appendix D

2020 Vegetation Monitoring Reclamation Status Report

Prepared

By

Rusty Roberts

Reclamation Status Report
2020 Vegetation Monitoring Results for Reclaimed Sites

Evaluating Status of Current Plant Communities on Twelve Reclaimed Sites in meeting Criteria for Successful Reclamation

Prepared for:
Natural Soda
Rifle, Colorado

Prepared by:
Rusty Roberts
Meeker, Colorado

December 2020

Table of Contents

Introduction

The Bureau of Land Management (BLM) and the State of Colorado require reclaimed lands to be revegetated in a manner that establishes a diverse, effective, and long-lasting vegetation cover that is equal or nearly so to the natural vegetation of the surrounding areas. Natural Soda's approved mine plan requires periodic monitoring to evaluate the success of revegetation efforts.

Vegetation cover, species composition, species density and ground cover data were collected from undisturbed reference area sites on Natural Soda's lease area near their current mining operations. The data collected from undisturbed areas is used in comparison to the vegetation cover, species composition, species density and ground cover data collected from reclaimed sites to determine if a site has met the criteria for successful reclamation.

Data was collected from seven reclaimed pad sites in final reclamation status which included one plugged and abandoned production well site and six corehole sites. Data was also collected from five reclaimed linear sites which included two reclaimed corehole access routes and three reclaimed water supply pipelines. Baseline data was collected from six native rangeland reference area sites on Natural Soda's lease area and near the sites evaluated. Table 1 lists the twelve sites in final reclamation status for which data was collected in 2020.

Criteria for Successful Reclamation of Disturbed Areas

BLM approved Natural Soda's plant expansion in August 2015. The approval for the expansion modified the criterion for successful reclamation of disturbances. The criteria must reflect a plant community of at least five desirable plant species where no one species may exceed 70 percent relative cover and desired foliar cover, bare ground, and shrub and/or forb density must have 80 percent similarity in relation to the identified desired plant community.

The desired plant community referenced in the criteria refers to an ecological site present at or near the area of disturbance. Two ecological sites occur on the parts of the lease area being actively mined, a pinyon and juniper woodland site and a rolling loam rangeland site. Several of the sites were in or along the fringe of the pinyon and juniper community and have soils of both a woodland site and a rangeland site. The vegetative values in the criteria are based on the capability of a site in an early seral plant community, which is basically an herbaceous species dominated site with varying amounts of shrub species. The rolling loam rangeland site reflects more of the capability of a site in an early seral plant community, thus, data collected from the six-rolling loam native rangeland reference areas were used to evaluate the success of the plant community on each reclaimed site in achieving the reclamation criteria.

The scientific and common names of the plant species encountered within the sampling from reference sites and from each reclaimed site are presented in tables in the appendix.

Vegetation Sampling Methods Utilized to Measure Criteria for Successful Reclamation

Data was collected based upon recommendations in White River Field Office's Surface Reclamation Plan which require that vegetation cover, composition, and diversity data be gathered using quantitative methods to measure the six Core Terrestrial Indicators and Methods in BLM Technical Note 440. BLM

approved sampling methods are found in Monitoring Manual for Grassland, Shrubland, and Savanna Ecosystems, Volume I and II: Quick Start.

The six core terrestrial indicators include:

(1) Bare Ground: The amount of bare ground is accepted as one of the most sensitive indicators of resource condition in rangelands. A large percentage of bare ground can be an indicator of high erosion potential, low forage production, poor wildlife habitat, and increased risk of invasion by nonnative plant species.

(2) Vegetation Composition: Vegetation composition data, including the cover of groups of species are indicators generated from the same data, and when used together, are sensitive to most changes and are useful when determining the status of key species in a plant community.

(3) Nonnative Invasive Plant Species: The presence and cover of nonnative species is acquired as a component of vegetation composition. Nonnative invasive species can have the ability to significantly alter sustainability and site resilience.

(4) Plant Species of Management Concern: The presence and cover of plant species of management concern is also acquired as a component of vegetation composition. Plant species of management concern can be sensitive to site disturbance, provide important ecosystem functions, or contribute to biological diversity.

(5) Vegetation Height: The vertical structure of vegetation which can be used to characterize wildlife habitat and estimate wind erosion potential.

(6) Proportion of Soil Surface in Large Intercanopy Gaps: Canopy gap intercept measures the proportion of a line covered by large gaps between plant canopies and is an important indicator of the potential for erosion.

Line-point intercept with plot-level species inventory was the vegetation monitoring technique used to measure the core indicators of bare ground, vegetation composition, non-native invasive plant species and plant species of management concern.

Line-point intercept is a rapid, accurate method for quantifying soil cover, including vegetation, litter, rocks and biological crusts. The theory behind this method is that if an infinite number of points are placed in a two-dimensional area, the cover of a plant species can be determined by counting the number of points that hit that species. These measurements are related to wind and water erosion, water infiltration, and the ability of the site to resist and recover from disturbance.

Gap intercept measurements were made along the line-point intercept transect line to provide information about the proportion of the line covered by large gaps between plants. Large gaps between plant canopies are important indicators of increased susceptibility to water erosion and runoff, wind erosion, weed invasion, and wildlife habitat.

A plot-level plant species inventory provides a rapid estimate of species richness. A search area at each site was utilized to record all plant species occurring within the plot. A thorough search of the plot can detect less-frequently occurring species that may not have been recorded in line-point intercept cover measurements.

Shrub and forb densities also a criterion for successful reclamation are not measured by the sampling methods used for the other criteria. Forb and shrub density measurements were taken from one-meter square density quadrants along the same line-point intercept transect line used for the other sampling techniques.

Summary of Results for Reclaimed Sites in Achieving Reclamation Goals

Vegetation cover, plant species composition, ground cover and shrub and forb density data were collected from one plugged and abandoned production well pad site in final reclamation status, from six reclaimed corehole pad sites, from five reclaimed linear sites and from six native rangeland reference area sites near the sites evaluated. Data was collected from July 28 thru August 27, 2020. Table 1 lists the sites in final reclamation status for which data was collected in 2020. The location of sites monitored are illustrated on the attached location map.

All the sites have productive plant communities with good distribution of perennial species across the site which has adequately stabilized each site. The vegetation that has established on the reclaimed sites are mostly the perennial species planted during reclamation. Many of the perennial species especially the grasses, are well established providing a resilient plant community that is difficult for desirable forbs and shrubs to compete and increase in cover and density.

Table 1 is a summary of the progress of each site monitored in achieving successful reclamation. The site-specific monitoring results for each site are discussed in detail later.

Table 1 - Summary of Results for Reclaimed Sites in Achieving Successful Reclamation Criteria

Well Pad #	Criteria for Successful Reclamation of Disturbed Areas						Criteria Met
	at least five desirable plant species where no one species may exceed 70 percent relative cover		desired foliar cover, bare ground, and shrub and/or forb density must have 80 percent similarity in relation to the values measured on nearby undisturbed native rangelands				
	the number of desired plant species present	the relative cover of the desired species with the greatest cover	% similarity of desired foliar cover	% similarity of bare ground	% similarity of shrub density	% similarity of forb density	
	2020 Data Collected for P&A Production Well Pad in Final Reclamation Status						
94-1M	18 species	30.5%	97%	127%	24%	83%	Yes
Site	**2020 Data Collected for Corehole Pads in Final Reclamation Status**						
Pad A	27 species	8.1%	93%	144%	82%	68%	Yes
Pad D	20 species	18.0%	99%	146%	102%	157%	Yes
Pad G	25 species	15.3%	84%	136%	37%	42%	No
IRI-2	15 species	28.0%	96%	127%	128%	36%	Yes
IRI-3 MW-1, PW-1, PW-2	17 species	23.3%	99%	120%	48%	15%	No

IRI-10	17 species	26.7%	79%	69%	201%	72%	No
Site	**2020 Data Collected for Linear Sites in Final Reclamation Status**						
Q ac rt	27 species	16.7%	79%	100%	57%	64%	No
T ac rt	15 species	12.7%	92%	82%	93%	142%	Yes
WSW2	24 species	16.0%	100%	143%	128%	47%	Yes
WSW3	24 species	20.0%	117%	153%	25%	80%	Yes
WSW4	26 species	18.7%	108%	124%	48%	82%	Yes
	2020 Baseline Data Collected from Native Rangeland Reference Areas						
	30 species	**27.3 %**	**58.0 %**	**30.0 %**	**1.80**	**5.90**	
Note: values in red are below the criteria required for successful reclamation							

Vegetation Sampling Methods and Procedures for Reclaimed Sites and Reference Areas

The line-point intercept with plot-level species inventory was the vegetation sampling protocol used on both the reclaimed pads and associated reference areas. The procedure involves random placement of a transect line (measuring tape) as the base for data collection. Values for foliar cover, basal cover, species composition and bare ground were measured at specific points along the line. Gaps in vegetation canopy were measured along the same tape line. Density quadrants were placed adjacent the line at specific points.

A 25-meter tape was used as the baseline transect for collecting data from the 6 rolling loam reference areas and from the 12 reclaimed sites. Data was collected from 1 transect for each of the 6 reference areas. Data was collected from 3 transects for most of the reclaimed sites.

The following techniques were used to collect the sample data:

- The beginning and ending points of each transect were recorded using a GPS receiver. Azimuths from the 0-meter to the 25-meter point were recorded.
- Photographs were taken at each transect that show vegetation features at the time of sampling.
- Point count data were collected at one half-meter intervals along a 25-meter tape using a thin, straight metal rod (pin flag) for a total of fifty samples taken along each transect.
    - The first plant species in the canopy hit by the drop of a pin flag at each sample point was recorded by species in the “Top Layer”. The total of top layer hits was used to determine total foliar cover for the study site and the total foliar cover for each species hit in the top layer.
    - Subsequent plant species and vegetative litter hits were recorded in the “Lower Canopy Layers”. Vegetative litter was recorded as either unattached herbaceous or woody litter.
    - Species composition based upon total of all plant species encountered in the top layer and the lower layers at each sample point and recorded by species and summarized by plant group.
    - Soil surface hits were recorded as plant species basal intercepts, lichen crust, moss, embedded litter, duff, rock, or bare soil. Bare ground percent was determined by a bare soil hit with no canopy intercepts in the top and lower canopy layers.
- Canopy gaps were recorded directly below the transect tape line. Only perennial plant species were used in the vegetative canopy. Annual species if present were not included as part of the

canopy. Gaps larger than 20 centimeters were recorded for the length of each transect. Gaps were totaled into gap sizes (21 to 50; 51 to 100; 101 to 200; >200). Though the gap data is not used in evaluating reclamation criteria, it was collected as a visualization of perennial species distribution and cover.

- Forb and shrub density data were taken from one-meter square density quadrants alongside the same line-point intercept transect line used for the other sampling techniques. Quadrants were placed at every 5th sample point along the transect tape for a total of 10 one-meter density quads for each transect. Only desirable forb and shrub densities are required in the criteria for successful reclamation. The total number of desirable forb and shrub species rooted in each quad were counted and recorded by species and summarized by plant group. Densities for grasses or trees were not collected.
- A plot-level plant species inventory was conducted within a search area at each site. The search area for reclaimed sites was within the original disturbance at the site. In addition to those plant species recorded during sampling, other species not encountered during sampling but were observed in the sample area were recorded for species richness.

Vegetation Sampling Results for Nearby Native Rangeland Reference Areas

Vegetation cover, species composition, species density and ground cover data were collected from four rolling loam rangeland sites on July 28 thru August 27, 2020. Transects were established in the six rolling loam sites which represent the site characteristic's common in the project area. The pre-disturbance vegetation for some of the reclaimed sites examined had pinyon and juniper tree cover over all or portion of the site. Several of the sites were along the fringe of the pinyon and juniper community and had soils of both a woodland site and a rangeland site. The vegetative values in the criteria are based on the capability of a site in an early seral plant community, which is basically an herbaceous species dominated site with varying amounts of shrub species. The rolling loam rangeland site reflects more of the capability of a site in an early seral plant community, thus, data collected from the 6 rolling loam rangeland reference areas were used to evaluate the success of the plant community on each reclaimed site in achieving the reclamation criteria.

Values for foliar cover, basal cover, species composition and bare ground were collected from six 25 meter transects for a total of 300 sample points. Values for forb and shrub densities were collected from 60 one-meter square quadrants. Table 2 summarizes the data collected in 2020 from the six reference areas. A comparison to the data collected in 2019 is included in the table.

The unusually dry conditions that occurred during the growing season in 2020 resulted declines in cover and composition of most herbaceous species. Foliar cover of native species measured on the reference sites in 2020 declined 7 percent in comparison to comparable data collected in 2019. Foliar cover of perennial grasses declined 4 percent, foliar cover of perennial forbs declined 46 percent and shrub cover increased 5 percent. The foliar cover of invasive nonnative grasses more than doubled in 2020. A 9 percent decline in herbaceous litter cover occurred in 2020.

The declines in foliar cover and herbaceous litter cover that occurred in 2020 resulted in a 11.6 percent increase in bare ground from that measured in 2019. The canopy gaps between perennial species is also an indicator of ground cover. The total canopy gaps between perennial species increased 2 percent from the values measured in 2019.

Table 2- Rolling Loam Native Rangeland Reference Area Vegetation Cover, Species Composition, Species Density & Ground Cover										
	Line-Point Canopy Intercept Data [1]								Density Data [2]	
	Number of Species		% Foliar Cover		% Basal Cover		Species Composition		Forb/Shrub Density (#/m^2)	
Plant Group	**2019**	**2020**	**2019**	**2020**	**2019**	**2020**	**2019**	**2020**	**2019**	**2020**
Perennial Grasses	5	6	42.5	41.0	6.5	6.66	61.08	69.63	n/a	n/a
Invasive Non-Native Grasses	1	1	1.0	2.33	0.0	0.0	1.34	3.27	n/a	n/a
Desirable Forbs	12	18	8.0	4.34	2.0	0.33	19.46	9.34	6.125	5.90
Invasive and Non-Native Forbs	2	2	0.5	0.0	0.0	0.0	1.34	0.0	n/a	n/a
Shrubs	5	5	12.0	12.67	1.0	0.33	16.78	17.76	1.701	1.80
Vegetation Totals	**26**	**33**	**64.0**	**60.34**	**9.5**	**7.32**	**100.0**	**100.0**	**1.751**	**7.70**

Line-Point Intercept Soil Surface Cover Data [3]												
Percent Cover by Type	**Bare Ground**		**Biotic Crust**		**Herbaceous Litter**		**Woody Litter**		**Duff**		**Rock**	
	2019	**2020**	**2019**	**2020**	**2019**	**2020**	**2019**	**2020**	**2019**	**2020**	**2019**	**2020**
	26.5	**30.0**	**0.5**	**0.33**	**40.5**	**39.3**	**1.5**	**1.3**	**0.0**	**0.0**	**0.0**	**0.0**

[1] Sum of data from 6 randomly placed transects with 50 sample points collected from each transect. Foliar cover based upon 1st plant species encountered in the canopy at each sample point. Species composition based upon total of all plant species encountered at each sample point.
[2] Sum of density data collected from ten 1-meter square quadrants along each transect. Only desirable forb and shrub densities were recorded based upon reclamation criteria.
[3] Percentages are not cumulative with vegetation totals, rather a measure by layer of ground cover from the top layer thru the lower layers to the soil surface. Values for bare ground have no vegetative, litter or rock cover above the soil surface.

The specific vegetation sampling data collected from the 6 rolling loam rangeland sites are presented in Appendix A. Data in the appendix include (1) vegetation cover, ground cover, species composition, and forb and shrub densities; (2) listing of plant species encountered; (3) GPS coordinate data for the transect start and end points; (4) inter-canopy gaps and (5) photographs of each transect.

Monitoring Results and Evaluation of Criteria for Sites in Final Reclamation Status

Vegetation cover, species composition, species density and ground cover data were collected from the disturbed areas of 12 sites in final reclamation status. The disturbed sites included one plugged and abandoned production well pad site (94-1M), six reclaimed corehole pad sites (pads A, D, G, IRI-2, IRI-3 and IRI-10), and five reclaimed linear sites (access routes to pad Q and to pad T, and water supply pipelines WSW-2, WSW-3 and WSW-4). Locations are noted on the attached location map.

Vegetation sampling data collected for the 12 reclaimed sites are presented in the Appendix B through Appendix M.

- Appendix B – reclaimed production well pad 94-1M.
- Appendix C – reclaimed corehole pad A.
- Appendix D – reclaimed corehole pad D.
- Appendix E – reclaimed corehole pad G.
- Appendix F – reclaimed corehole pad IRI-2.
- Appendix G – reclaimed corehole pads IRI-3, MW-1, PW-1, PW-2.
- Appendix H – reclaimed corehole pad IRI-10.
- Appendix I – reclaimed access route to pad Q.
- Appendix J – reclaimed access route to pad T.

- Appendix K – reclaimed waterline WSW-2.
- Appendix L – reclaimed waterline WSW-3.
- Appendix M – reclaimed waterline WSW-4.

Vegetation sampling data in the appendixes include (1) vegetation cover, ground cover, species composition, and forb and shrub densities; (2) listing of plant species encountered; (3) GPS coordinate data for the transect start and end points; (4) inter-canopy gaps; (5) photographs of each transect and access route photo-points and (6) plot diagram of transect layouts and photo-point locations.

Well Pad 94-1M

Data was collected for this site on August 4, 2020. The final reclamation of this site includes approximately 1.3 acres.

Three 25 meter transects were placed in a spoke pattern on the pad with 50 sample points on each transect for a total of 150 points for cover data. Ten one-meter square density quadrants were placed along each transect for a total of 30 quadrants. Data collected from this site include vegetative foliar and basal cover, species composition, forb and shrub densities all summarized by plant group. In addition, ground cover data was collected for dead vegetative litter, bare ground, and surface rock.

The data collected in 2020 is summarized in Table 3 from the sampling data presented in Appendix Table B1. Each plant species encountered at this site is listed in Table B1. As shown in Table B1 there is a good establishment of the perennial grasses with uniform distribution across much of the site.

Table 3 - Reclaimed Pad 94-1M
Vegetation Cover, Species Composition, Species Density & Ground Cover

	Line-Point Canopy Intercept Data [1]				Density Data [2]
Plant Group	**Number of Species**	**% Foliar Cover**	**% Basal Cover**	**Species Composition**	**Desirable Forb/Shrub Density (#/m²)**
Perennial Grasses	8	46.7	6.0	81.05	n/a
Invasive Non-Native Grasses	1	2.0	0.0	3.20	n/a
Desirable Forbs	6	6.7	0.7	11.55	4.87
Invasive and Non-Native Forbs	0	0.0	0.0	0.0	n/a
Shrubs	4	2.7	0.0	4.20	0.44
Vegetation Totals	**19**	**58.1**	**6.7**	**100.00**	**5.31**

Line-Point Intercept Soil Surface Cover Data [3]

Percent Cover by Type	Bare Ground	Biotic Crust	Herbaceous Litter	Woody Litter	Duff	Rock
	22.0	**0.0**	**45.3**	**7.3**	**0.0**	**0.7**

[1] Sum of data from 3 randomly placed 25 meter transects with 50 sample points collected from each transect. Foliar cover based upon 1st plant species encountered in the canopy at each sample point. Species composition based upon total of all plant species encountered at each sample point.
[2] Sum of density data collected from ten 1-meter square quadrants along each transect. Only desirable forb and shrub densities were recorded based upon reclamation criteria.
[3] Percentages are not cumulative with vegetation totals, rather a measure by layer of ground cover from the top layer thru the lower layers to the soil surface. Values for bare ground have no vegetative, litter or rock cover above the soil surface.

The foliar cover of desirable species on the site was only 97 percent of that measured on the reference areas. The cover of perennial grasses was 14 percent greater; the cover of desirable forbs was 54 percent greater and shrub cover was only 22 percent of that on the reference areas. The species composition of desirable species was equal to that on the reference areas. The composition of perennial grasses was 16 percent greater, desirable forbs was 24 percent greater and shrubs was 24 percent lower.

The density of desirable forbs on the site was only 83 percent of that on reference areas. The density of shrubs on the site was only 24 percent of that on reference areas.

The amount of bare ground on the reference areas was 27 percent greater than that measured on this site. The amount of herbaceous litter on this site was 15 percent greater than that on the reference areas. The canopy gaps between perennial species measured on the site were 5 percent larger than that measured on the reference areas.

The site has a productive established plant community which has good representation of the perennial species used in the seed mix with good distribution of those species across the site. The plant community has adequately stabilized the site.

Table 4 is a comparison of the data collected for reclaimed well pad 94-1M with that of the rolling loam rangeland reference areas. Only the data required to access the success of achieving successful reclamation is used in Table 4.

Table 4 – Comparison of Reclamation Criteria Elements with Native Rangeland Reference Areas

Site	# desired plant species	% desired foliar cover	% bare ground	shrub density (#/m^2)	forb density (#/m^2)
Pad 94-1M	18 species	56.1	22.0	0.44	4.87
Reference Area [1]	30 species	58.00	30.0	1.80	5.90

[1] *The average of six native rangelands reference areas were used as the base for evaluating success of the reclamation criteria.*

Evaluation of successful reclamation of the disturbance on Well Pad 94-1M:

- There are 18 desirable plant species established on the site (8 perennial grasses, 6 desirable forbs, and 4 shrubs) meeting the requirement of at least five plant species.
- Russian wildrye *(Psathyrostachys juncea*) was the desired species with the greatest relative cover at 30.5 percent meeting the requirement that no one species can exceed 70 percent relative cover.
- The foliar cover of desirable species on the site was 97 percent of that on the native rangeland reference area meeting the requirement of 80 percent similarity.
- The amount of unprotected bare ground on the site was 27 percent less than on the native rangeland reference area which equates to 127 percent similarity, exceeding the required 80 percent similarity.
- The density of desirable forbs and shrubs on the site in comparison with the native rangeland reference area was 83 percent and 24 percent, respectively. The criteria only require either forb density or shrub density meet the requirement of 80 percent similarity. The density of desirable forbs has met the required criteria.

The plant community established on this site has a good representation of the perennial species used in the seed mix. The perennial grasses are well established providing a resilient plant community that has been difficult for desirable forbs and shrubs to compete and increase in cover and density. This site has a very productive plant community with good distribution of perennial species across the site which has adequately stabilized the site. The plant community does meet the criteria for species diversity, desired foliar cover, density of desirable forbs and bare ground. The plant community on this site meets the criteria for successful reclamation of the disturbance.

Corehole Pad A

The site was reclaimed fall of 2014 with final reclamation of approximately 0.56 acres. Data was collected for this site on August 4, 2020.

