TRI-STATE

February 23, 2023

Mr. Zach Trujillo
Environmental Protection Specialist
Colorado Division of Reclamation, Mining & Safety
Department of Natural Resources
1313 Sherman Street, Room 215
Denver, CO 80203

RE: Colowyo Coal Company L.P.
Permit No. C-1981-019
2021 Annual Hydrology & Reclamation Report

Dear Mr. Trujillo,

Tri-State Generation and Transmission Association, Inc. (Tri-State), is the parent company to Axial Basin Coal Company, which is the general partner to Colowyo Coal Company L.P (Colowyo). The Colowyo Mine operates under the Colorado Division of Reclamation, Mining, and Safety Permit No. C-1981-019.

Rule 2.04.13(1) states, by February 15, or other such date as agreed on, each permittee shall file an annual reclamation report covering the previous calendar years for all areas under bond, and Rule 4.05.13(4)(c) states, a hydrologic report shall be submitted to the Division annually with the date of the submittal determined in consultation with the permittee. Colowyo by permit is required to submit both reports annually by March 15. Therefore, enclosed please find the Annual Reclamation Report and the Annual Hydrology Report for the calendar year 2022.

If you should have any questions or concerns, please feel free to contact Tony Tennyson at (970) 824-1232 at your convenience.

Sincerely,

DocuSigned by:
Chris Gilbreath
D250C711D0BF450...

Chris Gilbreath
Senior Manager
Remediation and Reclamation

GC:TT:der

Enclosure

cc: Tony Tennyson (via email)
File: C.F 17.14
G474-11.3(21)f - G474-11.3(21)g

P.O. BOX 33695
DENVER, CO 80233-0695
303-452-6111
WWW.TRISTATE.COOP

COLOWYO COAL COMPANY L.P.

Permit No. C-1981-019

Annual Hydrology
Water Year January 1, 2022 to December 31, 2022

Annual Reclamation Report
Report Year 2022

LIST OF EXHIBITS

SECTION 1 – SURFACE AND GROUND WATER DATA

RULE REQUIREMENT

Rule 4.05.13(4)(c) Monitoring Report Requirements

(i) Water quantity data for the monitoring sites is presented in Exhibit 1A and 1C of this report.

(ii) Water quality data obtained from the monitoring sites is presented in Exhibit 1A through 1D of this report. Discharge monitoring reports are submitted to the Colorado Department of Public Health and Environment on a monthly basis. A copy is forwarded to the Division each month.

(iii) A written interpretation of the data was requested by the Division in a letter to Colowyo dated September 30, 2013. Colowyo has been providing a written interpretation of the data annually, beginning with the submittal of the 2013 annual hydrology report; therefore, compliance has been met for this Rule as requested by the Division.

All analytical results from surface and ground water monitoring have been tabulated and are kept on file at the Colowyo mine site. Historical data is presented in past annual hydrology reports. The monitoring timeframe for this annual hydrology report (water year) is from January 1, 2021 through December 31, 2021.

A description of the surface and ground water monitoring plan is located in Colowyo's Permit No. C-1981-008, Volume 15, Section 4.05.13. Please see Map 10A in the permit for monitoring locations. Monitoring of each location occurs on a quarterly basis

SURFACE WATER

Colowyo currently samples each surface water monitoring location for a variety of quality parameters. Of all the parameters that are analyzed for, several key indicator parameters are identified an analyzed in more depth within this report. These are lab pH, lab conductivity, TDS, sulfate, calcium, iron, magnesium, sodium, and flow rate. Summary of the indicator parameters for each surface water monitoring location is provided in a table format. Surface water monitoring sites within each corresponding drainage have been compiled together and analyzed together as up gradient and down gradient conditions where applicable.

Sampling results acquired during the water year from each surface water monitoring location are presented in Exhibit 1A. Exhibit 1B presents a graphical statistical analysis of the up and down gradient surface monitoring locations (where applicable) for each

drainage potentially impacted by Colowyo's mining operations. These drainages include Good Spring Creek, Taylor Creek, Jubb Creek, Little Collom Gulch, and Collom Gulch.

Good Spring Creek

Five surface water-monitoring locations have been established along Good Spring Creek.

New Upper Good Springs Creek (NUGSC) is a downstream site, located south of the mine along State Highway 13. Monitoring has occurred from 1992 to 2021.

Lower Good Spring Creek (LGSC) is a downstream site below NUGSC, located below active mining conditions along State Highway 13. Monitoring has occurred from 1982 to 2021.

Upper West Fork Good Spring Creek (UWFGSC) is an upstream site, located southwest of the mine along State Highway 13. Monitoring has occurred from the fourth quarter of 2007 to 2021.

The final two monitoring locations, EFGSC and LWFGSC are flow measurements only. The flows from these two locations are applied to create the actual flow for NUGSC.

NUGSC:

Parameter	Mean	Std dev	Range	Max.	Min.	Max at	Min at
Lab pH	8.19	0.25	1.1	8.6	7.5	04/27/98	10/24/02
Lab Cond.	1507	293	2842	3600	758	03/06/98	05/27/93
TDS	1141	231	1250	1610	360	7/8/2002	05/08/02
Sulfate	499	138	760	930	170	7/8/2002	05/20/97
Calcium	126	19	166	169	3.4	08/02/02	06/01/93
Iron	0.78	1.5	8.53	8.54	0.01	05/17/99	02/11/02
Magnesium	122.7	29.0	226.9	228	1.1	08/02/02	04/27/98
Sodium	48.6	16.0	121.1	138	16.9	11/10/08	04/27/98
Flow rate	2.87	3.23	19.99	20	0.01	04/27/98	9/14/22

NUGSC Water Year Review

There were not any minimum or maximum values from sampling in 2022 at NUGSC. All sampling results for 2022 within historical analysis. For the indicator parameters most are staying very stable with no trends apparent. Laboratory pH is slightly trending upward. Data for the water year for NUGSC is provided in Exhibit 1A.

LGSC:

Parameter	Mean	Std dev	Range	Max.	Min.	Max at	Min at
Lab pH	8.09	0.26	2.5	8.6	6.1	08/19/91	05/14/91
Lab Cond.	1,733	334	3139	3300	161	08/21/18	06/23/92
TDS	1,391	355	3420	4050	630	11/08/00	05/23/95
Sulfate	658	161	815	1050	235	08/21/18	05/20/97
Calcium	141	24	198	208	10	12/28/89	3/13/84
Iron	0.63	0.87	8.81	8.84	0.03	08/13/08	04/08/15
Magnesium	145.2	29.3	225.3	226.0	0.7	12/04/89	05/20/97
Sodium	89.3	49.25	323.3	343	19.7	08/21/18	04/17/00
Flow rate	4.00	5.07	46.94	47.0	0.06	04/27/98	12/06/99

LGSC Water Year Review

No results from 2022 sampling were minimum or maximum values for any parameters listed above during the monitoring period. All sampling results for 2022 tracked consistent with historical analyses. For the indicator parameters most are staying very stable. Laboratory conductivity, TDS, pH, and sodium are trending upward, while sulfate is showing a minor trend downward over time. Flows for Good Spring Creek are trending down also. Data for the water year for LGSC is provided in Exhibit 1A.

UWFGSC:

Parameter	Mean	Std dev	Range	Max.	Min.	Max at	Min at
Lab pH	8.5	0.1	0.6	8.7	8.1	5/11/22	11/2/09
Lab Cond.	956	214	1027	1330	303	03/19/14	04/15/08
TDS	694	153	620	930	310	9/15/21	5/15/19
Sulfate	219	77	290	358	68	9/15/21	5/15/19
Calcium	97	16	66	121	55	11/10/11	5/15/19
Iron	1.52	2.09	9.81	9.86	0.05	04/27/16	10/31/12
Magnesium	76	20	90	120	30	9/15/21	5/15/19
Sodium	9	3	15	19	4	2/23/10	5/15/19
Flow rate	1.07	1.81	8.92	8.94	0.02	5/15/19	10/31/12

UWFGSC Water Year Review

For the 2022 water year, a maximum value for pH occurred. All other sampling results for 2022 tracked similar to historical analysis. For the indicator parameters most are staying very stable with no trends apparent with the exception of pH was is slight trending upward. Data for the water year for UWFGSC is provided in Exhibit 1A.

Good Spring Creek Impact Assessment

As shown on the graphs in Exhibit 1B for the indicator parameters, when comparing the up gradient and down gradient locations, LGSC tends to be historically higher for some the indicator parameters including calcium, laboratory conductivity, magnesium, sodium, sulfate, and TDS. As discussed in Volume 1, Section 2.04.7, TDS concentrations showed an incremental increase (pre-mine) of 40 mg/l to 50 mg/l per mile of flow for Wilson and Good Spring Creeks. Therefore, the increase in the indicator parameters tracks similar to surface water conditions found on Good Spring Creek prior to mining occurring.

Overall, the indicator parameters up gradient versus down gradient of mining are typically stable including calcium, iron, magnesium, and sulfate. Sodium, electrical conductivity, and TDS at LGSC are trending upward over time compared to the up-gradient locations, while pH at all up gradient and down gradient locations is increasing. pH at the down gradient location LGSC is lower overall than NUGSC and UWFGSC.