Three 25 meter transects were placed in a spoke pattern on the pad with 50 sample points on each transect for a total of 150 points for cover data. Ten one-meter square density quadrants were placed along each transect for a total of 30 quadrants. Data collected from this site include vegetative foliar and basal cover, species composition, forb and shrub densities and ground cover all summarized by plant group. In addition, ground cover data was collected for dead vegetative litter, bare ground, and surface rock.

The data collected in 2020 is summarized in Table 5 from the sampling data presented in Appendix Table C1. Each plant species encountered at this site is listed in Table C1.

Table 5 - Reclaimed Corehole Pad A
Vegetation Cover, Species Composition, Species Density & Ground Cover

	Line-Point Canopy Intercept Data [1]				Density Data [2]
Plant Group	**Number of Species**	**% Foliar Cover**	**% Basal Cover**	**Species Composition**	**Desirable Forb/Shrub Density (#/m²)**
Perennial Grasses	11	42.0	8.8	60.19	n/a
Invasive Non-Native Grasses	1	13.3	0.0	20.37	n/a
Desirable Forbs	11	7.4	0.7	12.96	4.00
Invasive and Non-Native Forbs	1	0.0	0.0	0.00	n/a
Shrubs	6	4.7	0.0	6.48	1.47
Vegetation Totals	**30**	**67.4**	**9.5**	**100.00**	**5.47**

Line-Point Intercept Soil Surface Cover Data [3]

Percent Cover by Type	Bare Ground	Biotic Crust	Herbaceous Litter	Woody Litter	Duff	Rock
	16.7	**0.0**	**49.3**	**6.0**	**0.0**	**0.0**

[1] Sum of data from 3 randomly placed 25 meter transects with 50 sample points collected from each transect. Foliar cover based upon 1st plant species encountered in the canopy at each sample point. Species composition based upon total of all plant species encountered at each sample point.
[2] Sum of density data collected from ten 1-meter square quadrants along each transect. Only desirable forb and shrub densities were recorded based upon reclamation criteria.
[3] Percentages are not cumulative with vegetation totals, rather a measure by layer of ground cover from the top layer thru the lower layers to the soil surface. Values for bare ground have no vegetative, litter or rock cover above the soil surface.

The disturbance has been stabilized by the perennial species seeded on the site. The short access route to the site has mostly been eliminated by construction of a gas pipeline from the TEP gas well to the west. The site does have a significant amount of cheatgrass (*Bromus tectorum*), an annual non-native grass, occurring on the site.

The cover of cheatgrass is just over 23 percent of the site total and is 4.5 times greater than on the reference areas. The composition of cheatgrass on the site is just over 20 percent of the site total. It does not appear that cheatgrass is invading or increasing on the site. The desirable species on the site are robust and well established.

The foliar cover of desirable species on the site was only 93 percent of that measured on the reference areas. The cover of perennial grasses was 2 percent greater; the cover of desirable forbs was 71 percent greater and shrub cover was only 37 percent of that on the reference areas. The species composition of desirable species was only 82 percent of that on the reference areas. The composition of perennial grasses was 14 percent less than, desirable forbs was 39 percent greater and shrubs was 36 percent lower.

The density of desirable forbs on the site was only 68 percent of that on reference areas. The density of shrubs on the site was only 82 percent of that on reference areas.

The amount of bare ground on the reference areas was 44 percent greater than that measured on this site. The amount of herbaceous litter on this site was 25 percent greater than that on the reference areas. The canopy gaps between perennial species measured on the site were 45 percent larger than that measured on the reference areas.

Table 6 is a comparison of the data collected for reclaimed Pad A with that of the rolling loam rangeland reference areas. Only the data required to access the success of achieving successful reclamation is used in Table 6.

Table 6 – Comparison of Reclamation Criteria Elements with Native Rangeland Reference Areas

Site	# desired plant species	% desired foliar cover	% bare ground	shrub density (#/m^2)	forb density (#/m^2)
Corehole Pad A	28 species	54.1	16.7	1.47	4.00
Reference Area [1]	30 species	58.00	30.0	1.80	5.90

[1] *The average of six native rangelands reference areas were used as the base for evaluating success of the reclamation criteria.*

Evaluation of successful reclamation of the disturbance on Corehole Pad A:

- There are 28 desirable plant species established on the site (11 perennial grasses, 11 desirable forbs, and 6 shrubs) meeting the requirement of at least five plant species.
- Slender Wheatgrass (*Elymus trachycaulus*) was the desired species with the greatest relative cover at 8.1 percent meeting the requirement that no one species can exceed 70 percent relative cover. The cover of cheatgrass (*Bromus tectorum*), an annual non-native grass, is 13.3 percent more than any other species on the site.
- The foliar cover of desirable species on the site was 93 percent of that on the native rangeland reference areas meeting the requirement of 80 percent similarity.
- The amount of unprotected bare ground on the site was 44 percent less than that on the native rangeland reference areas which equates to 144 percent similarity, meeting the required 80 percent similarity.

- The density of forbs and shrubs on the site in comparison with the native rangeland reference areas was 68 percent and 82 percent, respectively. The criteria only require either forb density or shrub density meet the requirement of 80 percent similarity. Shrub density has met the required criteria.

The plant community established on this site has a good representation of the perennial species used in the seed mix. The perennial species are well established providing a resilient plant community that will be difficult for cheatgrass to increase above its current cover and composition, especially when considering the unfavorable climatic conditions that occurred during the growing season. The plant community meets the species diversity, desired foliar cover, shrub density and bare ground criteria necessary for successful reclamation of the disturbance at this site.

Corehole Pad D

The site was reclaimed fall of 2014 with final reclamation of approximately 0.64 acres. Data was collected for this site on July 28, 2020.

Three 25 meter transects were placed in a spoke pattern on the pad with 50 sample points on each transect for a total of 150 points for cover data. Ten one-meter square density quadrants were placed along each transect for a total of 30 quadrants. Data collected from this site include vegetative foliar and basal cover, species composition, forb and shrub densities and ground cover all summarized by plant group. In addition, ground cover data was collected for dead vegetative litter, bare ground, and surface rock.

The data collected in 2020 is summarized in Table 7 from the sampling data presented in Appendix Table D1. Each plant species encountered at this site is listed in Table D1.

Table 7 - Reclaimed Corehole Pad D
Vegetation Cover, Species Composition, Species Density & Ground Cover

	Line-Point Canopy Intercept Data [1]				Density Data [2]
Plant Group	**Number of Species**	**% Foliar Cover**	**% Basal Cover**	**Species Composition**	**Desirable Forb/Shrub Density (#/m²)**
Perennial Grasses	9	49.3	7.3	79.40	n/a
Invasive Non-Native Grasses	1	4.7	0.0	7.50	n/a
Desirable Forbs	8	6.0	1.3	10.30	9.27
Invasive and Non-Native Forbs	1	0.0	0.0	0.0	n/a
Shrubs	3	2.0	0.0	2.80	1.83
Vegetation Totals	**22**	**62.0**	**8.6**	**100.00**	**11.10**

Line-Point Intercept Soil Surface Cover Data [3]						
Percent Cover by Type	**Bare Ground**	**Biotic Crust**	**Herbaceous Litter**	**Woody Litter**	**Duff**	**Rock**
	19.3	**0.0**	**50.0**	**8.0**	**0.0**	**0.0**

[1] Sum of data from 3 randomly placed 25 meter transects with 50 sample points collected from each transect. Foliar cover based upon 1st plant species encountered in the canopy at each sample point. Species composition based upon total of all plant species encountered at each sample point.
[2] Sum of density data collected from ten 1-meter square quadrants along each transect. Only desirable forb and shrub densities were recorded based upon reclamation criteria.
[3] Percentages are not cumulative with vegetation totals, rather a measure by layer of ground cover from the top layer thru the lower layers to the soil surface. Values for bare ground have no vegetative, litter or rock cover above the soil surface.

The disturbance has been stabilized by the perennial species seeded on the site. A BLM road traverses thru bisecting the site. The road has not created any erosion or weed impacts to the site.

The foliar cover of desirable species on the site was 99 percent of that measured on the reference areas. The cover of perennial grasses was 20 percent greater; the cover of desirable forbs was 38 percent greater and shrub cover was only 16 percent of that on the reference areas. The species composition of desirable species was only 96 percent of that on the reference areas. The composition of perennial grasses was 14 percent greater, desirable forbs was 10 percent greater and shrubs was 16 percent lower.

The density of desirable forbs on the site was 57 percent greater than that on reference areas. The density of shrubs on the site was 2 percent greater than that on reference areas.

The amount of bare ground on the reference areas was 36 percent greater than that measured on this site. The amount of herbaceous litter on this site was 27 percent greater than that on the reference areas. The canopy gaps between perennial species measured on the site were 8 percent smaller than that measured on the reference areas.

The site has a productive established plant community which has good representation of the perennial species used in the seed mix with good distribution of those species across the site. The plant community has adequately stabilized the site.

Table 8 is a comparison of the data collected for reclaimed Pad A with that of the rolling loam rangeland reference areas. Only the data required to access the success of achieving successful reclamation is used in Table 8.

Table 8 – Comparison of Reclamation Criteria Elements with Native Rangeland Reference Areas

Site	# desired plant species	% desired foliar cover	% bare ground	shrub density (#/m^2)	forb density (#/m^2)
Corehole Pad D	20 species	57.3	19.3	1.83	9.27
Reference Area [1]	30 species	58.00	30.0	1.80	5.90

[1] *The average of six native rangelands reference areas were used as the base for evaluating success of the reclamation criteria.*

Evaluation of successful reclamation of the disturbance on Corehole Pad D:

- There are 20 desirable plant species established on the site (9 perennial grasses, 8 desirable forbs, and 3 shrubs) meeting the requirement of at least five plant species.
- Green needlegrass (*Nassella viridula*) was the desired species with the greatest relative cover at 18 percent meeting the requirement that no one species can exceed 70 percent relative cover.
- The foliar cover of desirable species on the site was 99 percent of that on the native rangeland reference areas meeting the requirement of 80 percent similarity.
- The amount of unprotected bare ground on the site was 36 percent less than on the native rangeland reference areas which equates to 136 percent similarity, meeting the required 80 percent similarity.

- The density of forbs and shrubs on the site in comparison with the native rangeland reference areas was 157 percent and 102 percent, respectively. The criteria only require either forb density or shrub density meet the requirement of 80 percent similarity. The density of both desirable forbs and shrubs exceeds the required criteria.

The plant community established on this site has a good representation of the perennial species used in the seed mix. This site has a very productive plant community with good distribution of perennial species across the site which has adequately stabilized the site. The plant community does meet all the criteria of species diversity, desired foliar cover, desirable forb density, shrub density and bare ground for successful reclamation of the disturbance at this site.

Corehole Pad G

The site was reclaimed fall of 2014 with final reclamation of approximately 0.60 acres. Vegetation sampling data was collected on July 31, 2020.

Three 25 meter transects were randomly placed on the pad with 50 sample points on each transect for a total of 150 points for cover data. Ten one-meter square density quadrants were placed along each transect for a total of 30 quadrants. Data collected from this site include vegetative foliar and basal cover, species composition, forb and shrub densities and ground cover all summarized by plant group. In addition, ground cover data was collected for dead vegetative litter, bare ground, and surface rock.

The 2020 data in the Table 9 is summarized from data presented in Appendix Table E1. Each plant species encountered at this site is listed in Table E1. As shown in Table E1 there is a good representation of the seeded species established on the site.

Table 9 - Reclaimed Corehole Pad G
Vegetation Cover, Species Composition, Species Density & Ground Cover

	Line-Point Canopy Intercept Data [1]				Density Data [2]
Plant Group	**Number of Species**	**% Foliar Cover**	**% Basal Cover**	**Species Composition**	**Desirable Forb/Shrub Density (#/m²)**
Perennial Grasses	9	43.4	7.4	78.18	n/a
Invasive Non-Native Grasses	1	1.3	0.0	2.30	n/a
Desirable Forbs	11	2.7	0.0	5.75	2.47
Invasive and Non-Native Forbs	2	4.7	0.0	9.17	n/a
Shrubs	6	2.7	0.0	4.60	0.67
Vegetation Totals	**29**	**54.8**	**7.4**	**100.00**	**3.14**

Line-Point Intercept Soil Surface Cover Data [3]						
Percent Cover by Type	**Bare Ground**	**Biotic Crust**	**Herbaceous Litter**	**Woody Litter**	**Duff**	**Rock**
	19.3	**0.0**	**52.7**	**2.7**	**0.0**	**0.0**

[1] Sum of data from 3 randomly placed 25 meter transects with 50 sample points collected from each transect. Foliar cover based upon 1st plant species encountered in the canopy at each sample point. Species composition based upon total of all plant species encountered at each sample point.
[2] Sum of density data collected from ten 1-meter square quadrants along each transect. Only desirable forb and shrub densities were recorded based upon reclamation criteria.

[3] Percentages are not cumulative with vegetation totals, rather a measure by layer of ground cover from the top layer thru the lower layers to the soil surface. Values for bare ground have no vegetative, litter or rock cover above the soil surface.

A visual inspection of the short access route to the pad site was also conducted with a photograph taken which represent the plant community established on the route. The same seed mix used on the pad was also used on the access route. All the plant species encountered on the pad site were also present on the access route.

The foliar cover of desirable species on the site was 84 percent of that measured on the reference areas. The cover of perennial grasses was 6 percent greater; the cover of desirable forbs was 38 percent lower and shrub cover was only 21 percent of that on the reference areas. The species composition of desirable species was only 92 percent of that on the reference areas. The composition of perennial grasses was 12 percent greater, desirable forbs was 38 percent greater and shrubs was 26 percent lower.

The density of desirable forbs on the site was only 42 percent of that on reference areas. The density of shrubs on the site was only 37 percent of that on reference areas.

The amount of bare ground on the reference areas was 36 percent greater than that measured on this site. The amount of herbaceous litter on this site was 34 percent greater than that on the reference areas. The canopy gaps between perennial species measured on the site were 41 percent larger than that measured on the reference areas.

Both the pad site and the access route to the pad have productive established plant communities which have good representation of the perennial species used in the seed mix with good distribution of those species across both. The cover and composition of the of the species on the route appeared comparable to that on the pad site.

Table 10 is a comparison of the data collected for exploration corehole pad G with that from the rolling loam rangeland reference area. Only the data required to access the success of achieving successful reclamation is used in Table 10.

Table 10 – Comparison of Reclamation Criteria Elements with Native Rangeland Reference Areas

Site	# desired plant species	% desired foliar cover	% bare ground	shrub density (#/m^2)	forb density (#/m^2)
Corehole Pad G	26 species	48.8	19.3	0.67	2.47
Reference Area [1]	30 species	58.00	30.0	1.80	5.90

[1] *The average of six native rangelands reference areas were used as the base for evaluating success of the reclamation criteria.*

Evaluation of successful reclamation of the disturbance on Corehole Pad G:

- There are 26 desirable plant species established on the site (9 perennial grasses, 11 desirable forbs, and 6 shrubs) meeting the requirement of at least five plant species.
- Slender wheatgrass (*Elymus trachycaulus*) was the desired species with the greatest relative cover at 15.3 percent meeting the requirement that no one species can exceed 70 percent relative cover.

- The foliar cover of desirable species on the site was 84 percent of that on the native rangeland reference areas meeting the requirement of 80 percent similarity.
- The amount of unprotected bare ground on the site was 36 percent less than on the native rangeland reference areas which equates to 136 percent similarity, meeting the required 80 percent similarity.
- The density of forbs and shrubs on the site in comparison with the native rangeland reference areas was 42 percent and 37 percent, respectively. The criteria only require either forb density or shrub density meet the requirement of 80 percent similarity. Neither desirable forbs nor shrub densities have met the requirement of 80 percent similarity.

The plant community does meet the criteria for species diversity, desired foliar cover, and bare ground, but does not meet the desirable forb density nor shrub density criteria for successful reclamation of the disturbance at the site.

Corehole Pad IRI-2

Vegetation sampling data was collected on August 4, 2020. The reclaimed area at this site is a narrow strip alongside the access road to a TEP gas well to the west. It is likely the access road was upgraded and may have taken out some of the reclaimed portion of original site. The reclaimed portion of this site has a good cover of perennial species that have stabilized the disturbance.

The remining reclaimed portion of the site only had sufficient area for one vegetation transect. Data was collected from one 25 meter transect randomly placed with 50 sample points for cover data. Ten one-meter square density quadrants were placed along the transect. Data collected from this site include vegetative foliar and basal cover, species composition, forb and shrub densities and ground cover all summarized by plant group. In addition, ground cover data was collected for dead vegetative litter, bare ground, and surface rock.

The 2020 data in the Table 11 is summarized from data presented in Appendix Table F1. Each plant species encountered at this site is listed in Table F1. As shown in Table F1 there is a good representation of the seeded species established on the site.

Table 11 - Reclaimed Corehole Pad IRI-2
Vegetation Cover, Species Composition, Species Density & Ground Cover

	Line-Point Canopy Intercept Data [1]				Density Data [2]
Plant Group	**Number of Species**	**% Foliar Cover**	**% Basal Cover**	**Species Composition**	**Desirable Forb/Shrub Density (#/m²)**
Perennial Grasses	6	48.0	6.0	71.5	n/a
Invasive Non-Native Grasses	1	10.0	0.0	14.1	n/a
Desirable Forbs	6	2.0	0.0	5.8	2.10
Invasive and Non-Native Forbs	0	0.0	0.0	0.0	n/a
Shrubs	3	6.0	0.0	8.6	2.30
Vegetation Totals	**16**	**66.0**	**6.0**	**100.0**	**4.40**

Line-Point Intercept Soil Surface Cover Data [3]						
	Bare Ground	**Biotic Crust**	**Herbaceous Litter**	**Woody Litter**	**Duff**	**Rock**

Percent Cover by Type	**22.0**	**0.0**	**40.0**	**6.0**	**0.0**	**0.0**

[1] Sum of data from 1 randomly placed 25 meter transect with 50 sample points collected. Foliar cover based upon 1st plant species encountered in the canopy at each sample point. Species composition based upon total of all plant species encountered at each sample point.
[2] Sum of density data collected from ten 1-meter square quadrants along the transect. Only desirable forb and shrub densities were recorded based upon reclamation criteria.
[3] Percentages are not cumulative with vegetation totals, rather a measure by layer of ground cover from the top layer thru the lower layers to the soil surface. Values for bare ground have no vegetative, litter or rock cover above the soil surface.

The foliar cover of desirable species on the site was 96 percent of that measured on the reference areas. The cover of perennial grasses was 17 percent greater; the cover of desirable forbs was only 46 percent and shrub cover was only 47 percent of that on the reference areas. The species composition of desirable species was only 89 percent of that on the reference areas. The composition of perennial grasses was 3 percent greater, desirable forbs was 38 percent lower and shrubs was 52 percent lower.

The density of desirable forbs on the site was only 36 percent of that on reference areas. The density of shrubs on the site was 28 percent greater than that on reference areas.

The amount of bare ground on the reference areas was 27 percent greater than that measured on this site. The amount of herbaceous litter on this site was 2 percent greater than that on the reference areas. The canopy gaps between perennial species measured on the site were 3 percent larger than that measured on the reference areas.

The site has a productive established plant community which has good representation of the perennial species used in the seed mix with good distribution of those species across the site. The plant community has adequately stabilized the site.

Table 12 is a comparison of the data collected for exploration corehole pad H with that from the rolling loam rangeland reference area. Only the data required to access the success of achieving successful reclamation is used in Table 12.

Table 12 – Comparison of Reclamation Criteria Elements with Native Rangeland Reference Areas

Site	# desired plant species	% desired foliar cover	% bare ground	shrub density (#/m^2)	forb density (#/m^2)
Corehole IRI-2	15 species	56.0	22.0	2.30	2.10
Reference Area [1]	30 species	58.00	30.0	1.80	5.90

[1] *The average of six native rangelands reference areas were used as the base for evaluating success of the reclamation criteria.*

Evaluation of successful reclamation of the disturbance on Corehole Pad IRI-2

- There are 15 desirable plant species established on the site (6 perennial grasses, 6 desirable forbs, and 3 shrubs) meeting the requirement of at least five plant species.
- Russian wildrye (*Psathyrostachys juncea*) was the desired species with the greatest relative cover at 28 percent meeting the requirement that no one species can exceed 70 percent relative cover.

- The foliar cover of desirable species on the site was 96 percent of that on the native rangeland reference areas meeting the requirement of 80 percent similarity.
- The amount of unprotected bare ground on the site was 27 percent less than on the native rangeland reference areas which equates to 127 percent similarity, meeting the required 80 percent similarity.
- The density of forbs and shrubs on the site in comparison with the native rangeland reference areas was 36 percent and 128 percent, respectively. The criteria only require either forb density or shrub density meet the requirement of 80 percent similarity. The density of shrubs exceeds the required criteria.

The plant community does meet the criteria of species diversity, desired foliar cover, desirable shrub density and bare ground for successful reclamation of the disturbance at the site.

Corehole Pad IRI-3, MW-1, PW-1, PW-2

This site includes corehole pads MW-1, PW-1, PW-2, and IRI-3. All 4 sites are in the same area and were reclaimed the in 2015 with final reclamation of approximately 0.72 acres. The sites have a good cover of perennial species distributed across the site which has stabilized the site.

Vegetation sampling data was collected on July 29, 2020. Three 25 meter transects were randomly placed on the site with 50 sample points on each transect for a total of 150 points for cover data. Ten one-meter square density quadrants were placed along each transect for a total of 30 quadrants. Data collected from this site include vegetative foliar and basal cover, species composition, forb and shrub densities and ground cover all summarized by plant group. In addition, ground cover data was collected for dead vegetative litter, bare ground, and surface rock.

The 2020 data in the Table 13 is summarized from data presented in Appendix Table G1. Each plant species encountered at this site is listed in Table G1. As shown in Table G1 there is a good representation of the seeded species established on the site.