TDS concentrations were predicted to increase in surface water during the post-mining period [Volume 1 Section 2.04.7 and Volume 12 Section 2.05.6(3)(b)(iii)] with sulfate being the dominate increasing ion. This impact would be due to infiltration through mine spoil material. Water flowing through the backfill spoil areas is expected to exhibit a temporary increase in TDS owing to rapid dissolution of relatively soluble minerals such as gypsum and calcite. The increase in TDS and major ions is predicated to be followed by a gradual decrease over time. Data from the down gradient location LGSC is showing increases in TDS as predicted. Please refer to Exhibit 1B for graphs presenting the long-term trends for LGSC in comparison to the up-gradient monitoring locations NUGSC and UWFGSC. The trends in the data presented including an increase in TDS due to mining are as predicated to occur within the Good Spring Creek watershed.

Base flows in Good Spring Creek were also anticipated to be decreased by approximately 7% for approximately 45 years due to mining [Volume 12 Section 2.05.6(3)(b)(iii)]. Data from the down gradient location LGSC is trending downward, while the up-gradient locations are remaining stable or slightly increasing (Exhibit 1B). However, the Colowyo Mine area has experienced drought conditions for many years and decreased flows in Good Spring Creek cannot fully be contributed to mining activities from Colowyo specifically, as overall precipitation over the long term in the area of Colowyo has been trending down. This predicted impact in decreased flows from mining activities has been minimized overall.

Taylor Creek

One surface water-monitoring location, Lower Taylor Creek (LTC) has been established along Taylor Creek and is a downstream site, located below active mining conditions near Moffat County Road 17. Monitoring has occurred from 1983 to 2022. Colowyo's mining area extends into the headwaters of Taylor Creek; therefore, no upstream monitoring location has been established for comparison of data to the down gradient LTC location.

LTC:

Parameter	Mean	Std dev	Range	Max.	Min.	Max at	Min at
Lab pH	8.2	0.3	1.7	8.7	7	09/13/16	02/22/89
Lab Cond.	1824	670	3650	3850	200	3/22/22	02/28/90
TDS	1496	641	2776	2920	144	11/10/11	02/28/90
Sulfate	698	354	1591	1610	19	11/10/11	02/28/90
Calcium	96	25	133	159	26	11/10/11	02/05/01
Iron	3.5	15.3	132	132	0.01	02/28/90	09/13/95
Magnesium	126	41	230	238	8	10/12/88	02/28/90
Sodium	206	173	694	700	6	11/12/19	02/28/90
Flow rate	0.35	0.78	6.3	6.3	0	04/29/86	12/13/02

LTC Water Year Review

Sampling results for the 2021 water year track within all previous acquired results and no minimum or maximum values were noted. For the indicator parameters, some are increasing including laboratory conductivity, TDS, sulfate, pH, and sodium. Data for the water year for LTC is provided in Exhibit 1A.

Taylor Creek Impact Assessment

TDS concentrations were predicted to increase in surface water during the post-mining period [Volume 1 Section 2.04.7 and Volume 12 Section 2.05.6(3)(b)(iii)] with sulfate being the dominate increasing ion. This impact would be due to infiltration through mine spoil material. Water flowing through the backfill spoil areas is expected to exhibit a temporary increase in TDS owing to rapid dissolution of relatively soluble minerals such as gypsum and calcite. The increase in TDS and major ions is predicated to be followed by a gradual decrease over time. A significant acreage of reclamation has occurred in the Taylor Creek watershed, and data from LTC is showing increases in TDS as predicted. Please refer to Exhibit 1B for graphs presenting the long-term trends for LTC. The trends

in the data presented, including an increase in TDS, confirm predictions from mining activities occurring within the Taylor Creek watershed.

Base flows in Taylor Creek were also anticipated to be decreased by approximately 2% [Volume 12 Section 2.05.6(3)(b)(iii)] from mining activities in the South Taylor Pit. Data from LTC is trending downward (Exhibit 1B). The notable part of this downward trend is an extended period of minimal to zero flows recorded in at LTC. Prior to mining activities Taylor Creek was an ephemeral drainage at best, and Colowyo uses water from Taylor Creek as part of a water right held by Colowyo on Taylor Creek above LTC. In approximately 2011, flows from Taylor Creek became more consistent than was recorded from 2002, and have been more consistent than the previous years of minimal or no flow. If the years of low to zero flow were removed, the base flows in Taylor Creek would be consistent or increasing. Given this, the predicted impact of decreased flows has not occurred overall as flows in Taylor Creek have increased or have been more consistent since approximately 2011.

Jubb Creek

Two surface water-monitoring locations have been established along Jubb Creek. Confluence of Jubb Creek (CJC) represents the aggregate water quality in the Jubb Creek basin, downstream of mining impacted areas. Monitoring has occurred from the first quarter of 2011 to 2022.

West Fork of Jubb Creek (WFJC) represents conditions in the Jubb Creek watershed adjacent to the mining disturbance. Monitoring has occurred from the first quarter of 2011 to 2022.

CJC:

Parameter	Mean	Std dev	Range	Max.	Min.	Max at	Min at
Lab pH	8.4	0.1	0.4	8.6	8.2	08/18/11	03/14/12
Lab Cond.	1994	253	1460	2380	920	11/26/16	03/22/11
TDS	1545	187	1150	1820	670	08/01/12	03/22/11
Sulfate	639	111	680	859	179	11/21/16	03/22/11
Calcium	141	16	77	178	101	08/01/12	3/6/19
Iron	0.81	1.47	8.88	8.93	0.05	9/4/19	08/18/11
Magnesium	156	21	130	199	69	11/21/16	03/22/11
Sodium	137	22	140	167	27	08/01/12	03/22/11
Flow rate	0.09	0.13	0.79	0.8	0.01	9/4/19	08/20/18

CJC Water Year Review

No minimum or maximum value were recorded in 2022 for CJC. For the indicator parameters most are stable over time at CJC. Iron was shown to be increasing some in 2019 and 2020, but appears to be trending back down to pre-mine levels in 2021 and 2022. Data for the water year for CJC is provided in Exhibit 1A.

WFJC:

Parameter	Mean	Std dev	Range	Max.	Min.	Max at	Min at
Lab pH	8.44	0.10	0.6	8.6	8	11/19/13	03/14/12
Lab Cond.	1230.7	133.5	858	1740	882	03/22/11	05/04/11
TDS	901.8	115.0	680	1450	770	03/22/11	05/04/11
Sulfate	326.5	65.8	415	651	236	03/22/11	11/08/11
Calcium	119.2	8.2	39	135	96	11/05/14	09/18/17
Iron	0.36	0.60	3.52	3.57	0.05	05/04/11	08/18/11
Magnesium	99.4	11.0	64	143	79	03/22/11	05/04/11
Sodium	18.7	21.2	126	139	13	03/22/11	11/29/17
Flow rate	0.03	0.03	0.13	0.13	0.00	05/15/11	08/20/18

WFJC Water Year Review

No maximum or minimum values were recorded in 2022 as WFJC was dry at for all sampling events during the water year. For the indicator parameters, all have been stable overtime at WFJC. Data for the water year for WFJC is provided in Exhibit 1A.

Jubb Creek Impact Assessment

A complete data set from March of 2011 to December of 2022 is presented on the graphs in Exhibit 1B, which provides WFJC and CJC indicator parameters together on one graph. While reviewing this data, it needs to be noted that the Jubb Creek Haul Road disturbance commenced in 2017, and mining in the Collom Pit commenced in 2018; therefore, data acquired prior to 2017 represents the background condition prior to mining occurring.

Data results as shown for the indicator parameters establishes the down gradient location CJC tends to be higher overall than WFJC, except for pH. Iron is trending upward at the CJC, however, sampling results from 2021 and 2022 indicate that iron is decreasing down towards pre-mining levels. All the remaining indicator parameters tend to track along with baseline conditions of Jubb Creek for both CJC and WFJC.

Potential mining impacts to Jubb Creek as described in Colowyo's permit were not anticipated to be statistically significant [Volume 15 Section 2.05.6(3)(b)(i & ii)]. To date, the data acquired and presented in this report indicates all the indicator parameter are tracking similar to pre-mine conditions except for iron at CJC. Iron appears to be trending downward from 2021 and 2022 which indicates impacts may not be occurring as data was indicating in 2019 and 2020. The remaining indicator parameters track similar to pre-mining conditions, which indicates that surface water impacts from the Jubb Creek Haul Road and Collom mining operations are being minimized on Jubb Creek.

Collom Gulch

Two surface water-monitoring locations have been established along Collom Gulch. Upper Collom Gulch (UCG) represents the water quality conditions in Collom Gulch upstream of the Collom mining area. Monitoring has occurred from the first quarter of 2011 through 2022.

Lower Collom Gulch (LCG) represents the conditions in Collom Gulch downstream of mining impacts. Monitoring has occurred from the first quarter of 2011 through 2022.