Table 13 - Reclaimed Corehole Pad IRI-3, MW-1, PW-1 and PW-2
Vegetation Cover, Species Composition, Species Density & Ground Cover

	Line-Point Canopy Intercept Data [1]				Density Data [2]
Plant Group	Number of Species	% Foliar Cover	% Basal Cover	Species Composition	Desirable Forb/Shrub Density (#/m^2)
Perennial Grasses	9	54.8	7.4	91.27	n/a
Invasive Non-Native Grasses	1	2.0	0.0	3.30	n/a
Desirable Forbs	4	0.0	0.0	0.0	0.90
Invasive and Non-Native Forbs	1	0.0	0.0	0.0	n/a
Shrubs	4	2.6	0.0	5.43	0.87
Vegetation Totals	**19**	**59.4**	**7.4**	**100.0**	**1.77**

Line-Point Intercept Soil Surface Cover Data [3]						
Percent Cover by Type	Bare Ground	Biotic Crust	Herbaceous Litter	Woody Litter	Duff	Rock
	24.0	**0.0**	**52.0**	**0.0**	**0.0**	**0.0**

[1] Sum of data from 3 randomly placed 25 meter transects with 50 sample points collected from each transect. Foliar cover based upon 1st plant species encountered in the canopy at each sample point. Species composition based upon total of all plant species encountered at each sample point.
[2] Sum of density data collected from ten 1-meter square quadrants along each transect. Only desirable forb and shrub densities were recorded based upon reclamation criteria.
[3] Percentages are not cumulative with vegetation totals, rather a measure by layer of ground cover from the top layer thru the lower layers to the soil surface. Values for bare ground have no vegetative, litter or rock cover above the soil surface.

The foliar cover of desirable species on the site was 99 percent of that measured on the reference areas. The cover of perennial grasses was 34 percent greater; there was zero cover of desirable forbs and shrub cover was only 21 percent of that on the reference areas. The species composition of desirable species was 100 percent of that on the reference areas. The composition of perennial grasses was 31 percent greater and shrub composition was 31 percent lower. There was zero composition of desirable forbs measured on the site.

The density of desirable forbs on the site was only 15 percent of that on reference areas. The density of shrubs on the site was 48 percent greater than that on reference areas.

The amount of bare ground on the reference areas was 20 percent greater than that measured on this site. The amount of herbaceous litter on this site was 32 percent greater than that on the reference areas. The canopy gaps between perennial species measured on the site were 8 percent larger than that measured on the reference areas.

The site has a productive established plant community which has good representation of the perennial species used in the seed mix with good distribution of those species across the site. The plant community has adequately stabilized the site.

Table 14 is a comparison of the data collected for exploration corehole pad IRI-3, MW-1, PW-1 and PW-2 with that from the rolling loam rangeland reference area. Only the data required to access the success of achieving successful reclamation is used in Table 14.

Table 14 – Comparison of Reclamation Criteria Elements with Native Rangeland Reference Areas

Site	# desired plant species	% desired foliar cover	% bare ground	shrub density (#/m^2)	forb density (#/m^2)
Corehole IRI-3, MW-1, PW-1 and PW-2	17 species	57.4	24.0	0.87	0.90
Reference Area [1]	30 species	58.00	30.0	1.80	5.90

[1] *The average of six native rangelands reference areas were used as the base for evaluating success of the reclamation criteria.*

Evaluation of successful reclamation of the disturbance on Corehole Pad IRI-3, MW-1, PW-1 and PW-2:

- There are 17 desirable plant species established on the site (9 perennial grasses, 4 desirable forbs, and 4 shrubs) meeting the requirement of at least five plant species.
- Russian wildrye (*Psathyrostachys juncea*) was the desired species with the greatest relative cover at 23.3 percent meeting the requirement that no one species can exceed 70 percent relative cover.
- The foliar cover of desirable species on the site was 99 percent of that on the native rangeland reference areas meeting the requirement of 80 percent similarity.

- The amount of unprotected bare ground on the site was 20 percent less than on the native rangeland reference areas which equates to 120 percent similarity, meeting the required 80 percent similarity.
- The density of forbs and shrubs on the site in comparison with the native rangeland reference areas was 15 percent and 48 percent, respectively. The criteria only require either forb density or shrub density meet the requirement of 80 percent similarity. Neither desirable forbs nor shrub densities have met the requirement of 80 percent similarity.

The plant community does meet the criteria of species diversity, desired foliar cover, and bare ground but does not meet the criteria desirable forb density nor shrub density for successful reclamation of the disturbance at the site.

Corehole Pad IRI-10

Vegetation sampling data was collected on July 28, 2020. Three 25 meter transects were randomly placed on the pad with 50 sample points on each transect for a total of 150 points for cover data. Ten one-meter square density quadrants were placed along each transect for a total of 30 quadrants. Data collected from this site include vegetative foliar and basal cover, species composition, forb and shrub densities and ground cover all summarized by plant group. In addition, ground cover data was collected for dead vegetative litter, bare ground, and surface rock.

The 2020 data in the Table 15 is summarized from data presented in Appendix Table H1. Each plant species encountered at this site is listed in Table H1. As shown in Table H1 there is a good representation of the seeded species established on the site.

Table 15 - Reclaimed Corehole Pad IRI-10
Vegetation Cover, Species Composition, Species Density & Ground Cover

	Line-Point Canopy Intercept Data [1]				Density Data [2]
Plant Group	**Number of Species**	**% Foliar Cover**	**% Basal Cover**	**Species Composition**	**Desirable Forb/Shrub Density (#/m²)**
Perennial Grasses	4	36.1	4.7	77.33	n/a
Invasive Non-Native Grasses	0	0	0	0	n/a
Desirable Forbs	9	1.3	0	4.00	4.27
Invasive and Non-Native Forbs	0	0	0	0	n/a
Shrubs	4	8.7	0.7	18.67	3.73
Vegetation Totals	**17**	**46.1**	**5.4**	**100.0**	**8.00**

Line-Point Intercept Soil Surface Cover Data [3]						
Percent Cover by Type	**Bare Ground**	**Biotic Crust**	**Herbaceous Litter**	**Woody Litter**	**Duff**	**Rock**
	39.3	**0.0**	**34.0**	**2.0**	**0.0**	**2.7**

[1] Sum of data from 3 randomly placed 25 meter transects with 50 sample points collected from each transect. Foliar cover based upon 1st plant species encountered in the canopy at each sample point. Species composition based upon total of all plant species encountered at each sample point.
[2] Sum of density data collected from ten 1-meter square quadrants along each transect. Only desirable forb and shrub densities were recorded based upon reclamation criteria.
[3] Percentages are not cumulative with vegetation totals, rather a measure by layer of ground cover from the top layer thru the lower layers to the soil surface. Values for bare ground have no vegetative, litter or rock cover above the soil surface.

About one-half mile access road has been seeded same seed mix used on the pad. A visual inspection of the reclaimed access route to the pad site was conducted with photographs taken at points which represent the plant community established on the route. The same seed mix, mostly perennial grasses, used on the pad was also used on the access route.

The foliar cover of desirable species on the site was 79 percent of that measured on the reference areas. The cover of perennial grasses was 12 percent lower; the cover of desirable forbs was 30 percent less and shrub cover was 69 percent less than that on the reference areas. The species composition of desirable species was 3 percent greater than that on the reference areas. The composition of perennial grasses was 11 percent greater, desirable forbs was 43 percent lower and shrubs was 5 percent greater than that on the reference areas.

The density of desirable forbs on the site was 72 percent of that on reference areas. The density of shrubs on the site was 52 percent greater than that on reference areas. Nearly all the density of both desirable forbs and shrubs came from species not seeded on the site but from seed sources in either the topsoil or from adjacent plants.

The amount of bare ground measured on this site was 31 percent greater than that on the reference areas. The amount of herbaceous litter was 13 percent lower than that on the reference areas. The canopy gaps between perennial species measured on this site were 19 percent larger than that measured on the reference areas.

Table 16 is a comparison of the data collected for corehole pad IRI-10 with that from the rolling loam rangeland reference area. Only the data required to access the success of achieving successful reclamation is used in Table 16.

Table 16 – Comparison of Reclamation Criteria Elements with Native Rangeland Reference Areas

Site	# desired plant species	% desired foliar cover	% bare ground	shrub density (#/m^2)	forb density (#/m^2)
Corehole IRI-10	17 species	46.1	39.3	3.73	4.27
Reference Area [1]	30 species	58.00	30.0	1.80	5.90

[1] The average of six native rangelands reference areas were used as the base for evaluating success of the reclamation criteria.

Evaluation of successful reclamation of the disturbance on Corehole IRI-10

- There are 17 desirable plant species established on the site (4 perennial grasses, 9 desirable forbs, and 4 shrubs) meeting the requirement of at least five plant species.
- Crested wheatgrass (*Agropyron cristatum*) was the desired species with the greatest relative cover at 26.7 percent meeting the requirement that no one species can exceed 70 percent relative cover.
- The foliar cover of desirable species on the site was 79 percent of that on the native rangeland reference areas nearly meeting the requirement of 80 percent similarity.
- The amount of unprotected bare ground on the site was 69 percent of that on the native rangeland reference areas not meeting the required 80 percent similarity.
- The density of forbs on the site was 72 percent of that on native rangeland reference areas not meeting the requirement of 80 percent similarity. The shrub density was 201 percent greater than that on native rangeland reference areas meeting the required 80 percent similarity. The criteria

only require either forb density or shrub density meet the requirement of 80 percent similarity with the native rangeland reference areas in which the density of shrubs meets the required criteria.

The plant community does meet the criteria of species diversity and shrub density but does not meet the criteria for desired foliar cover, density of desirable forbs and bare ground. The site comes close but does not meet all the required criteria for successful reclamation of the disturbance.

Access Route to Corehole Pad Q

This is a narrow linear reclaimed access road leading to Corehole Pad Q. The route was reclaimed fall of 2014 with final reclamation of approximately 0.70 acres. Vegetation sampling data was collected on August 27, 2020. As this site was a linear disturbance, three 25 meter transects were randomly placed one near either end of the route and one near the mid-point of the route. Each transect had 50 sample points for a total of 150 points for the site for cover data. Ten one-meter square density quadrants were placed along each transect for a total of 30 quadrants. Data collected from this access route include vegetative foliar and basal cover, species composition, forb and shrub densities and ground cover all summarized by plant group. In addition, ground cover data was collected for dead vegetative litter, bare ground, and surface rock.

Photographs were taken at each transect to show the plant community present. In addition, photographs were also taken at locations between transect locations which represent the plant community established on the route.

The 2020 data in the Table 17 is summarized from data presented in Appendix Table I1. Each plant species encountered at this site is listed in Table I1. As shown in Table I1 there is a good representation of the seeded species established on the site.

Table 17 - Reclaimed Access Route to Corehole Pad Q
Vegetation Cover, Species Composition, Species Density & Ground Cover

	Line-Point Canopy Intercept Data [1]				Density Data [2]
Plant Group	**Number of Species**	**% Foliar Cover**	**% Basal Cover**	**Species Composition**	**Desirable Forb/Shrub Density (#/m^2)**
Perennial Grasses	8	32.2	6.1	53.68	n/a
Invasive Non-Native Grasses	1	6.0	0.0	11.58	n/a
Desirable Forbs	12	6.7	0.7	13.68	3.80
Invasive and Non-Native Forbs	2	4.0	0.0	8.42	n/a
Shrubs	7	6.7	0.0	12.63	1.03
Vegetation Totals	**30**	**55.6**	**6.8**	**100.0**	**4.83**

Line-Point Intercept Soil Surface Cover Data [3]						
Percent Cover by Type	**Bare Ground**	**Biotic Crust**	**Herbaceous Litter**	**Woody Litter**	**Duff**	**Rock**
	30	**0.0**	**36.0**	**6.0**	**0.0**	**0.7**

[1] Sum of data from 3 randomly placed 25 meter transects with 50 sample points collected from each transect. Foliar cover based upon 1st plant species encountered in the canopy at each sample point. Species composition based upon total of all plant species encountered at each sample point.
[2] Sum of density data collected from ten 1-meter square quadrants along each transect. Only desirable forb and shrub densities were recorded based upon reclamation criteria.

[3] Percentages are not cumulative with vegetation totals, rather a measure by layer of ground cover from the top layer thru the lower layers to the soil surface. Values for bare ground have no vegetative, litter or rock cover above the soil surface.

The foliar cover of desirable species on the site was 21 percent less than that measured on the reference areas. The cover of perennial grasses was 21 percent lower; the cover of desirable forbs was 46 percent greater and shrub cover was 47 percent less than that on the reference areas. The species composition of desirable species was 83 percent of that on the reference areas. The composition of perennial grasses was 23 percent lower, desirable forbs was 46 percent greater and shrubs was 29 percent lower.

The density of desirable forbs on the site was 64 percent of that on reference areas. The density of shrubs on the site was 57 percent of that on reference areas.

The amount of bare ground on this site was equal to that measured on the reference areas. The amount of herbaceous litter was 92 percent of that on the reference areas. The canopy gaps between perennial species measured on this site were 44 percent larger than that measured on the reference areas.

The access route has a plant community which has good representation of the perennial species used in the seed mix with good distribution of those species across the site. However, the invasive non-native species make up 10 percent of the foliar cover and 20 percent of the total species composition on the route. It appeared invasive species were not invading onto the route but rather occurred in small patches among the robust perennial species along the route. The distribution of desirable species across the route has stabilized the disturbance. The perennial species are well established providing a resilient plant community that will be difficult for invasive nonnative species to increase above their current cover and composition, especially when considering the unfavorable climatic conditions that occurred during the growing season.

Table 18 is a comparison of the data collected for exploration corehole pad Q with that from the rolling loam rangeland reference area. Only the data required to access the success of achieving successful reclamation is used in Table 18.

Table 18 – Comparison of Reclamation Criteria Elements with Native Rangeland Reference Areas

Site	# desired plant species	% desired foliar cover	% bare ground	shrub density (#/m^2)	forb density (#/m^2)
Access Route to Pad Q	27 species	45.6	30.0	1.03	3.80
Reference Area [1]	30 species	58.00	30.0	1.80	5.90

[1] *The average of six native rangelands reference areas were used as the base for evaluating success of the reclamation criteria.*

Evaluation of successful reclamation of the disturbance on Access Route to Corehole Pad Q

- There are 27 desirable plant species established on the site (8 perennial grasses, 12 desirable forbs, and 7 shrubs) meeting the requirement of at least five plant species.
- Indian ricegrass (*Achnatherum hymenoides*) was the desired species with the greatest relative cover at 16.7 percent meeting the requirement that no one species can exceed 70 percent relative cover.

- The foliar cover of desirable species on the site was 79 percent of than that on the native rangeland reference areas nearly meeting the requirement of 80 percent similarity.
- The amount of unprotected bare ground on the site was equal to that on the native rangeland reference areas which equates to 100 percent similarity, meeting the required 80 percent similarity.
- The density of forbs on the site was 64 percent of that on native rangeland reference areas not meeting the requirement of 80 percent similarity. The shrub density was 57 percent of that on native rangeland reference areas not meeting the required 80 percent similarity. The criteria only require either forb density or shrub density meet the requirement of 80 percent similarity with the native rangeland reference areas in which neither meet the required criteria.

The plant community meets only the species diversity and bare ground criteria. It does not meet the shrub or desirable forb densities nor the desired foliar cover criteria. The route does not meet successful reclamation standards required for successful reclamation.

Access Route to Corehole Pad T

This is a narrow linear reclaimed access road leading to Corehole Pad T. The route was reclaimed fall of 2014 with final reclamation of approximately 0.63 acres. Vegetation sampling data was collected on August 27, 2020. As this site was a linear disturbance, three 25 meter transects were randomly placed one near either end of the route and one near the center point of the route. Each transect had 50 sample points for a total of 150 points for the site for cover data. Ten one-meter square density quadrants were placed along each transect for a total of 30 quadrants. Data collected from this access route include vegetative foliar and basal cover, species composition, forb and shrub densities and ground cover all summarized by plant group. In addition, ground cover data was collected for dead vegetative litter, bare ground, and surface rock.

Photographs were taken at each transect to show the plant community present. In addition, photographs were also taken at locations between transect locations which represent the plant community established on the route.

The 2020 data in the Table 19 is summarized from data presented in Appendix Table J1. Each plant species encountered at this site is listed in Table J1. As shown in Table J1 there is a good representation of the seeded species established on the site.

Table 19 - Reclaimed Access Route to Corehole Pad T
Vegetation Cover, Species Composition, Species Density & Ground Cover

	Line-Point Canopy Intercept Data [1]				Density Data [2]
Plant Group	**Number of Species**	**% Foliar Cover**	**% Basal Cover**	**Species Composition**	**Desirable Forb/Shrub Density (#/m^2)**
Perennial Grasses	8	24.0	3.4	42.71	n/a
Invasive Non-Native Grasses	1	2.0	0.0	4.17	n/a
Desirable Forbs	9	10.7	0.7	20.83	8.37
Invasive and Non-Native Forbs	1	1.3	0.0	2.08	n/a
Shrubs	6	18.7	0.0	30.21	1.67
Vegetation Totals	**25**	**56.7**	**4.1**	**100.00**	**10.04**
Line-Point Intercept Soil Surface Cover Data [3]					

Percent Cover by Type	Bare Ground	Biotic Crust	Herbaceous Litter	Woody Litter	Duff	Rock
	35.3	0.0	23.3	4.0	0.0	0.7

[1] Sum of data from 3 randomly placed 25 meter transects with 50 sample points collected from each transect. Foliar cover based upon 1st plant species encountered in the canopy at each sample point. Species composition based upon total of all plant species encountered at each sample point.
[2] Sum of density data collected from ten 1-meter square quadrants along each transect. Only desirable forb and shrub densities were recorded based upon reclamation criteria.
[3] Percentages are not cumulative with vegetation totals, rather a measure by layer of ground cover from the top layer thru the lower layers to the soil surface. Values for bare ground have no vegetative, litter or rock cover above the soil surface.

The foliar cover of desirable species on the site was 92 percent of that measured on the reference areas. The cover of perennial grasses was 41 percent lower; the cover of desirable forbs was 53 percent greater and shrub cover was 52 percent greater than that on the reference areas. The species composition of desirable species was 3 percent greater than that on the reference areas. The composition of perennial grasses was 39 percent lower, desirable forbs was 123 percent greater and shrubs was 70 percent greater.

The density of desirable forbs on the site was 42 percent greater than that on reference areas. The density of shrubs on the site was 93 percent of that on reference areas.

The amount of bare ground on this site was 18 percent greater than that measured on the reference areas. The amount of herbaceous litter was 41 percent of that on the reference areas. The canopy gaps between perennial species measured on this site were 51 percent larger than that measured on the reference areas.

Table 20 is a comparison of the data collected for exploration corehole pad R with that from the rolling loam rangeland reference area. Only the data required to access the success of achieving successful reclamation is used in Table 20.

Table 20 – Comparison of Reclamation Criteria Elements with Native Rangeland Reference Areas

Site	# desired plant species	% desired foliar cover	% bare ground	shrub density (#/m^2)	forb density (#/m^2)
Access Route to Pad T	23 species	53.4	35.3	1.67	8.37
Reference Area [1]	30 species	58.00	30.0	1.80	5.90

[1] *The average of six native rangelands reference areas were used as the base for evaluating success of the reclamation criteria.*

Evaluation of successful reclamation of the disturbance on Access Route to Corehole Pad T

- There are 15 desirable plant species established on the site (8 perennial grasses, 9 desirable forbs, and 6 shrubs) meeting the requirement of at least five plant species.
- Western wheatgrass (*Pascopyrum smithii*) was the desired species with the greatest relative cover at 12.7 percent meeting the requirement that no one species can exceed 70 percent relative cover.
- The foliar cover of desirable species on the site was 92 percent of than that on the native rangeland reference areas meeting the requirement of 80 percent similarity.
- The amount of unprotected bare ground on the site was 18 percent greater than that on the native rangeland reference areas which equates to 82 percent similarity, meeting the required 80 percent similarity.

- The density of desirable forbs on the site was 42 percent greater than that on native rangeland reference areas which equates to 142 percent similarity, meeting the required 80 percent similarity. The shrub density was 93 percent of that on native rangeland reference areas meeting the required 80 percent similarity. The criteria only require either forb density or shrub density meet the requirement of 80 percent similarity with the native rangeland reference areas in which both the density of desirable forbs and the density of shrubs exceed the required criteria.

Water Supply Pipeline WSW-2

This is a narrow linear water pipeline reclaimed in 2012. Vegetation sampling data was collected on August 3, 2020. As this site was a short linear disturbance, two 25 meter transects were randomly placed near either end of the pipeline route. Each transect had 50 sample points for a total of 100 points for the site for cover data. Ten one-meter square density quadrants were placed along each transect for a total of 20 quadrants. Data collected from this waterline route include vegetative foliar and basal cover, species composition, forb and shrub densities and ground cover all summarized by plant group. In addition, ground cover data was collected for dead vegetative litter, bare ground, and surface rock.

The 2020 data in the Table 21 is summarized from data presented in Appendix Table K1. Each plant species encountered at this site is listed in Table K1. As shown in Table K1 there is a good representation of the seeded species established on the site.

Table 21 - Reclaimed Waterline WSW-2
Vegetation Cover, Species Composition, Species Density & Ground Cover

	Line-Point Canopy Intercept Data [1]				Density Data [2]
Plant Group	**Number of Species**	**% Foliar Cover**	**% Basal Cover**	**Species Composition**	**Desirable Forb/Shrub Density (#/m²)**
Perennial Grasses	7	43.0	6.0	62.9	n/a
Invasive Non-Native Grasses	1	7.0	0.0	12.9	n/a
Desirable Forbs	12	2.0	0.0	4.2	2.80
Invasive and Non-Native Forbs	2	1.0	0.0	1.4	n/a
Shrubs	5	13.0	0.0	18.6	2.30
Vegetation Totals	**27**	**66.0**	**6.0**	**100.0**	**5.10**

Line-Point Intercept Soil Surface Cover Data [3]

Percent Cover by Type	Bare Ground	Biotic Crust	Herbaceous Litter	Woody Litter	Duff	Rock
	17.0	**0.0**	**55.0**	**6.0**	**0.0**	**0.0**

[1] Sum of data from 2 randomly placed 25 meter transects with 50 sample points collected from each transect. Foliar cover based upon 1st plant species encountered in the canopy at each sample point. Species composition based upon total of all plant species encountered at each sample point.
[2] Sum of density data collected from ten 1-meter square quadrants along each transect. Only desirable forb and shrub densities were recorded based upon reclamation criteria.
[3] Percentages are not cumulative with vegetation totals, rather a measure by layer of ground cover from the top layer thru the lower layers to the soil surface. Values for bare ground have no vegetative, litter or rock cover above the soil surface.

The foliar cover of desirable species on the site was equal to that measured on the reference areas. The cover of perennial grasses was 5 percent greater; the cover of desirable forbs was 46 percent lower and shrub cover was 3 percent greater than that on the reference areas. The species composition of desirable species was 89 percent of

that on the reference areas. The composition of perennial grasses was 90 percent greater, desirable forbs was 45 percent lower and shrubs was 5 percent greater.

The density of desirable forbs on the site was 47 percent of that on reference areas. The density of shrubs on the site was 28 percent greater than that on reference areas.

The amount of bare ground on the reference areas was 43 percent greater than that measured on this site. The amount of herbaceous litter was 40 percent greater than that on the reference areas. The canopy gaps between perennial species measured on this site were 37 percent larger than that measured on the reference areas.

Table 22 is a comparison of the data collected for reclaimed waterline WSW-2 with that from the rolling loam rangeland reference area. Only the data required to access the success of achieving successful reclamation is used in Table 22.

Table 22 – Comparison of Reclamation Criteria Elements with Native Rangeland Reference Areas

Site	# desired plant species	% desired foliar cover	% bare ground	shrub density (#/m^2)	forb density (#/m^2)
Waterline WSW-2	24 species	58.0	17.0	2.30	2.80
Reference Area [1]	30 species	58.00	30.0	1.80	5.90

[1] *The average of six native rangelands reference areas were used as the base for evaluating success of the reclamation criteria.*

Evaluation of successful reclamation of the disturbance on Water Supply Pipeline WSW-2

- There are 24 desirable plant species established on the site (7 perennial grasses, 12 desirable forbs, and 5 shrubs) meeting the requirement of at least five plant species.
- Russian wildrye (*Psathyrostachys juncea*) was the desired species with the greatest relative cover at 16.0 percent meeting the requirement that no one species can exceed 70 percent relative cover.
- The foliar cover of desirable species on the site was 100 percent of than that on the native rangeland reference areas meeting the requirement of 80 percent similarity.
- The amount of unprotected bare ground on the site was 43 percent less than that on the native rangeland reference areas which equates to 143 percent similarity, meeting the required 80 percent similarity.
- The density of desirable forbs on the site was 47 percent of than that on native rangeland reference areas not meeting the required 80 percent similarity. The shrub density was 28 percent greater than that on native rangeland reference areas which equates to 128 percent similarity, meeting the required 80 percent similarity. The criteria only require either forb density or shrub density meet the requirement of 80 percent similarity with the native rangeland reference areas.

Water Supply Pipeline WSW-3

This is a narrow linear water pipeline reclaimed in 2015. Vegetation sampling data was collected on July 31 and on August 3, 2020. As this site was a short linear disturbance, two 25 meter transects were randomly placed near either end of the pipeline route. Each transect had 50 sample points for a total of 100 points for the site for cover data. Ten one-meter square density quadrants were placed along each

transect for a total of 20 quadrants. Data collected from this waterline route include vegetative foliar and basal cover, species composition, forb and shrub densities and ground cover all summarized by plant group. In addition, ground cover data was collected for dead vegetative litter, bare ground, and surface rock.

The 2020 data in the Table 23 is summarized from data presented in Appendix Table L1. Each plant species encountered at this site is listed in Table L1. As shown in Table L1 there is a good representation of the seeded species established on the site.

Table 23 - Reclaimed Waterline WSW-3
Vegetation Cover, Species Composition, Species Density & Ground Cover

	Line-Point Canopy Intercept Data [1]				Density Data [2]
Plant Group	**Number of Species**	**% Foliar Cover**	**% Basal Cover**	**Species Composition**	**Desirable Forb/Shrub Density (#/m^2)**
Perennial Grasses	9	55.0	7.0	74.7	n/a
Invasive Non-Native Grasses	1	4.0	0.0	5.7	n/a
Desirable Forbs	11	6.0	0.0	11.5	4.75
Invasive and Non-Native Forbs	0	0.0	0.0	0.0	n/a
Shrubs	4	7.0	0.0	8.1	0.45
Vegetation Totals	**25**	**72.0**	**7.0**	**100.0**	**5.20**

Line-Point Intercept Soil Surface Cover Data [3]

Percent Cover by Type	Bare Ground	Biotic Crust	Herbaceous Litter	Woody Litter	Duff	Rock
	14.0	**0.0**	**66.0**	**1.0**	**0.0**	**0.0**

[1] Sum of data from 2 randomly placed 25 meter transects with 50 sample points collected from each transect. Foliar cover based upon 1st plant species encountered in the canopy at each sample point. Species composition based upon total of all plant species encountered at each sample point.
[2] Sum of density data collected from ten 1-meter square quadrants along each transect. Only desirable forb and shrub densities were recorded based upon reclamation criteria.
[3] Percentages are not cumulative with vegetation totals, rather a measure by layer of ground cover from the top layer thru the lower layers to the soil surface. Values for bare ground have no vegetative, litter or rock cover above the soil surface.

The foliar cover of desirable species on the site was 17 percent greater than that measured on the reference areas. The cover of perennial grasses was 34 percent greater; the cover of desirable forbs was 38 percent greater and shrub cover was 3 percent greater than that on the reference areas. The species composition of desirable species was 89 percent of that on the reference areas. The composition of perennial grasses was 90 percent greater, desirable forbs was 45 percent lower and shrubs was 55 percent lower.

The density of desirable forbs on the site was 80.5 percent of that on reference areas. The density of shrubs on the site was 25 percent of that on reference areas.

The amount of bare ground on this site was 53 percent of that measured on the reference areas. The amount of herbaceous litter was 68 percent greater than that on the reference areas. The canopy gaps between perennial species measured on this site were 36 percent smaller than that measured on the reference areas.

Table 24 is a comparison of the data collected for reclaimed waterline WSW-3 with that from the rolling loam rangeland reference area. Only the data required to access the success of achieving successful reclamation is used in Table 24.

Table 24 – Comparison of Reclamation Criteria Elements with Native Rangeland Reference Areas					
Site	**# desired plant species**	**% desired foliar cover**	**% bare ground**	**shrub density (#/m^2)**	**forb density (#/m^2)**
Waterline WSW-3	24 species	68.0	14.0	0.45	4.75
Reference Area [1]	30 species	58.00	30.0	1.80	5.90
[1] *The average of six native rangelands reference areas were used as the base for evaluating success of the reclamation criteria.*					

Evaluation of successful reclamation of the disturbance on Water Supply Pipeline WSW-3

- There are 24 desirable plant species established on the site (9 perennial grasses, 11 desirable forbs, and 4 shrubs) meeting the requirement of at least five plant species.
- Slender wheatgrass (*Elymus trachycaulus*) was the desired species with the greatest relative cover at 20.0 percent meeting the requirement that no one species can exceed 70 percent relative cover.
- The foliar cover of desirable species on the site was 17 percent greater than that on the native rangeland reference areas which equates to 117 percent similarity, meeting the requirement of 80 percent similarity.
- The amount of unprotected bare ground on the site was 53 percent lower than that on the native rangeland reference areas which equates to 153 percent similarity, meeting the required 80 percent similarity.
- The density of desirable forbs on the site was 80.5 percent of that on native rangeland reference areas meeting the required 80 percent similarity. The shrub density was 25 percent of that on native rangeland reference areas not meeting the required 80 percent similarity. The criteria only require either forb density or shrub density meet the requirement of 80 percent similarity with the native rangeland reference areas in which the density of desirable forbs met the required criteria.

This site has a very productive plant community with good distribution of perennial species across the site which has adequately stabilized the site. The plant community does meet the criteria for species diversity, desired foliar cover, density for desirable forbs and bare ground but not shrub density. The plant community on the site does meets the criteria. for successful reclamation of the disturbance at this site.

Water Supply Pipeline WSW-4

The waterline disturbance is a narrow strip about 2500 feet long reclaimed in 2015. The disturbance has been stabilized by the perennial species seeded on the site as well as those that have colonized the site from adjacent undisturbed.

Vegetation sampling data was collected on July 31 and on August 3, 2020. As this site was a linear disturbance, three 25 meter transects were randomly placed one each near either end and one near mid-point of the pipeline route. Each transect had 50 sample points for a total of 150 points for the site for cover data. Ten one-meter square density quadrants were placed along each transect for a total of 30 quadrants. Data collected from this waterline route include vegetative foliar and basal cover, species composition, forb and shrub densities and ground cover all summarized by plant group. In addition, ground cover data was collected for dead vegetative litter, bare ground, and surface rock.

The 2020 data in the Table 25 is summarized from data presented in Appendix Table K1. Each plant species encountered at this site is listed in Table K1. As shown in Table K1 there is a good representation of the seeded species established on the site.

Table 25 - Reclaimed Waterline WSW-4
Vegetation Cover, Species Composition, Species Density & Ground Cover

	Line-Point Canopy Intercept Data [1]				Density Data [2]
Plant Group	Number of Species	% Foliar Cover	% Basal Cover	Species Composition	Desirable Forb/Shrub Density (#/m^2)
Perennial Grasses	10	57.5	8.8	90.0	n/a
Invasive Non-Native Grasses	1	0.7	0.0	1.0	n/a
Desirable Forbs	12	2.7	0.7	5.0	4.83
Invasive and Non-Native Forbs	1	0.0	0.0	0.0	n/a
Shrubs	4	2.7	0.0	4.0	0.87
Vegetation Totals	**28**	**63.6**	**9.5**	**100.0**	**5.70**

Line-Point Intercept Soil Surface Cover Data [3]

Percent Cover by Type	Bare Ground	Biotic Crust	Herbaceous Litter	Woody Litter	Duff	Rock
	22.7	**0.0**	**46.0**	**1.3**	**0.0**	**0.0**

[1] Sum of data from 3 randomly placed 25 meter transects with 50 sample points collected from each transect. Foliar cover based upon 1st plant species encountered in the canopy at each sample point. Species composition based upon total of all plant species encountered at each sample point.
[2] Sum of density data collected from ten 1-meter square quadrants along each transect. Only desirable forb and shrub densities were recorded based upon reclamation criteria.
[3] Percentages are not cumulative with vegetation totals, rather a measure by layer of ground cover from the top layer thru the lower layers to the soil surface. Values for bare ground have no vegetative, litter or rock cover above the soil surface.

The foliar cover of desirable species on the site was 8 percent greater than that measured on the reference areas. The cover of perennial grasses was 40 percent greater; the cover of desirable forbs was 62 percent of that on reference areas, and shrub cover was 21 percent of that on the reference areas. The species composition of desirable species was 2 percent greater than that on the reference areas. The composition of perennial grasses was 29 percent greater, desirable forbs was 46 percent lower and shrubs was 77 percent lower.

The density of desirable forbs on the site was 82 percent of that on reference areas. The density of shrubs on the site was 48 percent of that on reference areas.

The amount of bare ground on this site was 24 percent greater than that measured on the reference areas. The amount of herbaceous litter was 17 percent greater than that on the reference areas. The canopy gaps between perennial species measured on this site were 4 percent larger than that measured on the reference areas.

The plant community established on this site has a good representation of the perennial species used in the seed mix. The perennial grasses are well established providing a resilient plant community that has been difficult for desirable forbs and shrubs to compete and increase in cover and density.

Table 26 is a comparison of the data collected for reclaimed waterline WSW-4 with that from the rolling loam rangeland reference area. Only the data required to access the success of achieving successful reclamation is used in Table 26.

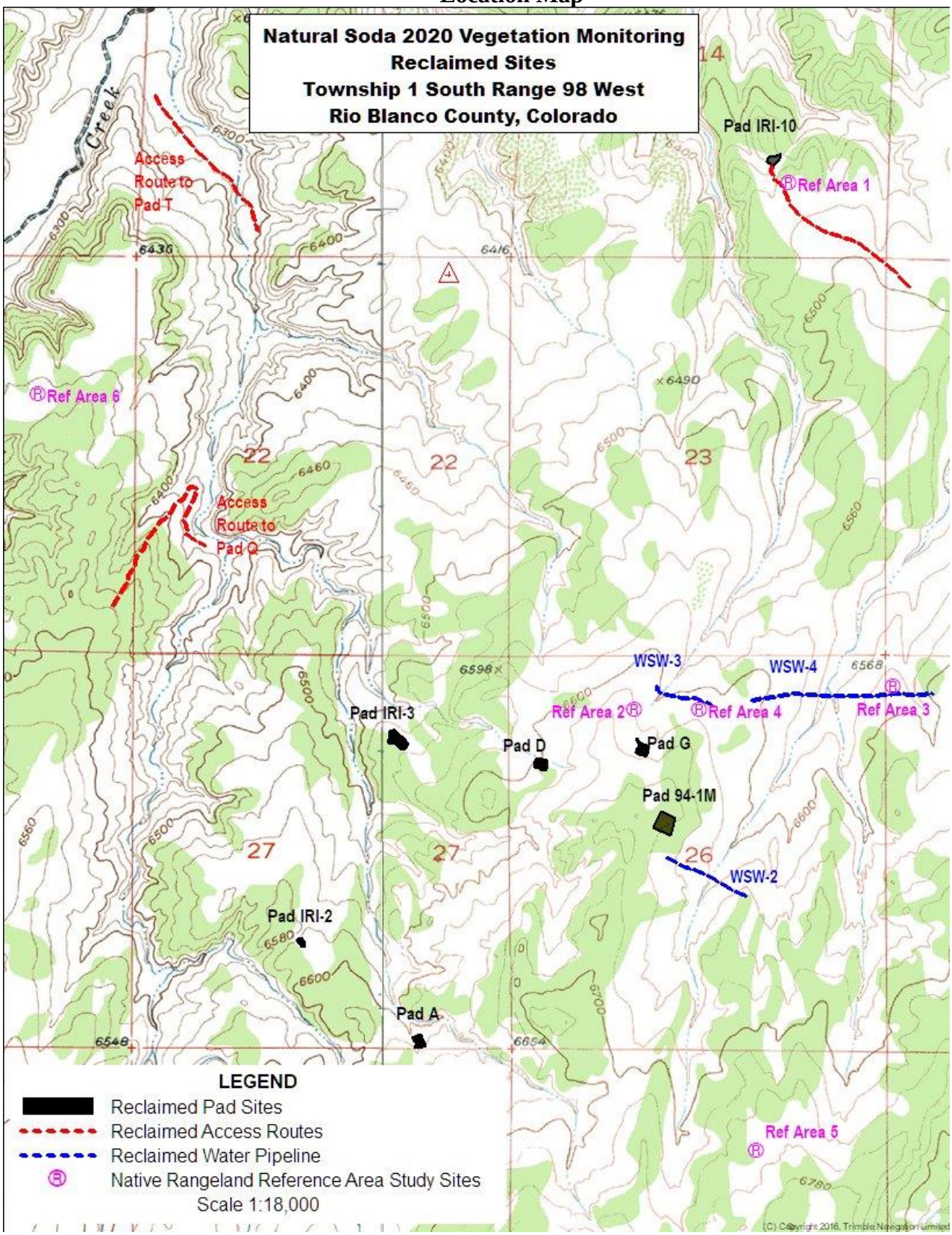
Table 26 – Comparison of Reclamation Criteria Elements with Native Rangeland Reference Areas					
Site	**# desired plant species**	**% desired foliar cover**	**% bare ground**	**shrub density (#/m^2)**	**forb density (#/m^2)**
Waterline WSW-4	26 species	62.9	22.7	0.87	4.83
Reference Area [1]	30 species	58.00	30.0	1.80	5.90
[1] *The average of six native rangelands reference areas were used as the base for evaluating success of the reclamation criteria.*					

Evaluation of successful reclamation of the disturbance on Water Supply Pipeline WSW-4

- There are 26 desirable plant species established on the site (10 perennial grasses, 12 desirable forbs, and 4 shrubs) meeting the requirement of at least five plant species.
- Slender wheatgrass (*Elymus trachycaulus*) was the desired species with the greatest relative cover at 18.7 percent meeting the requirement that no one species can exceed 70 percent relative cover.
- The foliar cover of desirable species on the site was 8 percent greater than that on the native rangeland reference areas which equates to 108 percent similarity, meeting the requirement of 80 percent similarity.
- The amount of unprotected bare ground on the site was 24 percent lower than that on the native rangeland reference areas which equates to 124 percent similarity, meeting the required 80 percent similarity.
- The density of desirable forbs on the site was 82 percent of that on native rangeland reference areas meeting the required 80 percent similarity. The shrub density was 48 percent of that on native rangeland reference areas not meeting the required 80 percent similarity. The criteria only require either forb density or shrub density meet the requirement of 80 percent similarity with the native rangeland reference areas in which the density of desirable forbs met the required criteria.

This site has a very productive plant community with good distribution of perennial species across the site which has adequately stabilized the site. The plant community does meet the criteria for species diversity, desired foliar cover, density of desirable forbs and bare ground but not shrub density. The plant community on this site has met the criteria for successful reclamation of the disturbance at this site.

Location Map



Appendix A – Vegetation Sampling Data Native Rangeland Reference Areas

Table A1 - Vegetation Cover, Species Composition, Species Density & Ground Cover Rolling Loam Native Rangeland Reference Area						
Plant Species Observed within Study Area			**Line-Point Canopy Intercept Data [1]**			**Density Data [2]**
Species Symbol	**Scientific Name**	**Common Name**	**% Foliar Cover**	**% Basal Cover**	**Species Composition**	
ACHY	*Achnatherum hymenoides*	Indian ricegrass	0.33	0.33	0.93	
BOGR2	*Bouteloua gracilis*	blue grama	0.33	0.33	0.47	
HECO26	*Hesperostipa comata*	needle & thread needlegrass	27.33	5.00	43.93	
KOMA	*Koeleria macrantha*	prairie junegrass	3.33	0.00	6.08	
PASM	*Pascopyrum smithii*	western wheatgrass	8.00	0.67	13.55	**Desirable Forb/Shrub Density (#/m^2)**
POSE	*Poa secunda*	Sandberg bluegrass	1.67	0.33	4.67	
		Perennial Grass Totals	**41.00**	**6.6**	**69.63**	
ASCO12	*Astragalus convallarius*	lesser-rushy mlkvetch	0.67	0.00	0.93	0.03
CAFI	*Carex filifolia*	threadleaf sedge	1.33	0.00	1.87	0.00
CALI4	*Castilleja linariifolia*	Wyoming Indian paintbrush	0.00	0.00	0.00	0.00
COUM	*Comandra umbellata*	bastard toadflax	0.00	0.00	0.00	0.03
CRAC	*Crepis acuminata*	longleaf hawksbeard	0.00	0.00	0.00	0.07
CRFL6	*Cryptantha flavoculata*	roughseed cryptanth	0.00	0.00	0.00	0.12
ERAL	*Eriogonum alatum*	winged buckwheat	0.00	0.00	0.00	0.10
EREA	*Erigeron eatonii*	Eaton's fleabane	1.00	0.33	1.87	0.67
HEBO	*Hedysarum boreale*	Utah sweetvetch	0.00	0.00	0.46	0.25
LEER	*Leucelene ericoides*	heath aster	0.00	0.00	0.00	0.13
LUAR3	*Lupinus argenteus*	silvery lupine	0.00	0.00	0.00	0.02
MAGR2	*Machaeranthera grindelioides*	rayless tansyaster	0.00	0.00	0.00	0.90
OPPO	*Opuntia polyacantha*	plains pricklypear cactus	0.00	0.00	0.00	0.07
PAMU11	*Pakera multilobata*	lobeleaf groundsel	0.00	0.00	0.47	0.05
PEFRF5	*Penstemon fremontii var. fremontii*	Fremont beardtongue	0.00	0.00	0.00	0.05
PHHO	*Phlox hoodii*	Hood's phlox	0.67	0.00	1.87	0.97
PHLO2	*Phlox longifolia*	longleaf phlox	0.00	0.00	0.00	0.22
SPCO	*Sphaeralcea coccinea*	scarlet globemallow	0.67	0.00	1.87	2.22
		Perennial Forb Totals	**4.34**	**0.33**	**9.34**	**5.90**
ARTRW	*Artemisia tridentata var. wyomingensis*	Wyoming big sagebrush	11.33	0.33	15.89	1.00
CHVI8	*Chrysothamnus viscidiflorus*	yellow rabbitbrush	0.33	0.00	0.47	0.07
GUSA2	*Gutierrezia sarothrae*	broom snakeweed	1.00	0.00	1.40	0.66
JUOS	*Juniperus osteosperma*	Utah juniper	0.00	0.00	0.00	0.03
SAVE4	*Sarcobatus vermiculatus*	greasewood	0.00	0.00	0.00	0.02
TECA2	*Tetradymia canescens*	spineless horsebrush	0.00	0.00	0.00	0.02
		Shrub Totals	**12.67**	**0.33**	**17.76**	**1.80**
ALDE	*Alyssum desertorum*	desert madwort	0.5	0.0	0.67	
BRTE	*Bromus tectorum*	cheatgrass	1.0	0.0	1.34	
LECA5	*Lepidium campestre*	field pepperweed	0.0	0.0	0.67	
		Totals for Invasive and Non-Native Species	**2.33**	**0.00**	**3.27**	
		Vegetation Totals	**60.34**	**7.32**	**100.00**	**7.70**

[1] Sum of data from 6 randomly placed transects with 50 sample points collected from each transect. Foliar cover based upon 1st plant species encountered in the canopy at each sample point. Species composition based upon total of all plant species encountered at each sample point.

[2] Sum of density data collected from 10 one square meter quadrants along each transect. Only desirable forb and shrub densities were recorded based upon reclamation criteria.

[3] Plant species not encountered in sampling data but were present within the study area.

[4] Percentages are not cumulative with vegetation totals, rather a measure by layer of ground cover from the top layer thru the lower layers to the soil surface. Values for bare ground have no vegetative, litter or rock cover above the soil surface.