UCG:

Parameter	Mean	Std dev	Range	Max.	Min.	Max at	Min at
Lab pH	8.6	0.1	0.4	8.7	8.3	08/01/12	03/22/11
Lab Cond.	675	158	726	1140	414	03/18/11	5/13/19
TDS	458	122	550	820	270	03/22/11	5/13/19
Sulfate	105	66	272	273	1	03/22/11	11/08/11
Calcium	73	16	70	118	48	03/22/11	5/13/19
Iron	1.6	2.1	8.95	9.0	0.05	04/26/16	08/18/11
Magnesium	44	15	74	97	23	03/22/11	05/19/14
Sodium	11	4	12	18	6	07/31/13	5/13/19
Flow rate	0.23	0.42	1.57	1.57	0	04/26/16	03/13/13

UCG Water Year Review

No maximum or minimum values were recorded in 2022. For the indicator parameters all demonstrate a consistent stability over time. Data acquired in 2022 tracked within previously analysis acquired from this UCG. Data for the water year for UCG is provided in Exhibit 1A.

LCG:

Parameter	Mean	Std dev	Range	Max.	Min.	Max at	Min at
Lab pH	8.4	0.1	0.6	8.7	8.1	08/20/18	03/14/12
Lab Cond.	1001	191	1139	1830	691	5/13/19	05/04/11
TDS	687	204	1100	1540	440	5/13/19	05/24/17
Sulfate	204	78	558	658	100	5/13/19	05/24/17
Calcium	100	11	63	138	75	5/13/19	05/24/17
Iron	1.04	1.49	7.12	7.17	0.05	04/26/16	08/18/11
Magnesium	67	16	119	159	40	5/13/19	05/24/17
Sodium	29	17	119	133	14	5/13/19	03/22/11
Flow rate	0.25	0.41	1.57	1.57	0.00	05/04/11	10/20/15

LCG Water Year Review

No maximum or minimum values were recorded in 2022. The indicator parameters at LCG have been stable over time. Data acquired in 2022 from LCG tracked within previously analysis acquired from this location. Data for the water year for LCG is provided in Exhibit 1A.

Collom Gulch Impact Assessment

A complete data set from March of 2011 to December of 2022 is presented on the graphs in Exhibit 1B, which provides UCG and LCG indicator parameters together on one graph. While reviewing this data, it should be noted that mining in the Collom Pit commenced in 2018; therefore, data acquired prior to 2018 represents the background condition prior to mining occurring.

Data results as shown from the indicator parameters express that the down gradient location LCG and up gradient UCG trend very similar over time for all the indicator parameters. Iron is trending upward at the up-gradient location UCG, while the down gradient LCG tends to remain constant. pH at both monitoring locations are trending upward with the upgradient site UCG reporting increased pH levels over the down gradient site LCG. All the remaining indicator parameters tend to track along with baseline conditions of Collom Gulch.

Potential mining impacts to Collom Gulch as described Colowyo's permit were not anticipated to be statistically significant [Volume 15 Section 2.05.6(3)(b)(i & ii)]. To date, the data acquired and presented in this report indicates all the indicator parameter are tracking similar to pre-mine conditions with influences from seasonal fluctuations. This signifies that impacts from the Collom mining operations have not occurred as predicated to date.

Little Collom Gulch

One surface water monitoring location, LLCG, has been established along Little Collom Gulch and represents the conditions in Little Collom Gulch downstream of mining disturbances. The Collom mining area extends nearly to the headwaters of Little Collom Gulch; therefore, no upstream monitoring location can be established for comparison of data to the down gradient LLCG monitoring location.

Little Collom Gulch Water Year Review

No flow has been observed at LLCG either during baseline data collection or during the ongoing monitoring that began in first quarter of 2011. Since no data has been collected from this site due to nonexistent flows, an evaluation, tabular and graphically analysis have not been completed for this monitoring location.

Little Collom Gulch Impact Assessment

Potential mining impacts to Little Collom Gulch as described Colowyo's permit were not anticipated to be statistically significant [Volume 15 Section 2.05.6(3)(b)(i & ii)]. Since no surface water flows have been present in Little Collom Gulch, there have not been any surface water impacts to Little Collom Gulch.

GROUNDWATER

Colowyo currently samples each ground water well for a variety of quality parameters. Of all the parameters that are analyzed for, several key indicator parameters are identified an analyzed in more depth within this report. These are lab pH, lab conductivity, TDS, sulfate, calcium, iron, magnesium, sodium, and water elevation. Summary of the indicator parameters, not including LGSW-1 and LWCW-1, for each ground water well is provided in a table format. Ground water wells within each corresponding drainage have been compiled together and analyzed together as up gradient and down gradient conditions where applicable.

LGSW-1 and LWCW-1 are points of compliance wells and data for each well for the water year is included in Exhibit 1C only. Indicator parameters are not analyzed nor provided for either of these wells. A data review narrative is provided for LGSW-1 and LWCW-1 in the Good Spring and Taylor Creek sections of the hydrology report.

Sampling results acquired during the water year from each ground water well are presented in Exhibit 1C. Exhibit 1D presents a graphical statistical analysis of the up and down gradient well (where applicable) for each drainage potentially impacted by Colowyo's mining operations. These drainages include Good Spring Creek, Taylor Creek, Jubb Creek, Little Collom Gulch, and Collom Gulch.

One well is located near the Gossard Loadout facility, which evaluates water quality adjacent to the Gossard Loadout facility, and another well is located down gradient of the confluence of Taylor and Wilson Creek and represents the further downstream point below all mining activities above Taylor and Wilson Creeks.

The Trout Creek well is a deep well that monitors potential impacts to the Trout Creek Sandstone, which is the only regional aquifer in the vicinity of the Colowyo Mine.

Good Spring Creek

Five ground water wells have been established along Good Spring Creek.

A-6 Well (A-6) is located south of the mine along State Highway 13, and this site represents up gradient, undisturbed or background conditions. Monitoring has occurred from 1984 through 2022.

A-7 Well (A-7) is located south of the mine along State Highway 13 and represents a potential down gradient condition below the South Taylor Pit operations. Monitoring started in the second quarter of 2008 and has continued through 2022.

A-8 Well (A-8) is located south of the mine, west of State Highway 13, and represents the condition up gradient of the South Taylor mining activities. Monitoring started in the second quarter of 2008 and has continued through 2022.

North Good Springs Well (NGSW) is located along State Highway 13 and this site represents the down gradient condition below mining activities. Monitoring has occurred from 1989 to 2022.

Lower Good Spring Well 1 (LGSW-1) is located along State Highway 13 and this site represents a further down gradient condition below mining activities. It is located further downstream on Good Spring Creek than NGSW. LGSW-1 is designated as a point of compliance well. Monitoring of LGSW-1 has occurred from the fourth quarter of 2021 through 2022.

A-6:

Parameter	Mean	Std dev	Range	Max.	Min.	Max at	Min at
Lab Ph	7.8	0.4	1.9	8.6	6.7	11/30/93	11/21/02
Lab Cond.	1111	72	512	1440	928	05/01/85	04/27/98
TDS	694	81	750	930	180	07/17/01	03/13/93
Sulfate	138	47	334	430	96	07/17/01	05/15/00
Calcium	61	15	121	169	48	11/18/97	11/13/00
Iron	0.21	0.36	1.81	1.82	0.004	09/26/98	12/12/22
Magnesium	53	15	128	169	41	11/18/97	03/21/11
Sodium	126	18	133	151	18	9/14/20	04/27/98
Elevation	6897.9	2.8	14.5	6902.5	6888.0	05/01/85	07/31/00

A-6 Water Year Review

A minimum value for iron occurred for all four quarters of the water year 2022. All the indicator parameters for the water year tracked within similar results as previous data acquired. The indicator parameters specify pH is slightly increasing while most of the indicator parameters are stable except for iron which is decreasing at this location. Data for the water year for monitoring location A-6 is provided in Exhibit 1C.

A-7:

Parameter	Mean	Std dev	Range	Max.	Min.	Max at	Min at
Lab pH	8.1	0.2	0.8	8.4	7.6	5/15/19	11/10/08
Lab Cond.	1523	164	1100	2260	1160	06/18/08	05/05/10
TDS	1149	204	1160	2100	940	06/18/08	9/9/17
Sulfate	425	119	794	1110	316	06/18/08	11/12/19
Calcium	126	18	112	214	102	05/03/11	11/30/17
Iron	0.05	0.01	0.05	0.1	0.05	08/17/11	06/18/08
Magnesium	119	24	151	244	93	06/18/08	11/30/17
Sodium	50	8	43	77	34	06/18/08	05/20/14
Elevation	6888.5	3.5	21.5	6904.9	6883.4	11/12/19	5/11/22

A-7 Water Year Review

A minimum water level elevation for A-7 occurred during 2022. All the indicator parameters for the water year tracked within similar results as previous data acquired. The indicator parameters specify pH and sodium are slightly increasing while all the other indicator parameters are stable or decreasing at this location. Data for the water year for monitoring location A-7 is provided in Exhibit 1C.