Percent Ground Cover by Cover Type [4]	
Bare Ground	**30.0**
Biotic Crust	**0.3**
Herbaceous Litter	**39.3**
Woody Litter	**1.3**
Duff	**0.0**
Rock	**0.0**

Table A2 - Canopy Gap Intercept Data Rolling Loam Native Rangeland Reference Area										
Canopy Gaps > 20 centimeters	**Total of Gaps > 20 cm**		**Gaps 21-50 cm**		**Gaps 51-100 cm**		**Gaps 101-200 cm**		**Gaps >200 cm**	
	2019	**2020**	**2019**	**2020**	**2019**	**2020**	**2019**	**2020**	**2019**	**2020**
Transect 1	987	991	641	452	346	317	0	222	0	0
Transect 2	1227	628	1008	224	219	404	0	0	0	0
Transect 3	684	629	629	498	55	131	0	0	0	0
Transect 4	1066	317	453	222	309	95	304	0	0	0
Transect 5	------	434	------	383	------	51	------	0	------	0
Transect 6	------	1043	------	445	------	308	------	290	------	0
Total Gaps (cm)	**3964**	**4042**	**2731**	**2224**	**929**	**1306**	**304**	**512**	**0**	**0**
% Line in Gaps	**26.43**	**26.95**	**18.21**	**14.83**	**6.19**	**8.71**	**2.03**	**3.41**	**0.00**	**0.00**
Two additional sites were added in 2020. Line length for each transect was 25 meters for site total length of 150 meters										

Table A3 - Transect Coordinate Locations Native Rangeland Reference Areas (Datum: UTM Zone 12, WGS 84)						
Site	**Azimuth from starting point (true N)**	**Transect Starting Point**		**Transect Ending Point**		**Length**
		Northing (mN)	**Easting (mE)**	**Northing (mN)**	**Easting (mE)**	
Transect 1	041º	4426561.175	725828.067	4426583.646	725840.2258	25 meters
Transect 2	001º	4424382.978	725271.1349	4424408.044	725269.6242	25 meters
Transect 3	298º	4424519.791	726355.9903	4424533.961	726331.7934	25 meters
Transect 4	177º	4424414.542	725534.3897	4424389.028	725535.7435	25 meters
Transect 5	348º	4422593.913	725829.9349	4422617.767	725825.0366	25 meters
Transect 6	234º	4425628.318	722779.6581	4425609.182	722759.7811	25 meters

Transect Photos Native Rangeland Reference Areas

Figure A1 Rolling Loam Rangeland Reference Area Transect #1

Figure A2 Rolling Loam Rangeland Reference Area Transect #2

Figure A3 Rolling Loam Rangeland Reference Area Transect #3

Figure A4 Rolling Loam Rangeland Reference Area Transect #4

Figure A5 Rolling Loam Rangeland Reference Area Transect #5

Figure A6 Rolling Loam Rangeland Reference Area Transect #6

Appendix B – Vegetation Sampling Data Reclaimed Well Pad 94-1M

Table B1 - Vegetation Cover, Species Composition, Species Density & Ground Cover Reclaimed Pad 94-1M						
Plant Species Observed within Study Area			**Line-Point Canopy Intercept Data [1]**			**Density Data [2]**
Species Symbol	**Scientific Name**	**Common Name**	**% Foliar Cover**	**% Basal Cover**	**Species Composition**	
ACHY	*Achnatherum hymenoides*	Indian ricegrass	1.3	0.7	3.15	
ELLAL	*Elymus lanceolatus*	thickspike wheatgrass	3.3	0.0	5.25	
ELTR7	*Elymus trachycaulus*	slender wheatgrass	9.3	2.0	14.74	
LECI4	*Leymus cinereus*	basin wildrye	4.0	0.0	6.32	
NAVI4	*Nassella viridula*	green needlegrass	4.8	0.0	11.60	
PSJU3	*Psathyrostachys juncea*	Russian wildrye	18.0	3.3	30.52	
PSSPS	*Pseudoroegneria spicata ssp. spicata*	bearded bluebunch wheatgrass	2.0	0.0	3.15	**Desirable Forb/Shrub Density (#/m^2)**
THIN6	*Thinopyrum intermedium*	pubescent wheatgrass	4.0	0.0	6.32	
		Totals for Perennial Grasses	**46.7**	**6.0**	**81.05**	
ASCH	*Astragalus chamaeleuce*	cicada milkvetch	0.0	0.0	0.00	0.10
ASCI4	*Astragalus cicer*	cicer milkvetch	0.0	0.0	0.00	0.40
LILE3	*Linum lewisii*	Lewis flax	0.7	0.0	1.05	0.70
MESA	*Medicago sativa*	alfalfa	6.0	0.7	10.50	3.27
PEPA8	*Penstemon palmeri*	Palmer's penstemon	0.0	0.0	0.00	0.17
SPCO	*Sphaeralcea coccinea*	scarlet globemallow	0.0	0.0	0.00	0.23
		Totals for Desirable Forb Species	**6.7**	**.07**	**11.55**	**4.87**
ATCA2	*Atriplex canescens*	four-wing saltbush	2.7	0.0	4.20	0.37
CHVI8[3]	*Chrysothamnus viscidiflorus*	yellow rabbitbrush	0.0	0.0	0.00	0.00
ERNA10[3]	*Ericameria nauseosa*	rubber rabbitbrush	0.0	0.0	0.00	0.00
KRLA2	*Krascheninnikovia lanata*	winterfat	0.0	0.0	0.00	0.07
		Totals for Shrubs	**2.7**	**0.0**	**4.20**	**0.44**
BRTE	*Bromus tectorum*	cheatgrass	2.0	0.0	3.20	
		Totals for Invasive and Non-Native Species	**2.0**	**0.0**	**3.20**	
		Vegetation Totals	**58.1**	**6.7**	**100.00**	**5.31**

[1] Sum of data from 3 randomly placed 25 meter transects with 50 sample points collected from each transect. Foliar cover based upon 1st plant species encountered in the canopy at each sample point. Species composition based upon total of all plant species encountered at each sample point.
[2] Sum of density data collected from 10 one-square meter quadrants along each transect. Only desirable forb and shrub densities were recorded based upon reclamation criteria.
[3] Plant species not encountered in sampling data but were present within the study area.
[4] Percentages are not cumulative with vegetation totals, rather a measure by layer of ground cover from the top layer thru the lower layers to the soil surface. Values for bare ground have no vegetative, litter or rock cover above the soil surface.

Percent Ground Cover by Cover Type [4]	
Bare Ground	**22.0**
Biotic Crust	**0.0**
Herbaceous Litter	**45.3**
Woody Litter	**7.3**
Duff	**0.0**
Rock	**0.7**

Table B2 - Canopy Gap Intercept Data Reclaimed Pad 94-1M										
Canopy Gaps > 20 centimeters	**Total of Gaps > 20 cm**		**Gaps 21-50 cm**		**Gaps 51-100 cm**		**Gaps 101-200 cm**		**Gaps >200 cm**	
Transect 1	529	270	259	0	0	79	0	0	0	0
Transect 2	752	489	263	0	0	78	0	0	0	0
Transect 3	799	680	119	0	0	0	0	0	0	0
Total Gaps (cm)	**2080**	**1439**	**641**	**0**	**0**	**157**	**0**	**0**	**0**	**0**
% Line in Gaps	**27.73**	**19.19**	**8.55**	**0.00**	**0.00**	**2.09**	**0.00**	**0.00**	**0.00**	**0.00**
Line length for each transect was 25 meters for site total length of 75 meters										

Table B3 - Transect Coordinate Locations Reclaimed Pad 94-1M (Datum: UTM Zone 12, WGS 84)						
	Azimuth from starting point (true N)	Transect Starting Point		Transect Ending Point		
Site		Northing (mN)	Easting (mE)	Northing (mN)	Easting (mE)	Length
Transect 1	224º	4423950.01	725410.6905	4423938.744	725390.4108	25 meters
Transect 2	041º	4423950.793	725418.3651	4423969.088	725435.8709	25 meters
Transect 3	151º	4423941.142	725415.1438	4423919.604	725426.9854	25 meters

Transect Photos and Transect Layout Plot

Figure B1 Transect 1 Reclaimed Pad 94-1M

Figure B2 Transect 2 Reclaimed Pad 94-1M

Figure B3 Transect 3 Reclaimed Pad 94-1M

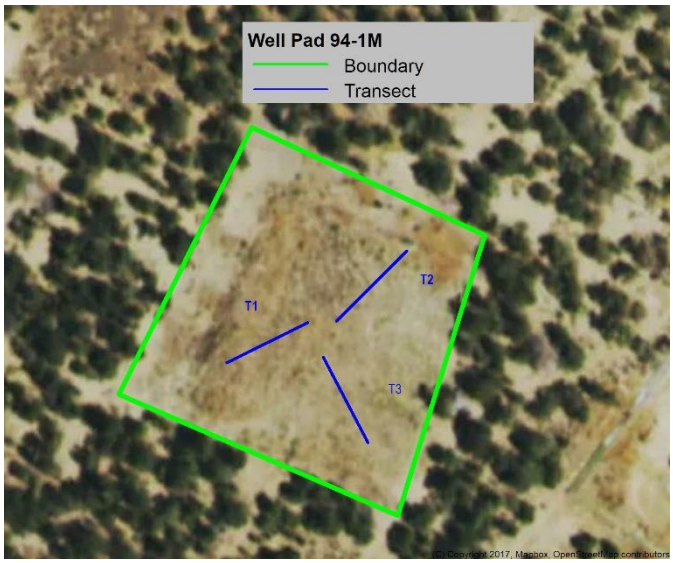


Figure B4 Transect Layout

Appendix C – Vegetation Sampling Data Reclaimed Corehole Pad A

Table C1 - Vegetation Cover, Species Composition, Species Density & Ground Cover Reclaimed Corehole Pad A						
Plant Species Observed within Study Area			**Line-Point Canopy Intercept Data [1]**			**Density Data [2]**
Species Symbol	**Scientific Name**	**Common Name**	**% Foliar Cover**	**% Basal Cover**	**Species Composition**	
ACHY	*Achnatherum hymenoides*	Indian ricegrass	7.3	0.7	10.19	
ELELE	*Elymus elymoides ssp. elymoides*	bottlebrush squirreltail	2.0	0.7	3.70	
ELLAL	*Elymus lanceolatus*	thickspike wheatgrass	2.0	1.3	2.78	
ELTR7	*Elymus trachycaulus*	slender wheatgrass	8.1	4.0	11.11	
HECO26	*Hesperostipa comata*	needle & thread needlegrass	1.3	0.0	1.85	
KOMA	*Koeleria macrantha*	prairie junegrass	2.0	0.7	2.78	
NAVI4	*Nassella viridula*	green needlegrass	5.3	0.7	7.41	
PASM	*Pascopyrum smithii*	western wheatgrass	2.7	0.0	4.63	
POSE	*Poa secunda*	Sandberg bluegrass	1.3	0.0	1.85	
PSSPI	*Pseudoroegneria spicata ssp. inermis*	beardless bluebunch wheatgrass	6.7	0.7	9.26	
PSSPS	*Pseudoroegneria spicata ssp. spicata*	bearded bluebunch wheatgrass	3.3	0.0	4.63	**Desirable Forb/Shrub Density (#/m²)**
		Perennial Grass Totals	**42.0**	**8.8**	**60.19**	
ACLAO	*Achillea lanulosa var.*	western yarrow	0.0	0.0	0.00	0.03
ASCI4	*Astragalus cicer*	cicer milkvetch	0.0	0.0	0.00	0.63
CRFL6[3]	*Cryptantha flavoculata*	roughseed cryptanth	0.0	0.0	0.00	0.00
DEPI	*Descurainia pinnata*	western tansymustard	2.7	0.0	3.70	0.00
EREA	*Erigeron eatonii*	Eaton's fleabane	0.0	0.0	0.00	0.07
IPCO3	*Ipomopsis congesta*	ballhead gilia	0.0	0.0	0.00	0.03
LILE3	*Linum lewisii*	Lewis flax	1.3	0.0	1.85	1.03
MACA2	*Machaeranthera canescens*	hoary tansyaster	0.7	0.0	0.93	0.17
MESA	*Medicago sativa*	alfalfa	2.0	0.7	3.70	1.20
PHHO	*Phlox hoodii*	Hood's phlox	0.0	0.0	0.93	0.07
SPCO	*Sphaeralcea coccinea*	scarlet globemallow	0.7	0.0	1.85	0.77
		Desirable Forb Totals	**7.4**	**0.7**	**12.96**	**4.00**
ARTRW	*Artemisia tridentata var. wyomingensis*	Wyoming big sagebrush	0.0	0.0	0.00	0.07
ATCA2	*Atriplex canescens*	four-wing saltbush	3.4	0.0	4.63	0.40
CHDE2	*Chrysothamnus depressus*	longflower rabbitbrush	0.0	0.0	0.00	0.07
CHVI8	*Chrysothamnus viscidiflorus*	yellow rabbitbrush	0.0	0.0	0.00	0.07
GUSA2	*Gutierrezia sarothrae*	broom snakeweed	1.3	0.0	1.85	0.53
KRLA2	*Krascheninnikovia lanata*	winterfat	0.0	0.0	0.00	0.33
		Shrub Totals	**4.7**	**0.0**	**6.48**	**1.47**
BRTE	*Bromus tectorum*	cheatgrass	13.3	0.0	20.37	
SATR12[3]	*Salsola tragus*	Russian thistle	0.0	0.0	0.00	
		Totals for Invasive and Non-Native Species	**13.3**	**0.0**	**20.37**	
		Vegetation Totals	**67.4**	**9.5**	**100.00**	**5.47**

[1] Sum of data from 3 randomly placed 25 meter transects with 50 sample points collected from each transect. Foliar cover based upon 1st plant species encountered in the canopy at each sample point. Species composition based upon total of all plant species encountered at each sample point.
[2] Sum of density data collected from 10 one-square meter quadrants along each transect. Only desirable forb and shrub densities were recorded based upon reclamation criteria.
[3] Plant species not encountered in sampling data but were present within the study area.
[4] Percentages are not cumulative with vegetation totals, rather a measure by layer of ground cover from the top layer thru the lower layers to the soil surface. Values for bare ground have no vegetative, litter or rock cover above the soil surface.

Percent Ground Cover by Cover Type [4]	
Bare Ground	**16.7**
Biotic Crust	**0.0**
Herbaceous Litter	**49.3**
Woody Litter	**6.0**
Duff	**0.0**
Rock	**0.0**

Table C2 - Canopy Gap Intercept Data Reclaimed Corehole Pad A					
Canopy Gaps > 20 centimeters	**Total of Gaps > 20 cm**	**Gaps 21-50 cm**	**Gaps 51-100 cm**	**Gaps 101-200 cm**	**Gaps >200 cm**
Transect 1	1301	722	287	292	0
Transect 2	1034	461	398	175	0
Transect 3	1284	305	125	635	219
Total Gaps (cm)	**3619**	**1488**	**810**	**1102**	**219**
% Line in Gaps	**48.25**	**19.84**	**10.80**	**14.69**	**2.92**
Line length for each transect was 25 meters for site total length of 75 meters					

Table C3 - Transect Coordinate Locations Reclaimed Corehole Pad A (Datum: UTM Zone 12, WGS 84)						
	Azimuth from starting point (true N)	**Transect Starting Point**		**Transect Ending Point**		
Site		**Northing (mN)**	**Easting (mE)**	**Northing (mN)**	**Easting (mE)**	**Length**
Transect 1	325º	4423021.743	724425.0886	4423037.18	724405.9865	25 meters
Transect 2	015º	4423023.854	724428.8757	4423049.997	724429.988	25 meters
Transect 3	110º	4423017.274	724428.043	4423012.31	724451.8837	25 meters

Transect Photos and Transect Layout Plot

Figure C1 Transect 1 Reclaimed Corehole Pad A

Figure C2 Transect 2 Reclaimed Corehole Pad A

Figure C3 Transect 3 Reclaimed Corehole Pad A

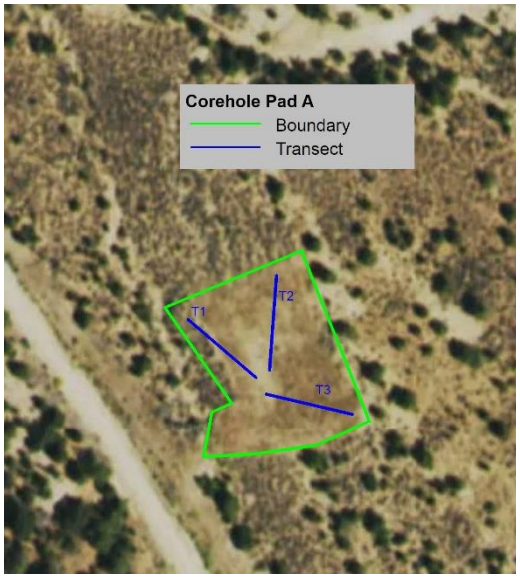


Figure C4 Pad Transect Layout

Appendix D – Vegetation Sampling Data Reclaimed Corehole Pad D

Table D1 - Vegetation Cover, Species Composition, Species Density & Ground Cover Reclaimed Corehole Pad D						
Plant Species Observed within Study Area			**Line-Point Canopy Intercept Data [1]**			**Density Data [2]**
Species Symbol	**Scientific Name**	**Common Name**	**% Foliar Cover**	**% Basal Cover**	**Species Composition**	
ACHY	*Achnatherum hymenoides*	Indian ricegrass	0.7	0.0	1.87	
ELELE[3]	*Elymus elymoides ssp. elymoides*	bottlebrush squirreltail	0.0	0.0	0.00	
ELLAL	*Elymus lanceolatus*	thickspike wheatgrass	7.3	0.0	14.02	
ELTR7	*Elymus trachycaulus*	slender wheatgrass	15.3	3.3	22.42	
KOMA[3]	*Koeleria macrantha*	prairie junegrass	0.0	0.0	0.00	
LECI4	*Leymus cinereus*	basin wildrye	1.3	0.0	1.87	
NAVI4	*Nassella viridula*	green needlegrass	18.0	3.3	28.94	
PASM	*Pascopyrum smithii*	western wheatgrass	0.7	0.0	0.93	
PSSPI	*Pseudoroegneria spicata ssp. inermis*	beardless bluebunch wheatgrass	6.0	0.7	9.35	**Desirable Forb/Shrub Density (#/m^2)**
		Perennial Grass Totals	**49.3**	**7.3**	**79.40**	
ACLAO	*Achillea lanulosa var. occidentalis*	western yarrow	0.0	0.0	0.00	0.20
ASCI4	*Astragalus cicer*	cicer milkvetch	0.0	0.0	0.00	0.17
ASCH[3]	*Astragalus chamaeleuce*	cicada milkvetch	0.0	0.0	0.00	0.00
CRFL6	*Cryptantha flavoculata*	roughseed cryptanth	0.0	0.0	0.00	0.07
LILE3	*Linum lewisii*	Lewis flax	0.0	0.0	0.00	0.10
MACA2	*Machaeranthera canescens*	hoary tansyaster	0.0	0.0	0.00	0.07
MAGR2[3]	*Machaeranthera grindelioides*	rayless tansyaster	0.0	0.0	0.00	0.00
MESA	*Medicago sativa*	alfalfa	6.0	1.3	10.30	8.66
		Perennial Forb Totals	**6.0**	**1.3**	**10.30**	**9.27**
ATCA2	*Atriplex canescens*	four-wing saltbush	2.0	0.0	2.80	1.27
CHVI8	*Chrysothamnus viscidiflorus*	yellow rabbitbrush	0.0	0.0	0.00	0.03
KRLA2	*Krascheninnikovia lanata*	winterfat	0.0	0.0	0.00	0.53
		Shrub Totals	**2.0**	**0.0**	**2.80**	**1.83**
BRTE	*Bromus tectorum*	cheatgrass	4.7	0.0	7.50	
SATR12[3]	*Salsola tragus*	Russian thistle	0.0	0.0	0.00	
		Totals for Invasive and Non-Native Species	**4.7**	**0.0**	**7.50**	
		Vegetation Totals	**62.0**	**8.6**	**100.00**	**11.10**

[1] Sum of data from 3 randomly placed 25 meter transects with 50 sample points collected from each transect. Foliar cover based upon 1st plant species encountered in the canopy at each sample point. Species composition based upon total of all plant species encountered at each sample point.
[2] Sum of density data collected from 10 one-square meter quadrants along each transect. Only desirable forb and shrub densities were recorded based upon reclamation criteria.
[3] Plant species not encountered in sampling data but were present within the study area.
[4] Percentages are not cumulative with vegetation totals, rather a measure by layer of ground cover from the top layer thru the lower layers to the soil surface. Values for bare ground have no vegetative, litter or rock cover above the soil surface.

Percent Ground Cover by Cover Type [4]	
Bare Ground	**19.3**
Biotic Crust	**0.0**
Herbaceous Litter	**50.0**
Woody Litter	**8.0**
Duff	**0.0**
Rock	**0.0**

Table D2 - Canopy Gap Intercept Data Reclaimed Corehole Pad D					
Canopy Gaps > 20 centimeters	**Total of Gaps > 20 cm**	**Gaps 21-50 cm**	**Gaps 51-100 cm**	**Gaps 101-200 cm**	**Gaps >200 cm**
Transect 1	566	218	242	106	0
Transect 2	432	323	109	0	0
Transect 3	821	300	278	243	0
Total Gaps (cm)	**1819**	**841**	**629**	**349**	**0**
% Line in Gaps	**24.25**	**11.21**	**8.39**	**4.65**	**0.00**
Line length for each transect was 25 meters for site total length of 75 meters					

Table D3 - Transect Coordinate Locations Reclaimed Corehole Pad D (Datum: UTM Zone 12, WGS 84)						
	Azimuth from starting point (true N)	Transect Starting Point		Transect Ending Point		
Site		Northing (mN)	Easting (mE)	Northing (mN)	Easting (mE)	Length
Transect 1	102º	4424161.103	724891.3648	4424159.641	724913.3885	25 meters
Transect 2	071º	4424153.481	724904.1623	4424175.13	724914.8986	25 meters
Transect 3	045º	4424168.381	724878.2354	4424194.607	724889.6918	25 meters