A-8:

Parameter	Mean	Std dev	Range	Max.	Min.	Max at	Min at
Lab pH	8.1	0.2	0.8	8.4	7.6	05/21/13	11/10/08
Lab Cond.	1254	345	1443	2330	887	03/12/13	05/5/10
TDS	948	345	1420	2040	620	03/12/13	03/13/12
Sulfate	346	205	804	977	173	03/12/13	08/03/10
Calcium	120	31	129	219	90	03/12/13	06/18/08
Iron	0.06	0.05	0.31	0.36	0.05	11/10/08	06/18/08
Magnesium	103	36	142	214	72	03/12/13	03/13/12
Sodium	17	6	24	35	11	03/12/13	03/13/12
Elevation	7105.1	4.8	16.7	7116.9	7100.2	06/18/08	09/19/17

A-8 Water Year Review

No results from 2022 sampling were minimum or maximum values for any parameters listed above during the water year. All sampling results from 2022 tracked within historical analyses The indicator parameters indicate pH is slightly trending upward while all the other indicator parameters are stable. Iron is decreasing at this location. Data for the water year for monitoring location A-8 is provided in Exhibit 1C.

NGSW:

Parameter	Mean	Std dev	Range	Max.	Min.	Max at	Min at
Lab pH	7.9	0.3	1.7	8.5	6.8	08/19/91	10/03/00
Lab Cond.	2103	304	1620	2770	1150	5/11/22	04/27/98
TDS	1719	269	1410	2190	780	04/27/16	04/27/98
Sulfate	800	156	1192	1340	148	03/17/09	05/05/10
Calcium	174	27	169	262	93	03/13/07	10/08/98
Iron	0.08	0.13	1.18	1.19	0.01	6/4/20	10/01/01
Magnesium	173	28	194	270	76	03/13/07	04/27/98
Sodium	107	32	167	199	32	5/24/21	04/27/98
Elevation	6534.9	1.8	10	6540.7	6530.7	03/13/93	05/19/99

NGSW Water Year Review

One sampling result for laboratory conductivity was a maximum value in 2022. All other monitoring results acquired during the water year tracked within previous results. For the indicator parameters, TDS, sulfate, sodium, pH, EC, calcium, and magnesium are trending upward. Water year data for monitoring location NGSW is provided in Exhibit 1C.

LGSW-1:

LGSW-1 is designated as a point of compliance well on Good Spring Creek, and the sampling parameters for LGSW-1 can be found in Volume 2C, Exhibit 7, Item 19, Table 16.

Sampling results obtained from LGSW-1 for the water year indicate that TDS exceeded the Table 6 standard (1,840 mg/l standard) for the March 22, May 11, September 14, and December 12 sampling events. TDS values were 1,870 mg/l, 2,010 mg/l, 2,060 mg/l, and 1,980 mg/l respectively. These instances were reported to the Division on April 6, May 31, September 27, 2022 and January 9, 2023 as required by Rule 4.05.13(1)(c)(i).

Good Spring Creek Impact Assessment

For the indicator parameters, please see Exhibit 1D, when comparing the up gradient and down gradient locations, for all the indicator parameters, NGSW is trending higher than the up-gradient wells except for iron which is stable at NGSW.

Ground water impacts are not anticipated to be affected by mining, primarily because there is not a continuous, regional ground water system within the stratigraphic section that was or is mined [Volume 1 Sections 2.04.7, 4.05.11 and Volume 12 Sections 2.04.7(1), 2.05.6(3)(b)(iii)]. As discussed in Volume 1, Section 2.04.7, TDS concentrations showed an incremental increase (pre-mine) of 40 mg/l to 50 mg/l per mile of flow for Wilson and Good Spring Creeks. This predication could be apparent within the alluvial aquifer along Good Spring Creek and TDS value found farther down gradient along Good Spring Creek. Other contributing factors to the alluvial aquifer along Good Spring Creek are the ranching operation that Good Spring Creek runs through the entire private property, and possibly discharges from Colowyo's sediment ponds. However, Streeter Pond is the only sediment pond that discharges in a consistent manner, and it has been released from monitoring requirements in Colowyo's Industrial Wastewater Permit by the Colorado Department of Public Health and Environment Water Quality Division.

Taylor Creek

One ground water well, MT-95-02, has been established along Taylor Creek and represents the down gradient condition below mining activities. Monitoring started in the first quarter of 2008 and has continued through 2022. An up gradient well location is not established for Taylor Creek as mining occurs in the headwaters of the Taylor Creek watershed.

MT-95-02:

Parameter	Mean	Std dev	Range	Max.	Min.	Max at	Min at
Lab pH	8.0	0.2	1.0	8.4	7.4	5/15/19	11/10/08
Lab Cond.	2824	312	1720	3790	2070	5/11/22	05/05/10
TDS	2306	227	980	2910	1930	12/12/22	12/10/20
Sulfate	928	89	412	1170	758	3/9/20	05/14/12
Calcium	207	17	112	233	121	9/14/20	11/10/11
Iron	0.05	0.00	0.01	0.06	0.05	11/10/08	11/02/09
Magnesium	200	13	80	227	147	6/4/20	11/10/11
Sodium	204	66	296	390	94	12/12/22	08/13/08
Elevation	6435.43	0.6	3.4	6437.9	6434.5	05/03/11	3/5/19

MT-95-02 Water Year Review

Maximum values for lab conductivity, TDS, and sodium were recorded during 2022. Water year data for monitoring location MT-95-02 is provided in Exhibit 1C.

LWCW-1:
LWCW-1 is designated as a point of compliance well below the confluence of Taylor and Wilson Creeks. The sampling parameters for LWCW-1 can be found in Volume 2C, Exhibit 7, Item 19, Table 16.

Sampling results obtained from LWCW-1 for the water year indicate one sample acquired on September 14, 2022, exceed the Table 16 standard for arsenic. Sampling results for arsenic were 0.021 mg/l and the Table 16 standard is 0.01 mg/l. This was reported to the Division on September 27, 2022, as required by Rule 4.05.13(1)(c)(i).

Taylor Creek Impact Assessment
A complete data set for MT-95-02 from 2008 to December of 2022 is presented on the graphs in Exhibit 1D. For the indicator parameters, laboratory conductivity, pH, sodium, sulfate, and TDS are showing an increase over time, while calcium, iron, and magnesium are indicating downward trends or remaining constant. TDS values were previously elevated (above 2,000 mg/l) when monitoring commenced at this location in 2008.

Ground water impacts are not anticipated to be affected by mining, primarily because there is not a continuous, regional ground water system within the stratigraphic section that was or is mined [Volume 1 Sections 2.04.7, 4.05.11 and Volume 12 Sections 2.04.7(1), 2.05.6(3)(b)(iii)]. TDS and other indicator parameters that are trending higher at MT-95-02 can be attributed to discharges from the East Taylor Pond which are being addressed with the Colorado Department of Public Health and Environment – Water Quality Division through compliance with Colowyo's Industrial Wastewater Discharge Permit.

Gossard Loadout

One ground water well has been established along the Gossard Loadout facility. The Gossard Well is located within the rail loop facility and represents the condition of groundwater associated with the Gossard Loadout Facility. Monitoring has occurred from 1983 to 2022.

Gossard:

Parameter	Mean	Std dev	Range	Max.	Min.	Max at	Min at
Lab pH	8.0	0.3	1.6	8.6	7	10/08/98	10/21/02
Lab Cond.	2002	261	1310	2670	1360	11/22/16	03/29/85
TDS	1490	265	1238	2200	962	09/13/16	03/13/93

Sulfate	582	177	1025	1030	5	11/22/16	05/20/14
Calcium	115	25	190	202	12	11/10/11	11/30/93
Iron	0.72	2.91	28.99	29	0.01	10/08/98	10/21/02
Magnesium	138	26	202	217	15	10/08/98	11/30/93
Sodium	170	25	221	240	19	10/08/98	11/30/93
Elevation	6330.1	2.7	14	6339.1	6325.1	10/03/00	03/28/91

Gossard Water Year Review

No results from 2022 sampling were minimum or maximum values for any parameters listed above during the monitoring period. All sampling results tracked within previous analysis. Water year data for the Gossard well is provided in Exhibit 1C.

Gossard Impact Assessment

A complete data set for the Gossard well from 1983 to December of 2022 is presented on the graphs in Exhibit 1D. For the indicator parameters, laboratory conductivity, calcium, sodium, magnesium, sulfate, and TDS are showing an increase over time. However, the last eight sampling events indicate that TDS maybe decreasing. Iron is trending down, and pH remains relatively constant. The water level in the Gossard well is also trending upward overtime.

Ground water impacts are not anticipated to be affected by mining, primarily because there is not a continuous, regional ground water system within the stratigraphic section that was or is mined [Volume 1 Sections 2.04.7, 4.05.11 and Volume 12 Sections 2.04.7(1), 2.05.6(3)(b)(iii)]. Indicator parameters that are trending higher at the Gossard may be attributed to the conditions described for Taylor Creek in the *Taylor Creek Impact Assessment* for Surface Water provided previously in this hydrology report.