Transect Photos and Transect Layout Plot

Figure D1 **Transect 1 Reclaimed Corehole Pad D**

Figure D2 **Transect 2 Reclaimed Corehole Pad D**

Figure D3 **Transect 3 Reclaimed Corehole Pad D**

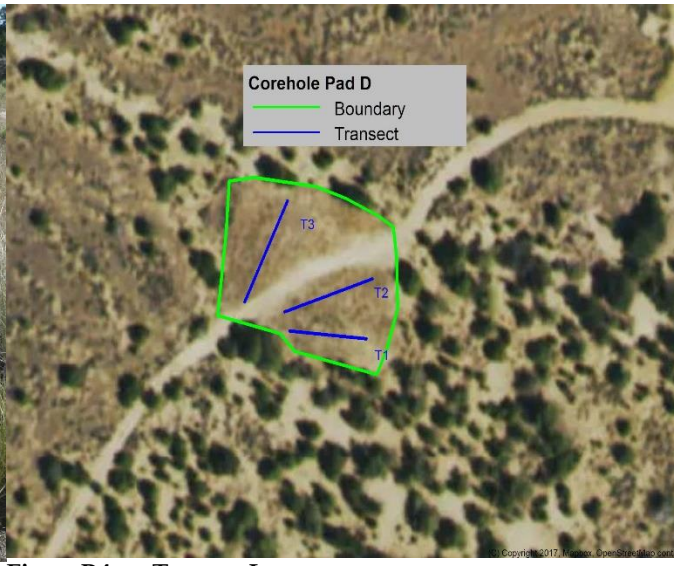


Figure D4 **Transect Layout**

Appendix E – Vegetation Sampling Data Reclaimed Corehole Pad G

Table E1 - Vegetation Cover, Species Composition, Species Density & Ground Cover Reclaimed Corehole Pad G						
Plant Species Observed within Study Area			**Line-Point Canopy Intercept Data [1]**			**Density Data [2]**
Species Symbol	**Scientific Name**	**Common Name**	**percent Foliar Cover**	**percent Basal Cover**	**Species Composition**	
ACHY	*Achnatherum hymenoides*	Indian ricegrass	5.3	1.3	9.20	
ELLAL	*Elymus lanceolatus*	thickspike wheatgrass	4.7	0.7	9.20	
ELTR7	*Elymus trachycaulus*	slender wheatgrass	15.3	3.3	26.44	
HECO26	*Hesperostipa comata*	needle & thread needlegrass	2.7	0.7	5.75	
LECI4	*Koeleria macrantha*	prairie junegrass	0.7	0.7	1.15	
NAVI4	*Nassella viridula*	green needlegrass	8.7	0.7	14.94	
PASM	*Pascopyrum smithii*	western wheatgrass	4.0	0.0	6.90	
PSSPI	*Pseudoroegneria spicata ssp. inermis*	beardless bluebunch wheatgrass	0.7	0.0	1.15	
PSSPS	*Pseudoroegneria spicata ssp. spicata*	bearded bluebunch wheatgrass	1.3	0.0	3.45	**Desirable Forb/Shrub Density (#/m^2)**
		Perennial Grass Totals	**43.4**	**7.4**	**78.18**	
ASCH	*Astragalus chamaeleuce*	cicada milkvetch	0.0	0.0	0.00	0.03
CRFL6	*Cryptantha flavoculata*	roughseed cryptanth	0.0	0.0	0.00	0.10
HEBO	*Hedysarum boreale*	Utah sweetvetch	0.0	0.0	0.00	0.17
LILE3	*Linum lewisii*	Lewis flax	0.7	0.0	1.15	0.27
MACA2	*Machaeranthera canescens*	hoary tansyaster	2.0	0.0	3.45	0.23
MAGR2	*Machaeranthera grindelioides*	rayless tansyaster	0.0	0.0	0.00	0.03
MESA	*Medicago sativa*	alfalfa	0.0	0.0	1.15	1.00
PEPA8[3]	*Penstemon palmeri*	Palmer's penstemon	0.0	0.0	0.00	0.00
PHHO	*Phlox hoodii*	Hood's phlox	0.0	0.0	0.00	0.07
SPCO	*Sphaeralcea coccinea*	scarlet globemallow	0.0	0.0	0.00	0.40
TRDU	*Tragopogon dubius*	western salsify	0.0	0.0	0.00	0.17
		Perennial Forb Totals	**2.7**	**0.0**	**5.75**	**2.47**
ARTRW	*Artemisia tridentata var. wyomingensis*	Wyoming big sagebrush	0.0	0.0	0.00	0.03
ATCA2	*Atriplex canescens*	four-wing saltbush	2.0	0.0	3.40	0.44
CHVI8	*Chrysothamnus viscidiflorus*	yellow rabbitbrush	0.0	0.0	0.00	0.11
GUSA2	*Gutierrezia sarothrae*	broom snakeweed	0.7	0.0	1.20	0.03
KRLA2	*Krascheninnikovia lanata*	winterfat	0.0	0.0	0.00	0.03
PUTR2	*Purshia tridentata*	antelope bittrebrush	0.0	0.0	0.00	0.03
		Shrub Totals	**2.7**	**0.0**	**4.60**	**0.67**
BRTE	*Bromus tectorum*	cheatgrass	1.3	0.0	2.30	
BASC5[3]	*Bassia scoparia*	burningbush (kochia)	0.0	0.0	0.00	
SATR12	*Salsola tragus*	Russian thistle	4.7	0.0	9.17	
		Totals for Invasive and Non-Native Species	**6.0**	**0.0**	**11.47**	
		Vegetation Totals	**54.8**	**7.4**	**100.00**	**3.14**

[1] Sum of data from 3 randomly placed 25 meter transects with 50 sample points collected from each transect. Foliar cover based upon 1st plant species encountered in the canopy at each sample point. Species composition based upon total of all plant species encountered at each sample point.
[2] Sum of density data collected from 10 one-square meter quadrants along each transect. Only desirable forb and shrub densities were recorded based upon reclamation criteria.
[3] Plant species not encountered in sampling data but were present within the study area.
[4] Percentages are not cumulative with vegetation totals, rather a measure by layer of ground cover from the top layer thru the lower layers to the soil surface. Values for bare ground have no vegetative, litter or rock cover above the soil surface.

Percent Ground Cover by Cover Type [4]	
Bare Ground	**19.3**
Biotic Crust	**0.0**
Herbaceous Litter	**52.7**
Woody Litter	**2.7**
Duff	**0.0**
Rock	**0.0**

Table E2 - Canopy Gap Intercept Data Reclaimed Corehole Pad G					
Canopy Gaps > 20 centimeters	**Total of Gaps > 20 cm**	**Gaps 21-50 cm**	**Gaps 51-100 cm**	**Gaps 101-200 cm**	**Gaps >200 cm**
Transect 1	1337	191	349	567	230
Transect 2	965	260	176	529	0
Transect 3	858	405	453	0	0
Total Gaps (cm)	**3160**	**856**	**978**	**1096**	**230**
% Line in Gaps	**42.13**	**11.41**	**13.04**	**14.61**	**3.07**
Line length for each transect was 25 meters for site total length of 75 meters					

Table E3 - Transect Coordinates Locations Reclaimed Corehole Pad G (Datum: UTM Zone 12, WGS 84)						
	Azimuth from starting point (true N)	**Transect Starting Point**		**Transect Ending Point**		
Site		**Northing (mN)**	**Easting (mE)**	**Northing (mN)**	**Easting (mE)**	**Length**
Transect 1	326º	4424257.087	725308.4687	4424280.287	725292.7301	25 meters
Transect 2	095º	4424253.918	725310.273	4424255.531	725334.7715	25 meters
Transect 3	218º	4424253.802	725306.3422	4424235.313	725289.7834	25 meters

Transect Photos, Access Route Photos and Transect Layout Plot

Figure E1 Transect 1 Reclaimed Corehole Pad G

Figure E2 Transect 2 Reclaimed Corehole Pad G

Figure E3 Transect 3 Reclaimed Corehole Pad G

Figure E4 Photo Point Access Road to Corehole Pad G

Figure E5 Transect Layout

Appendix F – Vegetation Sampling Data Reclaimed Corehole Pad IRI-2

Table F1 - Vegetation Cover, Species Composition, Species Density & Ground Cover Reclaimed Corehole Pad IRI-2						
Plant Species Observed within Study Area			**Line-Point Canopy Intercept Data [1]**			**Density Data [2]**
Species Symbol	**Scientific Name**	**Common Name**	**percent Foliar Cover**	**percent Basal Cover**	**Species Composition**	
ACHY	*Achnatherum hymenoides*	Indian ricegrass	2.0	0.0	2.9	
AGCR	*Agropyron cristatum*	crested wheatgrass	6.0	2.0	11.4	
PASM	*Pascopyrum smithii*	western wheatgrass	4.0	0.0	5.7	
POSE	*Poa secunda*	Sandberg bluegrass	2.0	0.0	2.9	
PSJU3	*Psathyrostachys juncea*	Russian wildrye	28.0	4.0	40.0	**Desirable Forb/Shrub Density (#/m^2)**
THIN6	*Thinopyrum intermedium*	pubescent wheatgrass	6.0	0.0	8.6	
		Perennial Grass Totals	**48.0**	**6.0**	**71.5**	
ASCH	*Astragalus chamaeleuce*	cicada milkvetch	0.0	0.0	0.0	0.10
EREA	*Erigeron eatonii*	Eaton's fleabane	0.0	0.0	2.9	0.20
LEALE	*Lepidium alyssoides var. eastwoodiae*	mesa pepperwort	2.0	0.0	2.9	0.00
LEER	*Leucelene ericoides*	heath aster	0.0	0.0	0.0	1.00
PHLO2	*Phlox longifolia*	longleaf phlox	0.0	0.0	0.0	0.30
SPCO	*Sphaeralcea coccinea*	scarlet globemallow	0.0	0.0	0.0	0.50
		Desirable Forb Totals	**2.0**	**0.0**	**5.8**	**2.10**
ARTRW	*Artemisia tridentata var. wyomingensis*	Wyoming big sagebrush	0.0	0.0	0.0	0.10
ATCA2	*Atriplex canescens*	four-wing saltbush	4.0	0.0	5.7	1.60
GUSA2	*Gutierrezia sarothrae*	broom Snakeweed	2.0	0.0	2.9	0.60
		Shrub Totals	**6.0**	**0.0**	**8.6**	**2.30**
BRTE[3]	*Bromus tectorum*	cheatgrass	10.0	0.0	14.1	
		Totals for Invasive and Non-Native Species	**10.0**	**0.0**	**14.1**	
		Vegetation Totals	**66.0**	**6.0**	**100.0**	**4.40**

[1] Sum of data from 1 randomly placed 25 meter transect with 50 sample points collected from the transect. Foliar cover based upon 1st plant species encountered in the canopy at each sample point. Species composition based upon total of all plant species encountered at each sample point.
[2] Sum of density data collected from 10 one-square meter quadrants along the transect. Only desirable forb and shrub densities were recorded based upon reclamation criteria.
[3] Plant species not encountered in sampling data but were present within the study area.
[4] Percentages are not cumulative with vegetation totals, rather a measure by layer of ground cover from the top layer thru the lower layers to the soil surface. Values for bare ground have no vegetative, litter or rock cover above the soil surface.

Percent Ground Cover by Cover Type [4]	
Bare Ground	**22.0**
Biotic Crust	**0.0**
Herbaceous Litter	**40.0**
Woody Litter	**6.0**
Duff	**0.0**
Rock	**0.0**

Table F2 - Canopy Gap Intercept Data Reclaimed Corehole Pad IRI-2					
Canopy Gaps > 20 centimeters	**Total of Gaps > 20 cm**	**Gaps 21-50 cm**	**Gaps 51-100 cm**	**Gaps 101-200 cm**	**Gaps >200 cm**
Transect 1	644	265	155	0	224
Total Gaps (cm)	**644**	**265**	**155**	**0**	**224**
% Line in Gaps	**25.76**	**10.60**	**6.20**	**0.00**	**8.96**
Line length for transect was 25 meters					

Table F3 - Transect Coordinates Locations Reclaimed Corehole Pad IRI-2 (Datum: UTM Zone 12, WGS 84)						
	Azimuth from starting point (true N)	Transect Starting Point		Transect Ending Point		
Site		Northing (mN)	Easting (mE)	Northing (mN)	Easting (mE)	Length
Transect 1	177º	4423432.749	723931.0844	4423408.235	723936.2524	25 meters

Transect Photos and Transect Layout Plot

Figure F1 Transect 1 Reclaimed Corehole Pad IRI-2

Figure F2 Transect Layout Corehole Pad IRI-2

Appendix G – Vegetation Sampling Data Reclaimed Corehole Pad IRI-3, MW1, PW1, PW2

Table G1 - Vegetation Cover, Species Composition, Species Density & Ground Cover
Reclaimed Corehole Pad IRI-3, MW-1, PW-1 and PW-2

Plant Species Observed within Study Area			Line-Point Canopy Intercept Data [1]			Density Data [2]
Species Symbol	**Scientific Name**	**Common Name**	**percent Foliar Cover**	**percent Basal Cover**	**Species Composition**	
ACHY	*Achnatherum hymenoides*	Indian ricegrass	0.7	0.0	1.09	
AGCR	*Agropyron cristatum*	crested wheatgrass	8.0	2.0	14.12	
ELTR7	*Elymus trachycaulus*	slender wheatgrass	8.7	0.0	14.12	
HECO26	*Hesperostipa comata*	needle & thread needlegrass	0.7	0.0	1.09	
LECI4	*Leymus cinereus*	basin wildrye	0.7	0.0	1.09	
NAVI4	*Nassella viridula*	green needlegrass	0.7	0.0	1.09	
PSJU3	*Psathyrostachys juncea*	Russian wildrye	23.3	2.7	39.12	
PSSPI	*Pseudoroegneria spicata ssp. inermis*	beardless bluebunch wheatgrass	2.0	0.7	3.25	**Desirable Forb/Shrub Density (#/m²)**
THIN6	*Thinopyrum intermedium*	pubescent wheatgrass	10.0	2.0	16.30	
		Perennial Grass Totals	**54.8**	**7.4**	**91.27**	
LEER	*Leucelene ericoides*	heath aster	0.0	0.0	0.00	0.03
LILE3	*Linum lewisii*	Lewis flax	0.0	0.0	0.00	0.10
MACA2	*Machaeranthera canescens*	hoary tansyaster	0.0	0.0	0.00	0.07
MESA	*Medicago sativa*	alfalfa	0.0	0.0	0.00	0.70
		Desirable Forb Totals	**0.0**	**0.0**	**0.0**	**0.90**
ARTRW	*Artemisia tridentata var. wyomingensis*	Wyoming big sagebrush	1.3	0.0	2.17	0.20
ATCA2	*Atriplex canescens*	four-wing saltbush	1.3	0.0	3.26	0.47
CHVI8	*Chrysothamnus viscidiflorus*	yellow rabbitbrush	0.0	0.0	0.00	0.17
GUSA2	*Juniperus osteosperma*	Utah juniper	0.0	0.0	0.00	0.03
		Shrub Totals	**2.6**	**0.0**	**5.43**	**0.87**
BRTE	*Bromus tectorum*	cheatgrass	2.0	0.0	3.30	
SATR12[3]	*Salsola tragus*	Russian thistle	0.0	0.0	0.00	
		Totals for Invasive and Non-Native Species	**2.0**	**0.0**	**3.30**	
		Vegetation Totals	**59.4**	**7.4**	**100.0**	**1.77**

[1] Sum of data from 3 randomly placed 25 meter transects with 50 sample points collected from each transect. Foliar cover based upon 1st plant species encountered in the canopy at each sample point. Species composition based upon total of all plant species encountered at each sample point.
[2] Sum of density data collected from 10 one-square meter quadrants along each transect. Only desirable forb and shrub densities were recorded based upon reclamation criteria.
[3] Plant species not encountered in sampling data but were present within the study area.
[4] Percentages are not cumulative with vegetation totals, rather a measure by layer of ground cover from the top layer thru the lower layers to the soil surface. Values for bare ground have no vegetative, litter or rock cover above the soil surface.

Percent Ground Cover by Cover Type [4]	
Bare Ground	**14.4**
Biotic Crust	**0.0**
Herbaceous Litter	**42.7**
Woody Litter	**15.3**
Duff	**0.0**
Rock	**7.3**

Table G2 - Canopy Gap Intercept Data
Reclaimed Corehole Pad IRI-3, MW-1, PW-1 and PW-2

Canopy Gaps > 20 centimeters	Total of Gaps > 20 cm	Gaps 21-50 cm	Gaps 51-100 cm	Gaps 101-200 cm	Gaps >200 cm
Transect 1	720	292	131	297	0
Transect 2	1116	43	506	567	0
Transect 3	299	69	230	0	0
Total Gaps (cm)	**2135**	**404**	**867**	**864**	**0**
% Line in Gaps	**28.47**	**5.39**	**11.56**	**11.52**	**0.00**

Line length for each transect was 25 meters for site total length of 75 meters

Table G3 - Transect Coordinates Locations Reclaimed Corehole Pad IRI-3, MW-1, PW-1 and PW-2 (Datum: UTM Zone 12, WGS 84)						
	Azimuth from starting point (true N)	Transect Starting Point		Transect Ending Point		
Site		Northing (mN)	Easting (mE)	Northing (mN)	Easting (mE)	Length
Transect 1	287º	4424250.226	724296.294	4424255.494	724271.422	25 meters
Transect 2	029º	4424249.956	724302.2033	4424272.134	724312.0701	25 meters
Transect 3	112º	4424241.743	724306.2937	4424234.616	724328.3981	25 meters

Transect Photos and Transect Layout Plot

Figure G1 Transect 1 Reclaimed Pad IRI3, MW1, PW1, PW2

Figure G2 Transect 2 Reclaimed Pad IRI3, MW1, PW1, PW2

Figure G3 Transect 3 Reclaimed Pad IRI3, MW1, PW1, PW2

Figure G4 Transect Layout Pads IRI3, MW1, PW1, PW2

Appendix H – Vegetation Sampling Data Reclaimed Corehole Pad IRI-10

Table H1 - Vegetation Cover, Species Composition, Species Density & Ground Cover Reclaimed Corehole Pad IRI-10						
Plant Species Observed within Study Area			**Line-Point Canopy Intercept Data [1]**			**Density Data [2]**
Species Symbol	**Scientific Name**	**Common Name**	**percent Foliar Cover**	**percent Basal Cover**	**Species Composition**	
ACHY	*Achnatherum hymenoides*	Indian ricegrass	0.7	0.0	1.33	
AGCR	*Agropyron cristatum*	crested wheatgrass	26.7	4.0	57.33	
HECO26	*Hesperostipa comata*	needle & thread needlegrass	4.7	0.0	10.67	**Desirable Forb/Shrub Density (#/m²)**
THIN6	*Thinopyrum intermedium*	pubescent wheatgrass	4.0	0.7	8.00	
		Perennial Grass Totals	**36.1**	**4.7**	**77.33**	
ANDI2	*Antennaria dimorpha*	low pussytoes	0.0	0.0	0.00	0.17
ASCH	*Astragalus chamaeleuce*	cicada milkvetch	0.0	0.0	0.00	0.23
ASSP6	*Astragalus spatulatus*	tufted milkvetch	0.0	0.0	0.00	0.10
CRFL6	*Cryptantha flavoculata*	roughseed cryptanth	0.0	0.0	0.00	0.20
HEBO	*Hedysarum boreale*	Utah sweetvetch	0.0	0.0	0.00	0.07
MAGR2	*Machaeranthera grindelioides*	rayless tansyaster	0.0	0.0	0.00	0.53
MESA	*Medicago sativa*	alfalfa	0.0	0.0	0.00	0.17
PHHO	*Phlox hoodii*	Hood's phlox	0.0	0.0	0.00	0.27
SPCO	*Sphaeralcea coccinea*	scarlet globemallow	1.3	0.0	4.00	2.53
		Desirable Forb Totals	**1.3**	**0.0**	**4.00**	**4.27**
ARTRW	*Artemisia tridentata var. wyomingensis*	Wyoming big sagebrush	0.0	0.0	0.00	0.16
ATCA2	*Atriplex canescens*	four-wing saltbush	0.0	0.0	0.00	0.07
CHVI8	*Chrysothamnus viscidiflorus*	yellow rabbitbrush	2.7	0.7	5.33	0.10
GUSA2	*Gutierrezia sarothrae*	broom snakeweed	6.0	0.0	13.34	3.40
		Shrub Totals	**8.7**	**0.7**	**18.67**	**3.73**
		Totals for Invasive and Non-Native Species	**0.7**	**0.0**	**0.0**	
		Vegetation Totals	**46.1**	**5.4**	**100.00**	**8.00**

[1] Sum of data from 3 randomly placed 25 meter transects with 50 sample points collected from each transect. Foliar cover based upon 1st plant species encountered in the canopy at each sample point. Species composition based upon total of all plant species encountered at each sample point.
[2] Sum of density data collected from 10 one-square meter quadrants along each transect. Only desirable forb and shrub densities were recorded based upon reclamation criteria.
[3] Plant species not encountered in sampling data but were present within the study area.
[4] Percentages are not cumulative with vegetation totals, rather a measure by layer of ground cover from the top layer thru the lower layers to the soil surface. Values for bare ground have no vegetative, litter or rock cover above the soil surface.

Percent Ground Cover by Cover Type [4]	
Bare Ground	**39.3**
Biotic Crust	**0.0**
Herbaceous Litter	**34.0**
Woody Litter	**2.0**
Duff	**0.0**
Rock	**2.7**

Table H2 - Canopy Gap Intercept Data Reclaimed Corehole Pad IRI-10					
Canopy Gaps > 20 centimeters	**Total of Gaps > 20 cm**	**Gaps 21-50 cm**	**Gaps 51-100 cm**	**Gaps 101-200 cm**	**Gaps >200 cm**
Transect 1	574	574	0	0	0
Transect 2	1027	366	358	303	0
Transect 3	766	396	370	0	0
Total Gaps (cm)	**2367**	**1336**	**728**	**303**	**0**
% Line in Gaps	**31.56**	**17.81**	**9.71**	**4.04**	**0.00**
Line length for each transect was 25 meters for site total length of 75 meters					

Table H3 - Transect Coordinates and Access Route Photo-point Locations Reclaimed Corehole Pad IRI-10 (Datum: UTM Zone 12, WGS 84)						
Site	Azimuth from starting point (true N)	Transect Starting Point		Transect Ending Point		Length
		Northing (mN)	Easting (mE)	Northing (mN)	Easting (mE)	
Transect 1	217º	4426677.943	725779.1178	4426659.196	725768.9005	25 meters
Transect 2	280º	4426678.571	725781.5786	4426681.303	725757.5575	25 meters
Transect 3	057º	4426681.054	725786.635	4426698.772	725799.6187	25 meters
Access Route/Photo-point Location						
Photo-point # 1		4426175.794	726350.0549			
Photo-point # 2		4426265.59	726253.5007			
Photo-point # 3		4426409.058	725962.5438			
Photo-point # 4		4426566.579	725819.1856			

Transect Photos, Access Route Photos and Transect Layout Plot

Figure H1 Transect 1 Reclaimed Corehole Pad IRI-10

Figure H2 Transect 2 Reclaimed Corehole Pad IRI-10

Figure H3 Transect 3 Reclaimed Corehole Pad IRI-10

Figure H4 Photo Point 1 - Access Road to Corehole Pad IRI-10

Figure H5 Photo Point 2 - Access Road to Corehole Pad IRI-10

Figure H6 Photo Point 3 - Access Road to Corehole Pad IRI-10

Figure H7 Photo Point 4 - Access Road to Corehole Pad IRI-10

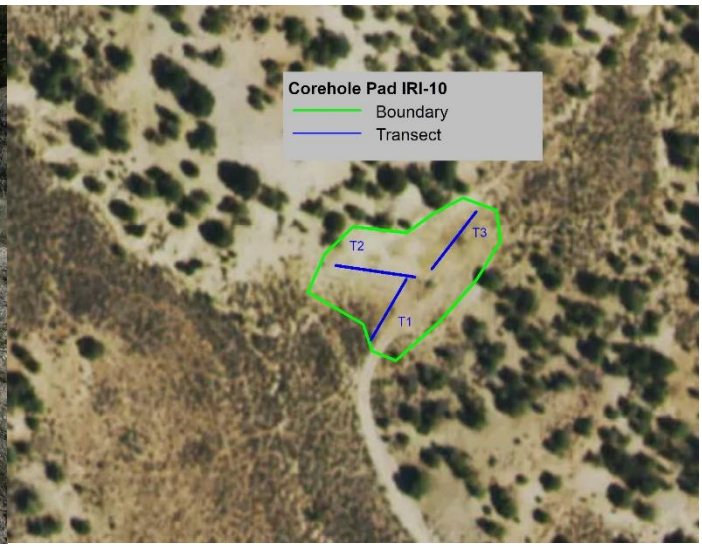


Figure H8 Transect layout

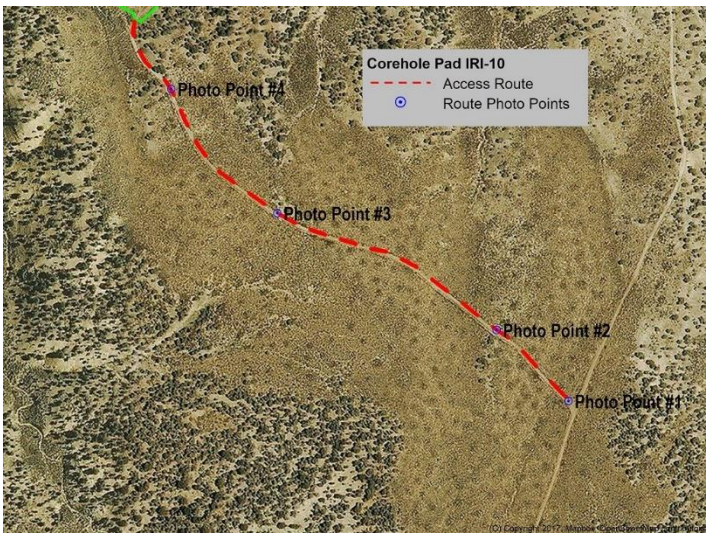


Figure H9 Access Route Photo Point Locations

Appendix I – Vegetation Sampling Data Reclaimed Access Route to Corehole Pad Q

Table I 1 - Vegetation Cover, Species Composition, Species Density & Ground Cover Reclaimed Access Route to Corehole Pad Q						
Plant Species Observed within Study Area			**Line-Point Canopy Intercept Data [1]**			**Density Data [2]**
Species Symbol	**Scientific Name**	**Common Name**	**percent Foliar Cover**	**percent Basal Cover**	**Species Composition**	
ACHY	*Achnatherum hymenoides*	Indian ricegrass	16.7	2.7	26.32	
BOGR2	*Bouteloua gracilis*	blue grama	0.7	0.7	1.05	
ELELE	*Elymus elymoides ssp. elymoides*	bottlebrush squirreltail	0.7	0.0	1.05	
ELLAL	*Elymus lanceolatus*	thickspike wheatgrass	0.7	0.7	1.05	
ELTR7	*Elymus trachycaulus*	slender wheatgrass	8.7	2.0	16.84	
LECI4	*Leymus cinereus*	basin wildrye	0.7	0.0	1.05	
NAVI4	*Nassella viridula*	green needlegrass	2.7	0.0	4.21	
PSSPI	*Pseudoroegneria spicata ssp. inermis*	beardless bluebunch wheatgrass	1.3	0.0	2.11	**Desirable Forb/Shrub Density (#/m^2)**
		Perennial Grass Totals	**32.2**	**6.1**	**53.68**	
ACLAO	*Achillea lanulosa var. occidentalis*	western yarrow	0.0	0.0	1.05	0.07
ASCH	*Astragalus cicer*	cicer milkvetch	0.0	0.0	0.00	0.07
ASSP6	*Astragalus spatulatus*	tufted milkvetch	0.0	0.0	0.00	0.03
CRFL6	*Cryptantha flavoculata*	roughseed cryptanth	0.0	0.0	0.00	0.03
ERLO4	*Eriogonum lonchophyllum*	spearleaf buckwheat	2.0	0.0	3.16	0.17
HEBO	*Hedysarum boreale*	Utah sweetvetch	0.0	0.0	0.00	0.03
MAGR2	*Machaeranthera grindelioides*	rayless tansyaster	1.3	0.0	3.16	0.53
MEMU2	*Mentzelia multicaulis*	manystem blazingstar	0.7	0.0	1.05	0.07
MESA	*Medicago sativa*	alfalfa	2.7	0.7	5.26	2.73
PEFRF5[3]	*Penstemon fremontii var. fremontii*	Fremont beardtongue	0.0	0.0	0.00	0.00
PEPA8[3]	*Penstemon palmeri*	Palmer's penstemon	0.0	0.0	0.00	0.00
PHHO	*Phlox hoodii*	Hood's phlox	0.0	0.0	0.00	0.07
		Desirable Forb Totals	**6.7**	**0.7**	**13.68**	**3.80**
ATCA2	*Atriplex canescens*	four-wing saltbush	2.7	0.0	5.26	0.40
ATCO	*Atriplex confertifolia*	shadscale saltbush	0.7	0.0	1.05	0.07
CHVI8	*Chrysothamnus viscidiflorus*	yellow rabbitbrush	2.0	0.0	3.16	0.17
GUSA2	*Gutierrezia sarothrae*	broom snakeweed	1.3	0.0	3.16	0.30
KRLA2	*Krascheninnikovia lanata*	winterfat	0.0	0.0	0.00	0.03
PUTR2	*Purshia tridentata*	antelope bittrebrush	0.0	0.0	0.00	0.03
SAVE4	*Sarcobatus vermiculatus*	greasewood	0.0	0.0	0.00	0.03
		Shrub Totals	**6.7**	**0.0**	**12.63**	**1.03**
BRTE	*Bromus tectorum*	cheatgrass	6.0	0.0	11.58	
HAGL	*Halogeton glomeratus*	halogeton	3.3	0.0	7.37	
SATR12	*Salsola tragus*	Russian thistle	0.7	0.0	1.05	
		Totals for Invasive and Non-Native Species	**10.0**	**0.0**	**20.00**	
		Vegetation Totals	**55.6**	**6.8**	**100.0**	**4.83**

[1] Sum of data from 3 randomly placed 25 meter transects with 50 sample points collected from each transect. Foliar cover based upon 1st plant species encountered in the canopy at each sample point. Species composition based upon total of all plant species encountered at each sample point.

[2] Sum of density data collected from 10 one-square meter quadrants along each transect. Only desirable forb and shrub densities were recorded based upon reclamation criteria.

[3] Plant species not encountered in sampling data but were present within the study area.

[4] Percentages are not cumulative with vegetation totals, rather a measure by layer of ground cover from the top layer thru the lower layers to the soil surface. Values for bare ground have no vegetative, litter or rock cover above the soil surface.

Percent Ground Cover by Cover Type [4]	
Bare Ground	**30.0**
Biotic Crust	**0.0**
Herbaceous Litter	**36.0**
Woody Litter	**6.0**
Duff	**0.0**
Rock	**0.7**

Table I 2 - Canopy Gap Intercept Data Reclaimed Access Route to Corehole Pad Q					
Canopy Gaps > 20 centimeters	**Total of Gaps > 20 cm**	**Gaps 21-50 cm**	**Gaps 51-100 cm**	**Gaps 101-200 cm**	**Gaps >200 cm**
Transect 1	1220	311	542	367	0
Transect 2	1541	134	440	336	631
Transect 3	748	220	346	182	0
Total Gaps (cm)	**3509**	**665**	**1328**	**885**	**631**
% Line in Gaps	**46.79**	**8.87**	**17.71**	**11.80**	**8.41**
Line length for each transect was 25 meters for site total length of 75 meters					

Table I 3 - Transect Coordinate and Access Route Photo-point Locations Reclaimed Access Route to Corehole Pad Q (Datum: UTM Zone 12, WGS 84)						
	Azimuth from starting point (true N)	**Transect Starting Point**		**Transect Ending Point**		
Site		**Northing (mN)**	**Easting (mE)**	**Northing (mN)**	**Easting (mE)**	**Length**
Transect 1	191º	4425206.463	723424.8846	4425181.369	723414.0761	25 meters
Transect 2	066º	4425213.26	723372.5216	4425226.226	723394.1185	25 meters
Transect 3	030º	4424805.744	723134.2429	4424830.212	723142.6768	25 meters
Access Route/Photo-point Location						
Photo-point # 1		4424960.472	723201.1178			
Photo-point # 2		4425059.211	723249.2779			
Photo-point # 3		4425124.942	723399.3975			

Transect Photos, Access Route Photos and Transect Layout Plot

Figure I 1 Transect 1 Reclaimed Access Route to Corehole Pad Q

Figure I 2 Transect 2 Reclaimed Access Route to Corehole Pad Q

Figure I 3 Transect 3 Reclaimed Access Route to Corehole Pad Q

Figure I4 Photo Point #1 Reclaimed Access Route to Corehole Pad Q

Figure I5 Photo Point #2 Reclaimed Access Route to Corehole Pad Q

Figure I6 Photo Point #3 Reclaimed Access Route to Corehole Pad Q

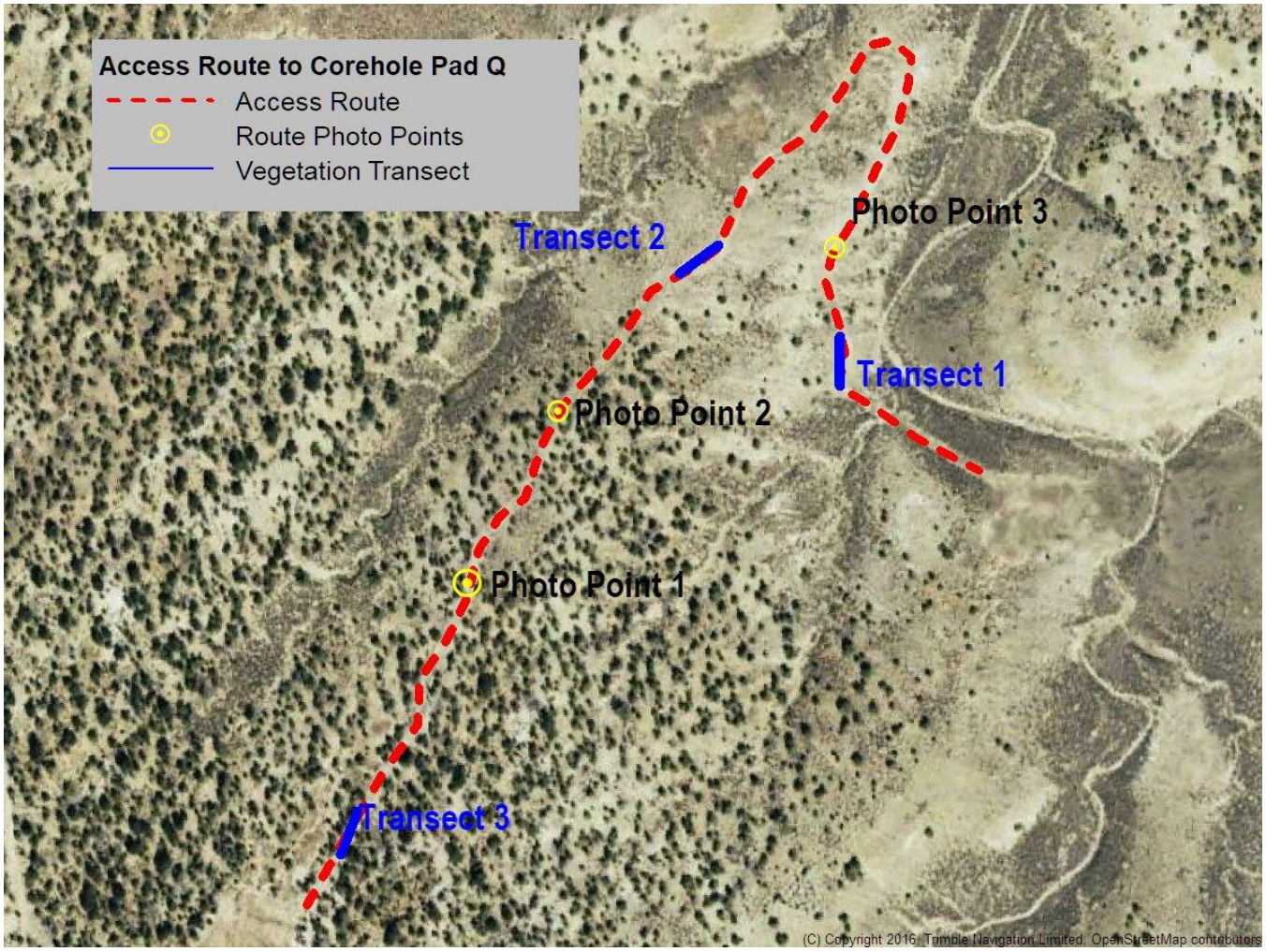


Figure I7 Transect & Photo Point Locations Access Route to Corehole Pad Q

Appendix J – Vegetation Sampling Data Reclaimed Access Route to Corehole Pad T

Table J1 - Vegetation Cover, Species Composition, Species Density & Ground Cover
Reclaimed Access Route to Corehole Pad T

Plant Species Observed within Study Area			Line-Point Canopy Intercept Data [1]			Density Data [2]
Species Symbol	**Scientific Name**	**Common Name**	**percent Foliar Cover**	**percent Basal Cover**	**Species Composition**	
ACHY	*Achnatherum hymenoides*	Indian ricegrass	0.7	0.0	1.04	
ELTR7	*Elymus trachycaulus*	slender wheatgrass	4.7	1.3	7.29	
HECO26	*Hesperostipa comata*	needle & thread needlegrass	4.0	0.7	8.34	
KOMA	*Koeleria macrantha*	prairie junegrass	0.7	0.0	1.04	
PASM	*Pascopyrum smithii*	western wheatgrass	12.7	0.0	22.92	
PSJU3	*Leymus cinereus*	basin wildrye	0.7	0.7	1.04	
PSSPI[3]	*Pseudoroegneria spicata ssp. inermis*	beardless bluebunch wheatgrass	0.0	0.0	0.00	
PSSPS	*Pseudoroegneria spicata ssp. spicata*	bearded bluebunch wheatgrass	0.7	0.7	1.04	**Desirable Forb/Shrub Density (#/m^2)**
		Perennial Grass Totals	**24.2**	**3.4**	**42.71**	
ASCH	*Astragalus chamaeleuce*	cicada milkvetch	0.0	0.0	0.00	0.03
ASCI4	*Astragalus cicer*	cicer milkvetch	0.0	0.0	0.00	0.03
EREA	*Erigeron eatonii*	Eaton's fleabane	0.0	0.0	0.00	0.03
ERLO4	*Eriogonum lonchophyllum*	spearleaf buckwheat	0.0	0.0	0.00	0.07
LEER	*Leucelene ericoides*	heath aster	0.0	0.0	0.00	0.07
MACA2	*Machaeranthera canescens*	hoary tansyaster	0.7	0.0	1.04	0.00
MAGR2	*Machaeranthera grindelioides*	rayless tansyaster	0.7	0.0	1.04	0.03
MESA	*Medicago sativa*	alfalfa	7.3	0.7	14.58	2.64
SPCO	*Sphaeralcea coccinea*	scarlet globemallow	2.0	0.0	4.17	5.47
		Desirable Forb Totals	**10.7**	**0.7**	**20.83**	**8.37**
ARTRW	*Artemisia tridentata var. wyomingensis*	Wyoming big sagebrush	6.7	0.0	10.42	0.43
ATCA2	*Atriplex canescens*	four-wing saltbush	1.3	0.0	2.08	0.10
CHDE2	*Chrysothamnus depressus*	longflower rabbitbrush	0.0	0.0	0.00	0.07
CHVI8	*Chrysothamnus viscidiflorus*	yellow rabbitbrush	1.3	0.0	2.08	0.10
GUSA2	*Gutierrezia sarothrae*	broom snakeweed	8.1	0.0	13.55	0.80
KRLA2	*Krascheninnikovia lanata*	winterfat	1.3	0.0	2.08	0.17
		Shrub Totals	**18.7**	**0.0**	**30.21**	**1.67**
BRTE	*Bromus tectorum*	cheatgrass	2.0	0.0	4.17	
SATR12	*Salsola tragus*	Russian thistle	1.3	0.0	2.08	
		Totals for Invasive and Non-Native Species	**3.3**	**0.0**	**6.25**	
		Vegetation Totals	**56.7**	**4.1**	**100.00**	**10.04**

[1] Sum of data from 3 randomly placed 25 meter transects with 50 sample points collected from each transect. Foliar cover based upon 1st plant species encountered in the canopy at each sample point. Species composition based upon total of all plant species encountered at each sample point.
[2] Sum of density data collected from 10 one-square meter quadrants along each transect. Only desirable forb and shrub densities were recorded based upon reclamation criteria.
[3] Plant species not encountered in sampling data but were present within the study area.
[4] Percentages are not cumulative with vegetation totals, rather a measure by layer of ground cover from the top layer thru the lower layers to the soil surface. Values for bare ground have no vegetative, litter or rock cover above the soil surface.

Percent Ground Cover by Cover Type [4]	
Bare Ground	**35.3**
Biotic Crust	**0.0**
Herbaceous Litter	**23.3**
Woody Litter	**4.0**
Duff	**0.0**
Rock	**0.7**

Table J2 - Canopy Gap Intercept Data Reclaimed Access Route to Corehole Pad T					
Canopy Gaps > 20 centimeters	**Total of Gaps > 20 cm**	**Gaps 21-50 cm**	**Gaps 51-100 cm**	**Gaps 101-200 cm**	**Gaps >200 cm**
Transect 1	1478	161	350	967	0
Transect 2	1101	191	564	346	0
Transect 3	1430	80	420	930	0
Total Gaps (cm)	**4009**	**432**	**1334**	**2243**	**0**
% Line in Gaps	**53.45**	**5.76**	**17.79**	**29.91**	**0.00**
Line length for each transect was 25 meters for site total length of 75 meters					

Table J3 - Transect Coordinates and Access Route Photo-point Locations Reclaimed Access Route to Corehole Pad T (Datum: UTM Zone 12, WGS 84)						
	Azimuth from starting point (true N)	**Transect Starting Point**		**Transect Ending Point**		
Site		**Northing (mN)**	**Easting (mE)**	**Northing (mN)**	**Easting (mE)**	**Length**
Transect 1	328º	4426350.278	723666.6496	4426369.162	723651.3887	25 meters
Transect 2	300º	4426627.554	723438.0903	4426640.309	723418.3934	25 meters
Transect 3	143º	4426822.341	723256.9363	4426804.16	723273.4572	25 meters
Access Route/Photo-point Location						
Photo-point # 1		4426533.231	723551.8364			