However, it is also possible that the alluvial aquifer along Wilson Creek is increasing in available water since the mass wasting event that occurred in the spring of 1984 along the entire length Wilson Creek above and below mining including the Gossard Loadout facility. This increase in the alluvial aquifer water level in Wilson Creek is shown in the Gossard well water elevation (Exhibit 1D). As discussed in Volume 1, Section 2.04.7, TDS concentrations showed an incremental increase (pre-mine) of 40 mg/l to 50 mg/l per mile of flow for Wilson and Good Spring Creeks. Since Wilson Creek is not impacted by mining activities the trending upward values for TDS and the major ions may be attributed to this natural phenomenon rather than impacts from mining.

Little Collom Gulch

One ground water well, MLC-04-01, has been established along Little Collom Gulch. This site represents the down gradient condition below the Collom Pit. Monitoring started in the first quarter of 2011 and has continued through 2022.
MLC-04-01:

Parameter	Mean	Std dev	Range	Max.	Min.	Max at	Min at
Lab pH	8.1	0.20	1.2	8.4	7.2	03/13/13	03/22/11
Lab Cond.	1068	402	1309	1610	301	03/18/14	5/13/19
TDS	752	302	1080	1280	200	5/24/21	5/13/19
Sulfate	237	121	502	505	3	05/15/12	03/22/11
Calcium	107	40	130	161	31	05/19/14	5/13/19
Iron	0.05	0.04	0.25	0.25	0.0006	03/14/12	9/14/2020
Magnesium	62	26	86	95	9	05/19/14	03/22/11
Sodium	39	18	73	78	5	11/27/18	03/22/11
Elevation*	45.4	4.7	27.4	50.2	22.8	11/28/18	03/13/18

*Water elevation is static water level depth from the top of casing.

MLC-04-01 Water Year Review
No results from 2022 sampling were minimum or maximum values for any parameters listed above during the monitoring period. All the indicator parameters from sampling results in 2022 track within previous analytical results. Water year data for monitoring location MLC-04-01 is provided in Exhibit 1C.

Little Collom Gulch Impact Assessment
A complete data set from March of 2011 to December of 2022 is presented on the graphs in Exhibit 1D. While reviewing this data, it needs to be noted that the mining in the Collom Pit commenced in 2018; therefore, data acquired prior to 2017 represents the background condition prior to mining occurring.

Data results as shown for the indicator parameters (Exhibit 1D) establishes that MLC-04-01 historically trends down for all the indicator parameters except for pH that is slight trending upward.

Impacts to ground water in Little Collom Gulch valley fill deposits were not anticipated to occur as described in Colowyo's permit [Volume 15 Section 2.05.6(3)(b)(i & ii)]. To date, the data acquired and presented in this report (Exhibit 1C and Exhibit 1D) indicates all the indicator parameter are tracking similar to pre-mine conditions. This demonstrates

that ground water impacts to the Little Collom Gulch valley fill deposits have not occurred to date as predicted.

Collom Gulch

Two ground water wells have been established along Collom Gulch. MC-04-01 is located in Collom Gulch, and this site represents the condition adjacent to the Collom Pit. MC-04-02 is located in Collom Gulch, and this site represents the down gradient condition below the Collom Pit. Monitoring at both wells commenced in the first quarter of 2011 and has continued through 2022.

MC-04-01:

Parameter	Mean	Std dev	Range	Max.	Min.	Max at	Min at
Lab pH	8.1	0.2	0.8	8.4	7.6	11/27/18	11/05/14
Lab Cond.	884	147	889	1270	381	6/4/20	9/14/20
TDS	612	142	990	1240	250	6/4/20	9/14/20
Sulfate	172	57	253	308	55	05/19/14	9/14/20
Calcium	88	16	95	133	38	6/4/20	9/14/20
Iron	0.05	0.02	0.13	0.18	0.05	03/14/12	03/22/11
Magnesium	57	12	62	80	18	05/23/13	9/14/20
Sodium	18	5	36	46	10	6/4/20	9/14/20
Elevation*	25.1	4.3	31.3	48.8	17.5	03/13/18	5/13/19

*Water elevation is static water level depth from the top of casing.

MC-04-01 Water Year Review

No minimum or maximum values were recorded in 2022 at MC-04-01. The indicator parameters for MC-04-01 indicate that calcium, electrical conductivity, iron, magnesium sulfate, and TDS are trending down, sodium is stable, and pH is slight increasing over time. Water year data for monitoring location MC-04-01 is provided in Exhibit 1C.

MC-04-02:

Parameter	Mean	Std dev	Range	Max.	Min.	Max at	Min at
Lab pH	8.1	0.1	0.8	8.4	7.6	11/27/18	11/05/14
Lab Cond.	1283	139	844	1490	646	08/27/14	08/20/18
TDS	868	102	630	1010	380	11/01/12	08/20/18
Sulfate	250	44	221	321	100	11/01/12	12/10/20
Calcium	121	19	72	148	76	08/27/14	12/12/22
Iron	0.07	0.11	0.77	0.82	0.05	03/14/12	03/22/11
Magnesium	75	13	45	92	47	08/27/14	12/12/22
Sodium	66	31	147	160	13	03/13/13	11/27/18
Elevation*	11.5	1.0	4.5	14.1	9.6	01/12/15	05/24/17

*Water elevation is static water level depth from the top of casing.

MC-04-02 Water Year Review

Two minimum values for calcium and magnesium occurred in 2022 at MC-04-02. All other sampling results tracking within previous analytical results acquired, including data acquired prior to mining commencing in 2018. The indicator parameters for MC-04-02 indicate that calcium, electrical conductivity, iron, magnesium sulfate, and TDS are trending down, sodium is stable, and pH is slight increasing over time. Water year data for monitoring location MC-04-02 is provided in Exhibit 1C.

Collom Gulch Impact Assessment

A complete data set from March of 2011 to December of 2022 is presented on the graphs in Exhibit 1D. The graphs provided include MC-04-01 and MC-04-02 indicator parameters together on one graph for comparisons of both monitoring locations. While reviewing this data, it needs to be noted that the mining in the Collom Pit commenced in 2018; therefore, data acquired prior to 2017 represents the background condition prior to mining occurring.

Data results as shown for the indicator parameters (Exhibit 1D) establishes that MC-04-02 historically tracks higher for most of the indicator parameters, while both monitoring locations trend similar in regard to iron and pH. Overall, all the indicator parameters from both monitoring locations tend to track consistently over time showing consistent or decreasing values over time except for pH, which is showing a minor increase.

Impacts to ground water in the Collom Gulch valley fill deposits were not anticipated to occur as described in Colowyo's permit [Volume 15 Section 2.05.6(3)(b)(i & ii)]. To date, the data acquired and presented in this report (Exhibit 1C and Exhibit 1D) indicates all the indicator parameter are tracking similar to pre-mine conditions with most values

are overall decreasing. This demonstrates that ground water impacts to the Collom Gulch valley fill deposits have not occurred to date as predicated.

Jubb Creek

Two ground water wells have been established along Jubb Creek. MJ-95-01 is located in the West Fork Jubb Creek, and this site represents the down gradient condition below the Collom Pit. MJ-95-03 is located in the Jubb Creek just downstream of the confluence of the West and East Forks of Jubb Creek, and this site represents the condition down gradient of the Collom Pit. Monitoring started in the first quarter of 2011 and has continued through 2022.

MJ-95-01:

Parameter	Mean	Std dev	Range	Max.	Min.	Max at	Min at
Lab pH	8.0	0.2	1.0	8.3	7.3	11/27/18	11/05/14
Lab Cond.	1286	81	350	1420	1070	08/27/14	05/04/11
TDS	864	74	520	1240	720	5/24/21	09/18/17
Sulfate	241	34	245	277	32	08/18/11	12/14/21
Calcium	121	4	18	131	113	05/19/14	05/24/17
Iron	0.07	0.05	0.25	0.30	0.05	03/14/12	03/22/11
Magnesium	93	4	14	101	87	05/19/14	03/14/12
Sodium	30	2	11	34	23	9/14/20	05/24/17
Elevation*	14.1	3.1	17.0	24.3	7.3	11/08/11	04/30/18

*Water elevation is static water level depth from the top of casing.

MJ-95-01 Water Year Review

No minimum or maximum values were recorded in 2022 at MJ-95-01. Indicator parameters for MJ-95-01 are trending along the same path as pre-mining conditions with all indicator parameters trending in a stable manner except for pH, which is slightly increasing. Water year data for monitoring location MJ-95-01 is provided in Exhibit 1C.

MJ-95-03:

Parameter	Mean	Std dev	Range	Max.	Min.	Max at	Min at
Lab pH	8.2	0.1	0.7	8.4	7.7	11/27/18	11/05/14
Lab Cond.	2244	150	700	2480	1760	5/11/22	05/04/11
TDS	1805	82	340	1940	1600	08/18/11	05/24/17
Sulfate	796	47	205	891	686	05/04/11	11/08/11
Calcium	146	7	26	161	130	9/14/20	11/19/13
Iron	0.06	0.03	0.17	0.22	0.05	03/14/12	03/22/11
Magnesium	191	11	57	217	160	03/22/11	3/24/22
Sodium	141	12	55	166	111	03/22/11	12/10/20
Elevation*	20.3	0.9	6.2	22.0	15.8	9/14/22	11/08/11

*Water elevation is static water level depth from the top of casing.

MJ-95-03 Water Year Review

Maximum values for laboratory conductivity and water level elevation occur in 2022, and one minimum value for magnesium also. Indicator parameters for MJ-95-03 are trending along the same path as pre-mining conditions with all indicator parameters trending in a stable manner except for pH, which is slightly increasing. Water year data for monitoring location MJ-95-03 is provided in Exhibit 1C.

Jubb Creek Impact Assessment

A complete data set from March of 2011 to December of 2022 is presented on the graphs in Exhibit 1D. The graphs provided include MJ-95-01 and MJ-95-03 indicator parameters together on one graph for comparisons of both monitoring locations. While reviewing this data, it needs to be noted that the Jubb Creek Haul Road disturbance commenced in 2017, and mining in the Collom Pit commenced in 2018; therefore, data acquired prior to 2017 represents the background condition prior to mining occurring.

Data results as shown for the indicator parameters (Exhibit 1D), establishes that MJ-95-03 historically tracks higher for all indicator parameters, while both monitoring locations trend similar in regard to iron. Overall, all the indicator parameters from both monitoring locations tend to track consistently over time, which pH showing a minor increase.

Potential mining impacts to Jubb Creek as described in Colowyo's permit were not anticipated to be statistically significant [Volume 15 Section 2.05.6(3)(b)(i & ii)]. To date, the data acquired and presented in this report indicates all the indicator parameter are tracking similar to pre-mine conditions, which indicates that ground water impacts within the Jubb Creek watershed are being minimized.

Trout Creek Sandstone Aquifer

One deep ground water well has been established into the Trout Creek Sandstone and is located on the northeastern edge of the Collom Pit. This well represents the regional aquifer condition of the Trout Creek Sandstone aquifer. Monitoring started in the first quarter of 2017 and has continued through 2022.

Trout Creek Well:

Parameter	Mean	Std dev	Range	Max.	Min.	Max at	Min at
Lab pH	9.3	0.2	0.9	9.5	8.6	08/20/18	3/6/19
Lab Cond.	1106	45	210	1220	1010	03/15/17	3/6/19
TDS	697	30	140	800	660	03/15/17	3/9/20
Sulfate	233	24	99	309	210	03/15/17	12/12/22
Calcium	6	3	12	16	4	03/15/17	12/10/20
Iron	0.07	0.04	0.17	0.22	0.05	03/13/18	11/29/17
Magnesium	20	6	25	38	13	03/15/17	12/12/22
Sodium	218	20	73	253	180	5/24/21	11/29/17
Elevation*	589.1	1.3	3.4	591.0	587.6	09/18/17	12/14/21

*Water elevations were not captured in 2022 due to issues with the Water Elevation Meter becoming stuck between the wiring and piping in the Trout Creek Well. Colowyo is investigating new measurement devices for the 2023 water year.

Trout Creek Well Water Year Review

Two minimum values occurred in 2021 for sulfate and magnesium. All other indicator parameters tracked within previous analytical results. Water year data for the Trout Creek well is provided in Exhibit 1C.

Trout Creek Well Impact Assessment

A complete data set from the first quarter of 2017 to December of 2021 is presented on the graphs in Exhibit 1D. Impacts to Trout Creek Sandstone aquifer were not anticipated to occur as described in Colowyo's permit [Volume 15 Section 2.05.6(3)(b)(i & ii)]. To date, the data acquired and presented in this report indicates all the indicator parameter are tracking similar to pre-mine conditions (in this case only data from 2017), which demonstrates that ground water impacts to the Trout Creek Sandstone aquifer have not occurred to date as predicated.

SPOIL SPRING DEVELOPMENT

Several springs have been identified on the reclaimed surface at the Colowyo Mine. These springs are the result of groundwater movement from groundwater complexes that

were present pre-mining, whose waters pass through regraded overburden subsurface from the highwall (non-mined areas) and emerge at a location down gradient in the reclaimed surface. Colowyo has detected three springs that originate from non-mined areas in the highwall and percolate through the regraded spoil and emerge on the reclaimed surface. One spring is located just south of the East Taylor Pond in reclamation parcel WP014. Two additional springs have been located in the East Pit reclamation parcel EP057, south of the Final East Pit Ditch where the final highwall was regraded to PMT.

Exhibit 1A

Surface Water Data

Water Year January 1, 2021 to December 31, 2021

Colowyo Mine
Site - CJC
Water Year 1/1/2022 - 12/31/2022

	Sample Date			
	3/22/2022	**5/11/2022**	**9/14/2022**	**12/12/2022**
As, tot rec, mg/L	<0.003	Dry	Dry	Dry
Ca, diss, mg/L	160			
Fe, tot, mg/L	0.34			
FlowStreamInst, cfs	0.02			
HCO3, mg/L	692			
Hg, tot rec, ug/L	<0.005			
Mg, diss, mg/L	167			
Mn, tot rec, mg/L	0.04			
Na, diss, mg/L	152			
NH3 as N, diss, mg/L	<0.1			
NO2 + NO3, diss, mg/L	<0.1			
NO2, diss, mg/L	<0.1			
NO3, diss, mg/L	<0.1			
P, tot, mg/L	<0.05			
Pb, tot rec, mg/L	<0.2			
pH (field)	7.9			
pH (lab)	8.2			
Se, tot rec, ug/L	0.005			
SO4, diss, mg/L	696			
Spec. Cond. (field), umhos/cm	2320			
Spec. Cond. (lab), umhos/cm	2140			
TDS, mg/L	1590			
Temp (Celcius), degrees C	2.3			
TSS, mg/L	7			
Zn, tot rec, mg/L	<0.05			

Colowyo Mine
Site - LCG
Water Year 1/1/2022 - 12/31/2022

	Sample Date			
	3/22/2022	**5/11/2022**	**9/14/2022**	**12/12/2022**
As, tot rec, ug/L	0.25	<0.16	<0.16	Dry
Ca, diss, mg/L	110	110	97	
Fe, tot, mg/L	2.5	4.96	0.22	
FlowStreamInst, cfs	0.03	0.04	0.03	
HCO3, mg/L	520	460	400	
Hg, tot rec, ug/L	<0.001	<0.001	<0.001	
Mg, diss, mg/L	66	71	69	
Mn, tot rec, mg/L	0.33	0.4	0.6	
Na, diss, mg/L	30	35	25	
NH3 as N, diss, mg/L	0.10	<0.029	<0.029	
NO2 + NO3, diss, mg/L	0.20	0.60	<0.024	
NO2, diss, mg/L	0.024	<0.024	<0.024	
NO3, diss, mg/L	0.20	0.60	<0.012	
P, tot, mg/L	0.16	0.31	<0.0085	
Pb, tot rec, ug/L	0.20	<0.16	<0.16	
pH (field), pH	8.3	8.4	8.1	
pH (lab), pH	8.4	8.5	8.3	
Se, tot rec, ug/L	0.11	<0.15	<0.15	
SO4, diss, mg/L	200	220	200	
Spec. Cond. (field), umhos/cm	1190	1150	1090	
Spec. Cond. (lab), umhos/cm	1090	1140	958	
TDS, mg/L	730	710	700	
Temp (Celcius), degrees C	4.3	7.2	10.7	
TSS, mg/L	160	510	12	
Zn, tot rec, mg/L	0.05	<0.05	<0.05	

Colowyo Mine
Site - LGSC
Water Year 1/1/2022 - 12/31/2022

	Sample Date			
	3/22/2022	**5/11/2022**	**9/14/2022**	**12/12/2022**
As, tot rec, ug/L	0.25	<0.16	<0.16	<0.16
Ca, diss, mg/L	170	170	160	170
Fe, tot, mg/L	0.44	0.23	0.26	1.3
FlowStreamInst, cfs	1.07	8.31	2.15	1.36
HCO3, mg/L	680	610	650	710
Hg, tot rec, ug/L	0.046	<0.046	<0.030	<0.030
Mg, diss, mg/L	170	170	180	180
Mn, tot rec, ug/L	190	80	90	260
Na, diss, mg/L	170	140	210	180
NH3 as N, diss, mg/L	0.029	<0.029	<0.029	<0.029
NO2 + NO3, diss, mg/L	1.5	0.7	0.1	0.6
NO2, diss, mg/L	0.036	<0.036	<0.036	<0.036
NO3, diss, mg/L	1.5	0.7	0.1	0.6
P, tot, mg/L	0.07	<0.0085	<0.0085	0.09
Pb, tot rec, ug/L	0.2	<0.16	<0.16	<0.16
pH (field), SU	8.0	8.0	8.0	8.1
pH (lab), pH	8.3	8.5	8.3	8.3
Se, tot rec, ug/L	7	<0.15	<0.15	<0.15
SO4, diss, mg/L	720	770	860	870
Spec. Cond. (field), umhos/cm	2510	2290	2480	2520
Spec. Cond. (lab), umhos/cm	2360	2370	2180	2340
TDS, mg/L	1900	1800	2000	1900
Temp (Celcius), degrees C	2.9	11.6	12.6	4.9
TSS, mg/L	10	5	<5.0	57
Zn, tot rec, mg/L	0.05	<0.05	<0.05	<0.05