Transect Photos, Access Route Photos and Transect Layout Plot

Figure J1 Transect 1 Reclaimed Access Route to Corehole Pad T

Figure J2 Transect 2 Reclaimed Access Route to Corehole Pad T

Figure J3 Transect 3 Reclaimed Access Route to Corehole Pad T

Figure J4 Photo Point 1 - Access Route to Corehole Pad T

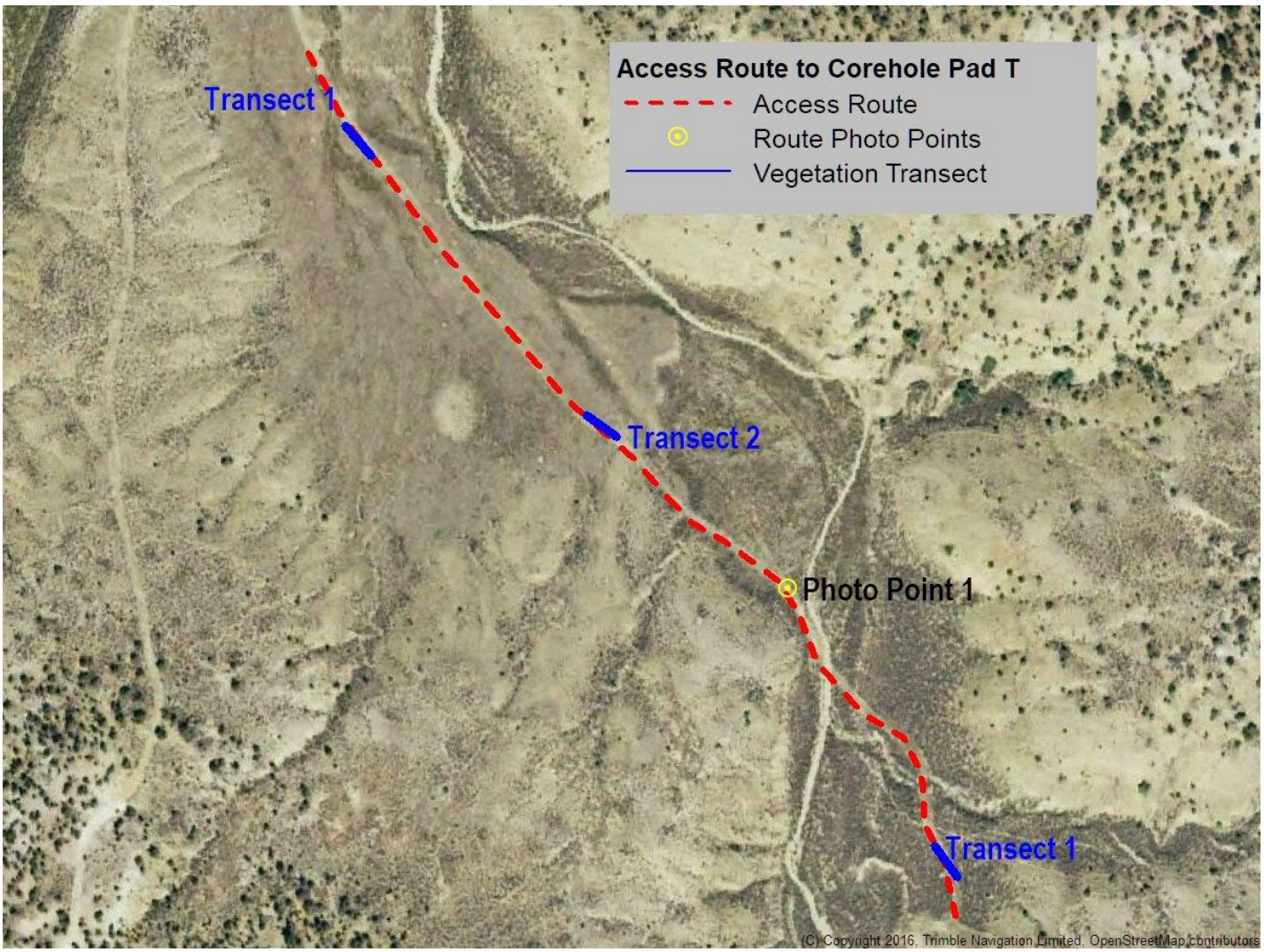


Figure J5 Transect & Photo Point Locations Access Route to Corehole Pad T

Appendix K – Vegetation Sampling Data Reclaimed Water Pipeline WSW-2

Table K1 - Vegetation Cover, Species Composition, Species Density & Ground Cover Reclaimed Waterline WSW-2						
Plant Species Observed within Study Area			**Line-Point Canopy Intercept Data [1]**			**Density Data [2]**
Species Symbol	**Scientific Name**	**Common Name**	**percent Foliar Cover**	**percent Basal Cover**	**Species Composition**	
ACHY	*Achnatherum hymenoides*	Indian ricegrass	2.0	1.0	2.9	
ELLAL	*Elymus lanceolatus*	thickspike wheatgrass	8.0	2.0	11.4	
ELTR7	*Elymus trachycaulus*	slender wheatgrass	11.0	0.0	17.1	
HECO26	*Hesperostipa comata*	needle & thread needlegrass	1.0	1.0	1.4	
PASM	*Pascopyrum smithii*	western wheatgrass	2.0	0.0	2.9	
PSJU3	*Psathyrostachys juncea*	Russian wildrye	16.0	2.0	22.9	
PSSPI	*Pseudoroegneria spicata ssp. inermis*	beardless bluebunch wheatgrass	3.0	0.0	4.3	**Desirable Forb/Shrub Density (#/m^2)**
		Perennial Grass Totals	**43.0**	**6.0**	**62.9**	
ASCH	*Astragalus chamaeleuce*	cicada milkvetch	0.0	0.0	0.0	0.10
ASSP6	*Astragalus spatulatus*	tufted milkvetch	0.0	0.0	0.0	0.10
CRAC	*Crepis acuminata*	longleaf hawksbeard	0.0	0.0	0.0	0.15
DEPI	*Descurainia pinnata*	western tansymustard	0.0	0.0	0.0	0.25
HEBO	*Hedysarum boreale*	Utah sweetvetch	0.0	0.0	0.0	0.05
LEER	*Leucelene ericoides*	heath aster	0.0	0.0	0.0	0.25
LILE3	*Linum lewisii*	Lewis flax	0.0	0.0	0.0	0.25
MACA2	*Machaeranthera canescens*	hoary tansyaster	1.0	0.0	1.4	0.35
MAGR2	*Machaeranthera grindelioides*	rayless tansyaster	1.0	0.0	1.4	0.00
MESA	*Medicago sativa*	alfalfa	0.0	0.0	0.0	0.20
PHHO	*Phlox hoodii*	Hood's phlox	0.0	0.0	0.0	0.10
SPCO	*Sphaeralcea coccinea*	scarlet globemallow	0.0	0.0	1.4	1.00
		Desirable Forb Totals	**2.0**	**0.0**	**4.2**	**2.80**
ARTRW	*Artemisia tridentata var. wyomingensis*	Wyoming big sagebrush	1.0	0.0	1.4	0.10
CHDE2	*Chrysothamnus depressus*	longflower rabbitbrush	0.0	0.0	0.0	0.05
CHVI8	*Chrysothamnus viscidiflorus*	yellow rabbitbrush	1.0	0.0	1.5	0.20
ERNA10	*Ericameria nauseosa*	rubber rabbitbrush	0.0	0.0	0.0	0.05
GUSA2	*Gutierrezia sarothrae*	broom snakeweed	11.0	0.0	15.7	1.90
		Shrub Totals	**13.0**	**0.0**	**18.6**	**2.30**
BRTE	*Bromus tectorum*	cheatgrass	7.0	0.0	12.9	
MEOF	*Melilotus officinalis*	yellow sweetclover	1.0	0.0	1.4	
SATR12[3]	*Salsola tragus*	Russian thistle	0.0	0.0	0.0	
		Totals for Invasive and Non-Native Species	**8.0**	**0.0**	**14.3**	
		Vegetation Totals	**66.0**	**6.0**	**100.0**	**5.10**

[1] Sum of data from 2 randomly placed 25 meter transects with 50 sample points collected from each transect. Foliar cover based upon 1st plant species encountered in the canopy at each sample point. Species composition based upon total of all plant species encountered at each sample point.

[2] Sum of density data collected from 10 one-square meter quadrants along each transect. Only desirable forb and shrub densities were recorded based upon reclamation criteria.

[3] Plant species not encountered in sampling data but were present within the study area.

[4] Percentages are not cumulative with vegetation totals, rather a measure by layer of ground cover from the top layer thru the lower layers to the soil surface. Values for bare ground have no vegetative, litter or rock cover above the soil surface.

Percent Ground Cover by Cover Type [4]	
Bare Ground	**17.0**
Biotic Crust	**0.0**
Herbaceous Litter	**55.0**
Woody Litter	**6.0**
Duff	**0.0**
Rock	**0.0**

Table K2 - Canopy Gap Intercept Data Reclaimed Waterline WSW-2					
Canopy Gaps > 20 centimeters	**Total of Gaps > 20 cm**	**Gaps 21-50 cm**	**Gaps 51-100 cm**	**Gaps 101-200 cm**	**Gaps >200 cm**
Transect 1	1081	490	264	327	0
Transect 2	1033	211	204	618	0
Total Gaps (cm)	**2114**	**701**	**468**	**945**	**0**
% Line in Gaps	**42.28**	**14.02**	**9.36**	**18.90**	**0.00**
Line length for each transect was 25 meters for site total length of 50 meters					

Table K3 - Transect Coordinates Locations Reclaimed Waterline WSW-2 (Datum: UTM Zone 12, WGS 84)						
	Azimuth from starting point (true N)	**Transect Starting Point**		**Transect Ending Point**		
Site		**Northing (mN)**	**Easting (mE)**	**Northing (mN)**	**Easting (mE)**	**Length**
Transect 1	305º	4423679.213	725717.5548	4423691.851	725697.8499	25 meters
Transect 2	133º	4423803.382	725438.121	4423792.696	725456.2278	25 meters

Transect Photos and Transect Layout

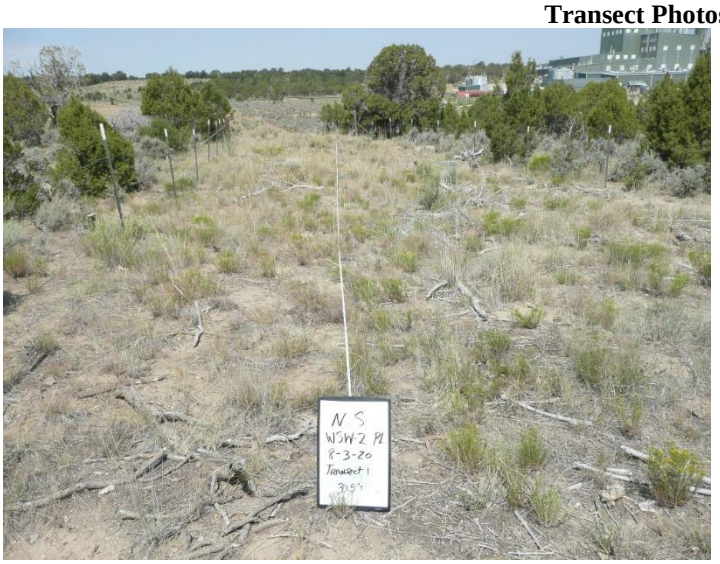


Figure K1 Transect 1 Reclaimed Waterline WSW-2

Figure K2 Transect 2 Reclaimed Waterline WSW-2

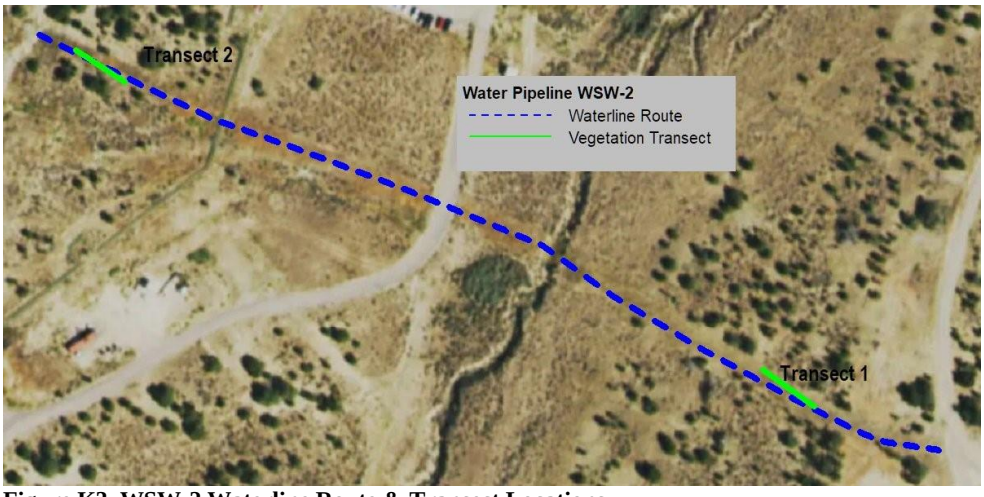


Figure K3 WSW-2 Waterline Route & Transect Locations

Appendix L – Vegetation Sampling Data Reclaimed Water Pipeline WSW-3

Table L1 - Vegetation Cover, Species Composition, Species Density & Ground Cover Reclaimed Waterline WSW-3						
Plant Species Observed within Study Area			**Line-Point Canopy Intercept Data [1]**			**Density Data [2]**
Species Symbol	**Scientific Name**	**Common Name**	**percent Foliar Cover**	**percent Basal Cover**	**Species Composition**	
ELLAL	*Elymus lanceolatus*	thickspike wheatgrass	3.0	0.0	3.4	
ELTR7	*Elymus trachycaulus*	slender wheatgrass	20.0	3.0	27.7	
HECO26	*Hesperostipa comata*	needle & thread needlegrass	4.0	0.0	4.6	
LECI4	*Leymus cinereus*	basin wildrye	5.0	2.0	5.7	
NAVI4	*Nassella viridula*	green needlegrass	5.0	0.0	8.1	
PASM	*Pascopyrum smithii*	western wheatgrass	1.0	0.0	1.1	
PSJU3	*Psathyrostachys juncea*	Russian wildrye	15.0	2.0	21.9	
PSSPI	*Pseudoroegneria spicata ssp. inermis*	beardless bluebunch wheatgrass	1.0	0.0	1.1	**Desirable Forb/Shrub Density (#/m^2)**
THIN6	*Thinopyrum intermedium*	pubescent wheatgrass	1.0	0.0	1.1	
		Perennial Grass Totals	**55.0**	**7.0**	**74.7**	
ASCI4	*Astragalus cicer*	cicer milkvetch	1.0	0.0	1.1	0.55
ASSP6	*Astragalus spatulatus*	tufted milkvetch	0.0	0.0	0.0	0.05
EREA	*Erigeron eatonii*	Eaton's fleabane	0.0	0.0	0.0	0.10
HEBO	*Hedysarum boreale*	Utah sweetvetch	0.0	0.0	0.0	0.10
LILE3	*Linum lewisii*	Lewis flax	0.0	0.0	0.0	0.40
MACA2	*Machaeranthera canescens*	hoary tansyaster	0.0	0.0	0.0	0.30
MESA	*Medicago sativa*	alfalfa	5.0	0.0	10.4	2.05
PEPA8	*Penstemon palmeri*	Palmer's penstemon	0.0	0.0	0.0	0.40
PHHO	*Phlox hoodii*	Hood's phlox	0.0	0.0	0.0	0.10
SPCO	*Sphaeralcea coccinea*	scarlet globemallow	0.0	0.0	0.0	0.65
TRDU	*Tragopogon dubius*	western salsify	0.0	0.0	0.0	0.05
		Desirable Forb Totals	**6.0**	**0.0**	**11.5**	**4.75**
ARTRW	*Artemisia tridentata var. wyomingensis*	Wyoming big sagebrush	0.0	0.0	0.0	0.05
ATCA2	*Atriplex canescens*	four-wing saltbush	4.0	0.0	4.7	0.25
GUSA2	*Gutierrezia sarothrae*	broom snakeweed	0.0	0.0	0.0	0.05
KRLA2	*Krascheninnikovia lanata*	winterfat	3.0	0.0	3.4	0.10
		Shrub Totals	**7.0**	**0.0**	**8.1**	**0.45**
BRTE	*Bromus tectorum*	cheatgrass	4.0	0.0	5.7	
		Totals for Invasive and Non-Native Species	**4.0**	**0.0**	**5.7**	
		Vegetation Totals	**72.0**	**7.0**	**100.0**	**5.20**

[1] Sum of data from 2 randomly placed 25 meter transects with 50 sample points collected from each transect. Foliar cover based upon 1st plant species encountered in the canopy at each sample point. Species composition based upon total of all plant species encountered at each sample point.

[2] Sum of density data collected from 10 one-square meter quadrants along each transect. Only desirable forb and shrub densities were recorded based upon reclamation criteria.

[3] Plant species not encountered in sampling data but were present within the study area.

[4] Percentages are not cumulative with vegetation totals, rather a measure by layer of ground cover from the top layer thru the lower layers to the soil surface. Values for bare ground have no vegetative, litter or rock cover above the soil surface.

Percent Ground Cover by Cover Type [4]	
Bare Ground	**14.0**
Biotic Crust	**0.0**
Herbaceous Litter	**66.0**
Woody Litter	**1.0**
Duff	**0.0**
Rock	**0.0**

Table L2 - Canopy Gap Intercept Data Reclaimed Waterline WSW-3					
Canopy Gaps > 20 centimeters	**Total of Gaps > 20 cm**	**Gaps 21-50 cm**	**Gaps 51-100 cm**	**Gaps 101-200 cm**	**Gaps >200 cm**
Transect 1	415	285	130	0	0
Transect 2	436	191	245	0	0
Total Gaps (cm)	**851**	**476**	**375**	**0**	**0**
% Line in Gaps	**17.02**	**9.52**	**7.50**	**0.00**	**0.00**
Line length for each transect was 25 meters for site total length of 50 meters					

Table L3 - Transect Coordinates Locations Reclaimed Waterline WSW-3 (Datum: UTM Zone 12, WGS 84)						
	Azimuth from starting point (true N)	**Transect Starting Point**		**Transect Ending Point**		
Site		**Northing (mN)**	**Easting (mE)**	**Northing (mN)**	**Easting (mE)**	**Length**
Transect 1	284º	4424470.326	725440.7994	4424474.316	725417.9318	25 meters
Transect 2	121º	4424472.522	725488.7138	4424468.022	725513.1361	25 meters

Transect Photos and Transect Layout

Figure L1 Transect 1 Reclaimed Waterline WSW-3

Figure L2 Transect 2 Reclaimed Waterline WSW-3

Figure L3 WSW-3 Waterline Route & Transect Locations

Appendix M – Vegetation Sampling Data Reclaimed Water Pipeline WSW-4

Table M1 - Vegetation Cover, Species Composition, Species Density & Ground Cover
Reclaimed Waterline WSW-4

Plant Species Observed within Study Area			Line-Point Canopy Intercept Data [1]			Density Data [2]
Species Symbol	**Scientific Name**	**Common Name**	**percent Foliar Cover**	**percent Basal Cover**	**Species Composition**	
ACHY	*Achnatherum hymenoides*	Indian ricegrass	6.7	0.7	9.9	
ELLAL	*Elymus lanceolatus*	thickspike wheatgrass	4.0	0.7	6.9	
ELTR7	*Elymus trachycaulus*	slender wheatgrass	18.7	2.0	29.7	
HECO26	*Hesperostipa comata*	needle & thread needlegrass	4.7	0.7	7.9	
NAVI4	*Nassella viridula*	green needlegrass	4.7	1.3	7.9	
PASM	*Pascopyrum smithii*	western wheatgrass	6.0	0.0	8.9	
PSJU3	*Psathyrostachys juncea*	Russian wildrye	10.0	2.7	14.8	
PSSPI	*Pseudoroegneria spicata ssp. inermis*	beardless bluebunch wheatgrass	1.3	0.7	2.0	
PSSPS	*Pseudoroegneria spicata ssp. spicata*	bearded bluebunch wheatgrass	0.7	0.0	1.0	**Desirable Forb/Shrub Density (#/m²)**
THIN6	*Thinopyrum intermedium*	pubescent wheatgrass	0.7	0.0	1.0	
		Perennial Grass Totals	**57.5**	**8.8**	**90.0**	
ASCI4	*Astragalus cicer*	cicer milkvetch	0.7	0.0	1.0	0.51
ASSP6	*Astragalus spatulatus*	tufted milkvetch	0.0	0.0	0.0	0.20
CRFL6	*Cryptantha flavoculata*	roughseed cryptanth	0.0	0.0	0.0	0.20
ERLO4	*Eriogonum lonchophyllum*	spearleaf buckwheat	0.0	0.0	0.0	0.03
HEBO	*Hedysarum boreale*	Utah sweetvetch	0.0	0.0	0.0	0.10
LEER	*Leucelene ericoides*	heath aster	0.0	0.0	0.0	0.13
LILE3	*Linum lewisii*	Lewis flax	0.0	0.0	0.0	0.57
MACA2	*Machaeranthera canescens*	hoary tansyaster	0.0	0.0	0.0	0.10
MAGR2	*Machaeranthera grindelioides*	rayless tansyaster	0.0	0.0	1.0	0.13
MESA	*Medicago sativa*	alfalfa	1.3	0.7	2.0	2.53
PHHO	*Phlox hoodii*	Hood's phlox	0.0	0.0	0.0	0.10
SPCO	*Sphaeralcea coccinea*	scarlet globemallow	0.7	0.0	1.0	0.23
		Desirable Forb Totals	**2.7**	**0.7**	**5.0**	**4.83**
ATCA2	*Atriplex canescens*	four-wing saltbush	2.0	0.0	3.0	0.57
ATCO	*Atriplex confertifolia*	shadscale saltbush	0.0	0.0	0.0	0.03
GUSA2	*Gutierrezia sarothrae*	broom snakeweed	0.7	0.0	1.0	0.20
KRLA2	*Krascheninnikovia lanata*	winterfat	0.0	0.0	0.0	0.07
		Shrub Totals	**2.7**	**0.0**	**4.0**	**0.87**
BRTE	*Bromus tectorum*	cheatgrass	0.7	0.0	1.0	
SATR12[3]	*Salsola tragus*	Russian thistle	0.0	0.0	0.0	
		Totals for Invasive and Non-Native Species	**0.7**	**0.0**	**1.0**	
		Vegetation Totals	**63.6**	**9.5**	**100.0**	**5.70**

[1] Sum of data from 3 randomly placed 25 meter transects with 50 sample points collected from each transect. Foliar cover based upon 1st plant species encountered in the canopy at each sample point. Species composition based upon total of all plant species encountered at each sample point.
[2] Sum of density data collected from 10 one-square meter quadrants along each transect. Only desirable forb and shrub densities were recorded based upon reclamation criteria.
[3] Plant species not encountered in sampling data but were present within the study area.
[4] Percentages are not cumulative with vegetation totals, rather a measure by layer of ground cover from the top layer thru the lower layers to the soil surface. Values for bare ground have no vegetative, litter or rock cover above the soil surface.

Percent Ground Cover by Cover Type [4]	
Bare Ground	**22.7**
Biotic Crust	**0.0**
Herbaceous Litter	**46.0**
Woody Litter	**1.3**
Duff	**0.0**
Rock	**0.0**

Table M2 - Canopy Gap Intercept Data Reclaimed Waterline WSW-4					
Canopy Gaps > 20 centimeters	**Total of Gaps > 20 cm**	**Gaps 21-50 cm**	**Gaps 51-100 cm**	**Gaps 101-200 cm**	**Gaps >200 cm**
Transect 1	656	524	132	0	0
Transect 2	751	299	452	0	0
Transect 3	658	389	269	0	0
Total Gaps (cm)	**2065**	**1212**	**853**	**0**	**0**
% Line in Gaps	**27.53**	**16.16**	**11.37**	**0.00**	**0.00**
Line length for each transect was 25 meters for site total length of 75 meters					

Table M3 - Transect Coordinates Locations Reclaimed Waterline WSW-4 (Datum: UTM Zone 12, WGS 84)						
		Transect Starting Point		**Transect Ending Point**		
Site	**Azimuth from starting point (true N)**	**Northing (mN)**	**Easting (mE)**	**Northing (mN)**	**Easting (mE)**	**Length**
Transect 1	094º	4424474.439	725782.3499	4424477.881	725808.5041	25 meters
Transect 2	108º	4424499.058	726114.2273	4424493.904	726139.0115	25 meters
Transect 3	282º	4424496.981	726358.635	4424512.784	726325.837	25 meters

Transect Photos and Transect Layout

Figure M1 Transect 1 Reclaimed Waterline WSW-4

Figure M2 Transect 2 Reclaimed Waterline WSW-4

Figure M3 Transect 3 Reclaimed Waterline WSW-4

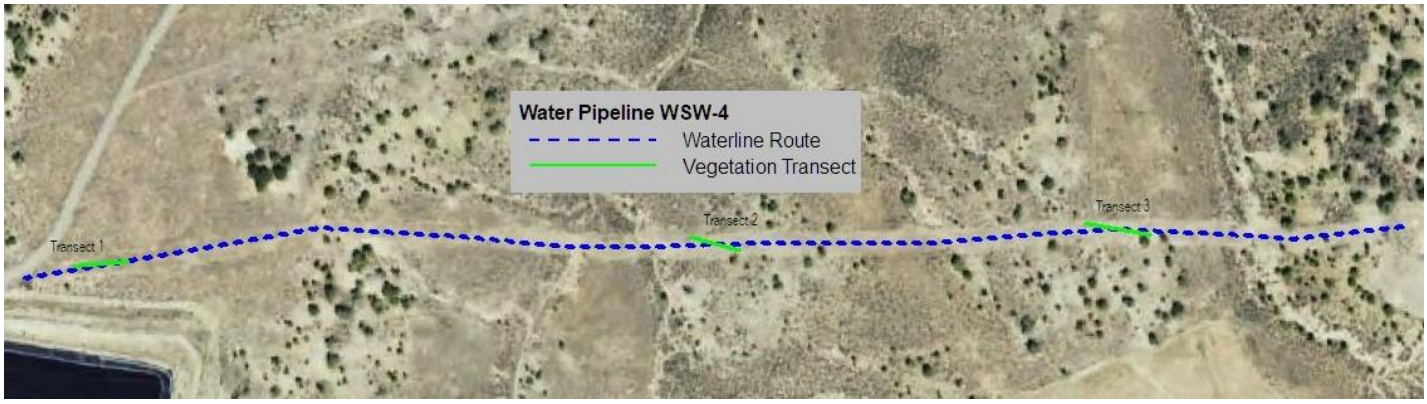


Figure M4 WSW-4 Waterline Route & Transect Locations