Colowyo Mine
Site - LLCG
Water Year 1/1/2022 - 12/31/2022

	Sample Date			
	3/22/2022	**5/11/2022**	**9/14/2022**	**12/12/2022**
As, tot rec, mg/L	Dry	Dry	Dry	Dry
Ca, diss, mg/L				
Fe, tot, mg/L				
FlowStreamInst, cfs				
HCO3, mg/L				
Hg, tot rec, ug/L				
Mg, diss, mg/L				
Mn, tot rec, mg/L				
Na, diss, mg/L				
NH3 as N, diss, mg/L				
NO2 + NO3, diss, mg/L				
NO2, diss, mg/L				
NO3, diss, mg/L				
P, tot, mg/L				
Pb, tot rec, mg/L				
pH (field)				
pH (lab)				
Se, tot rec, ug/L				
SO4, diss, mg/L				
Spec. Cond. (field), umhos/cm				
Spec. Cond. (lab), umhos/cm				
TDS, mg/L				
Temp (Celcius), degrees C				
TSS, mg/L				
Zn, tot rec, mg/L				

Colowyo Mine
Site - LTC
Water Year 1/1/2022 - 12/31/2022

	Sample Date			
	3/22/2022	**5/11/2022**	**9/14/2022**	**12/12/2022**
As, tot rec, mg/L	0.25	Dry	Dry	Dry
Ca, diss, mg/L	130			
Fe, tot, mg/L	0.29			
FlowStreamInst, cfs	0.43			
HCO3, mg/L	590			
Hg, tot rec, mg/L	0.046			
Mg, diss, mg/L	140			
Mn, tot rec, mg/L	<0.03			
Na, diss, mg/L	610			
NH3 as N, diss, mg/L	0.29			
NO2 + NO3, diss, mg/L	0.16			
NO2, diss, mg/L	0.072			
NO3, diss, mg/L	0.16			
P, tot, mg/L	0.07			
Pb, tot rec, mg/L	0.2			
pH (field)	8.1			
pH (lab)	8.4			
Se, tot rec, mg/L	0.11			
SO4, diss, mg/L	730			
Spec. Cond. (field), umhos/cm	7350			
Spec. Cond. (lab), umhos/cm	3850			
TDS, mg/L	2800			
Temp (Celcius), degrees C	4.1			
TSS, mg/L	17			
Zn, tot rec, mg/L	0.05			

Colowyo Mine
Site - NUGSC
Water Year 1/1/2022 - 12/31/2022

	Sample Date			
	3/22/2022	**5/11/2022**	**9/14/2022**	**12/12/2022**
As, tot rec, ug/L	0.25	<0.16	<0.16	<0.16
Ca, diss, mg/L	140	120	140	140
Fe, tot, mg/L	0.22	2.9	0.13	0.09
HCO3, mg/L	530	410	500	510
FlowStreamInst, cfs	0.12	4.87	0.01	0.04
Hg, tot rec, ug/L	0.046	<0.046	<0.030	<0.030
Mg, diss, mg/L	104	96	160	130
Mn, tot rec, ug/L	0.36	150	40	<0.36
Na, diss, mg/L	66	43	72	81
NH3 as N, diss, mg/L	0.029	<0.029	<0.029	<0.029
NO2 + NO3, diss, mg/L	3.2	2.7	4.2	2
NO2, diss, mg/L	<0.036	<0.024	<0.036	<0.036
NO3, diss, mg/L	3.2	2.7	4.2	2
P, tot, mg/L	0.0085	0.24	<0.0085	<0.0085
Pb, tot rec, ug/L	0.2	<0.16	<0.16	<0.16
pH (field), SU	8.0	8.1	8.0	7.8
pH (lab), pH	8.3	8.5	8.3	8.3
Se, tot rec, ug/L	19	10	14	<0.15
SO4, diss, mg/L	590	340	660	540
Spec. Cond. (field), umhos/cm	1930	1370	1930	1820
Spec. Cond. (lab), umhos/cm	1790	1400	1710	1690
TDS, mg/L	1400	960	1500	1300
Temp (Celcius), degrees C	4.6	12.5	11.6	6.3
TSS, mg/L	8	220	<5.0	<5.0
Zn, tot rec, mg/L	0.05	<0.05	<0.05	<0.05

Colowyo Mine
Site - UCG
Water Year 1/1/2022 - 12/31/2022

	Sample Date			
	3/22/2022	**5/11/2022**	**9/14/2022**	**12/12/2022**
As, tot rec, mg/L	Dry	<0.003	Dry	Dry
Ca, diss, mg/L		62		
Fe, tot, mg/L		1.31		
FlowStreamInst, cfs		0.03		
HCO3, mg/L		292		
Hg, tot rec, ug/L		<0.001		
Mg, diss, mg/L		29		
Mn, tot rec, mg/L		0.04		
Na, diss, mg/L		10		
NH3 as N, diss, mg/L		<0.1		
NO2 + NO3, diss, mg/L		0.7		
NO2, diss, mg/L		<0.1		
NO3, diss, mg/L		<0.1		
P, tot, mg/L		0.1		
Pb, tot rec, mg/L		<0.2		
pH (field)		8.4		
pH (lab)		8.7		
Se, tot rec, ug/L		<0.005		
SO4, diss, mg/L		41		
Spec. Cond. (field), umhos/cm		580		
Spec. Cond. (lab), umhos/cm		565		
TDS, mg/L		340		
Temp (Celcius), degrees C		4.8		
TSS, mg/L		70		
Zn, tot rec, mg/L		<0.05		

Colowyo Mine
Site - UWFGSC
Water Year 1/1/2022 - 12/31/2022

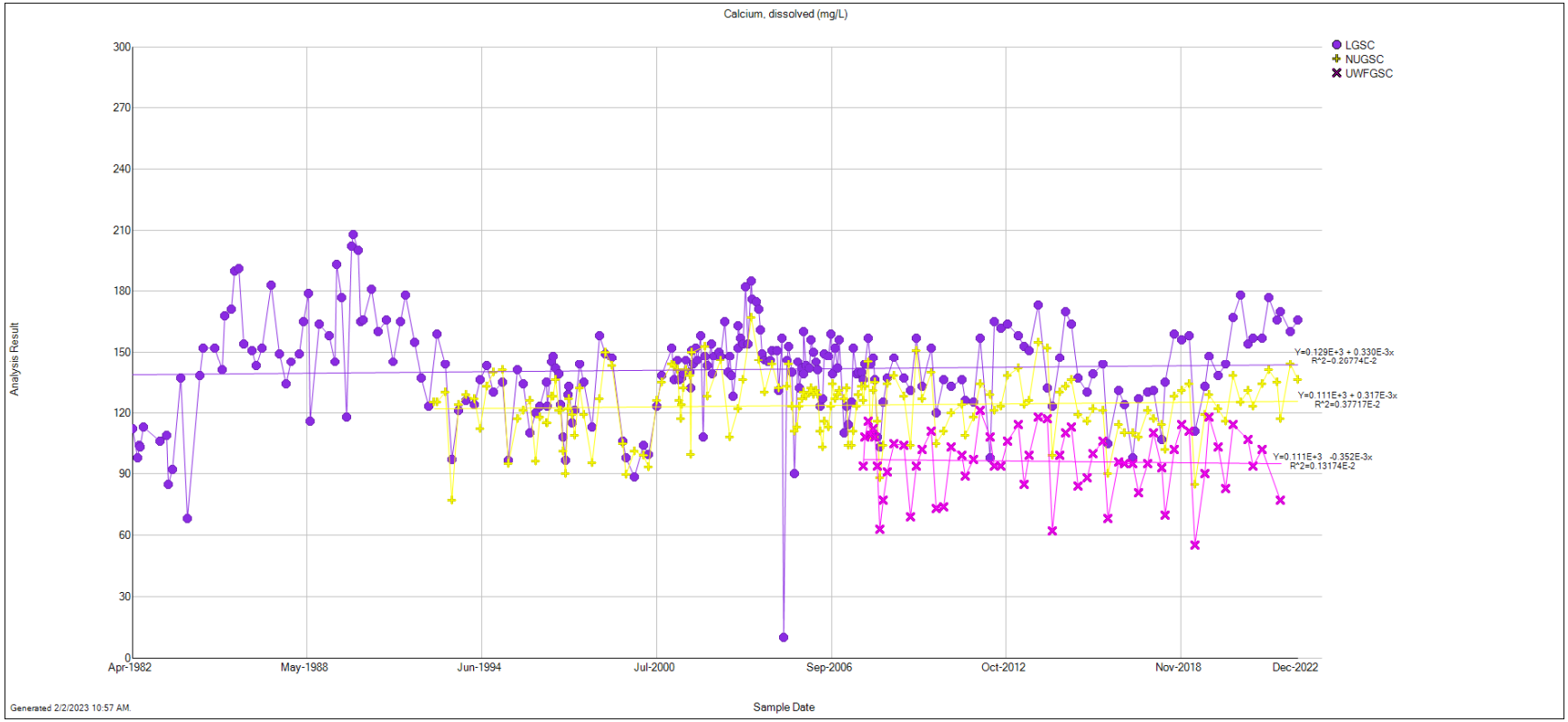
	Sample Date			
	3/22/2022	**5/11/2022**	**9/14/2022**	**12/12/2022**
As, tot rec, ug/L	Dry	<0.16	Dry	Dry
Ca, diss, mg/L		77		
Fe, tot, mg/L		4.5		
FlowStreamInst, cfs		0.09		
HCO3, mg/L		290		
Hg, tot rec, ug/L		<0.046		
Mg, diss, mg/L		44		
Mn, tot rec, mg/L		0.25		
Na, diss, mg/L		6		
NH3 as N, diss, mg/L		<0.029		
NO2 + NO3, diss, mg/L		2.1		
NO2, diss, mg/L		<0.012		
NO3, diss, mg/L		2.1		
P, tot, mg/L		0.33		
Pb, tot rec, ug/L		<0.16		
pH (field), SU		8.5		
pH (lab), pH		8.7		
Se, tot rec, ug/L		<0.15		
SO4, diss, mg/L		120		
Spec. Cond. (field), umhos/cm		730		
Spec. Cond. (lab), umhos/cm		724		
TDS, mg/L		450		
Temp (Celcius), degrees C		11.6		
TSS, mg/L		340		
Zn, tot rec, mg/L		<0.05		

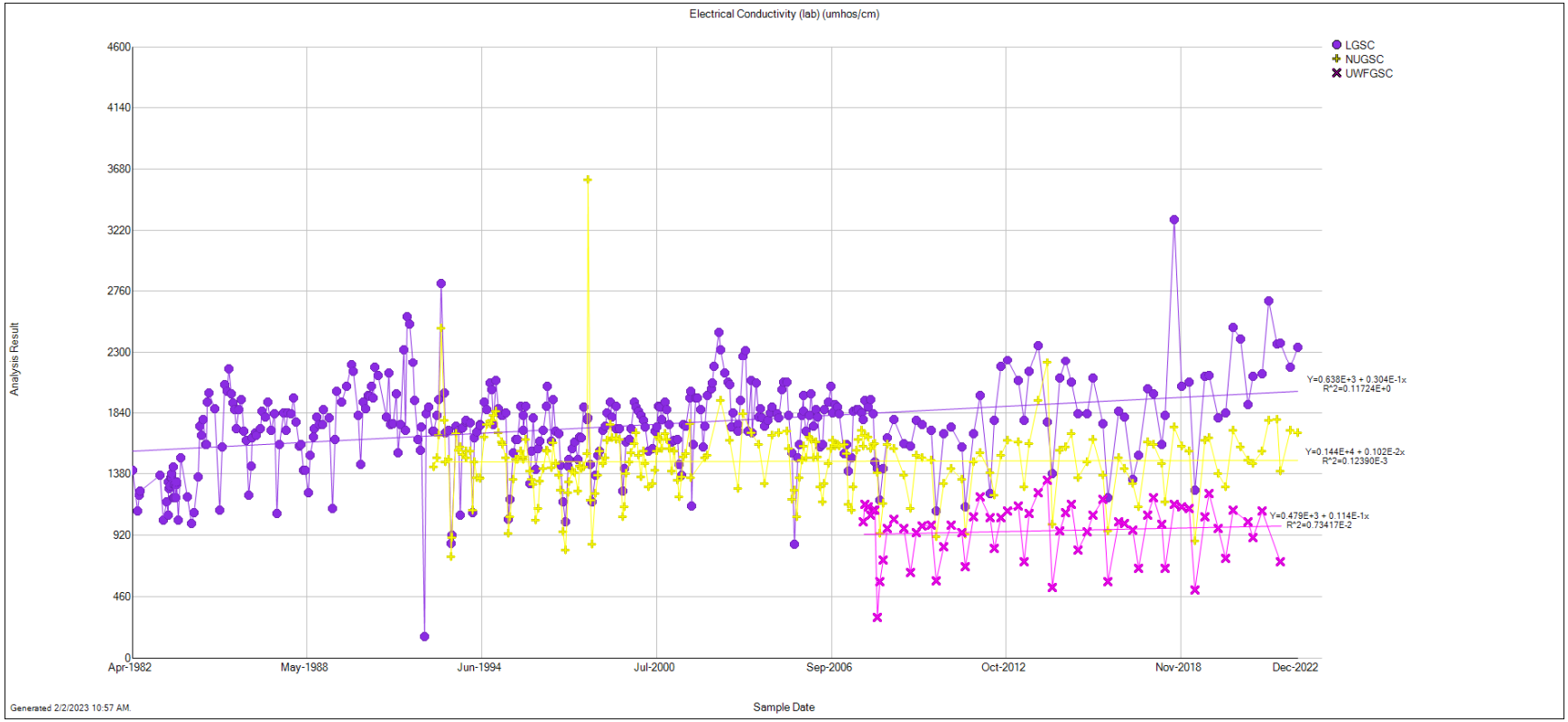
Colowyo Mine
Site - WFJC
Water Year 1/1/2022 - 12/31/2022

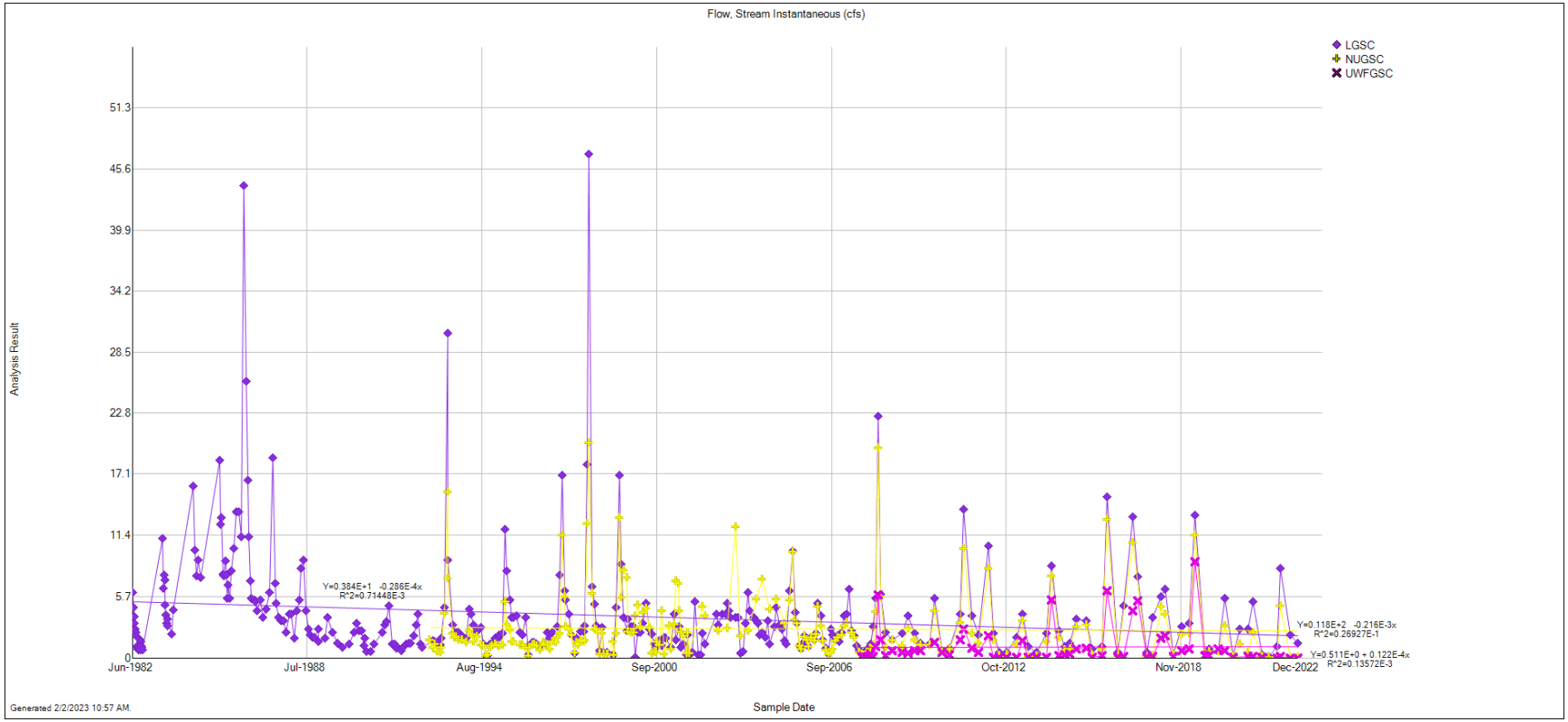
	Sample Date			
	3/22/2022	**5/11/2022**	**9/14/2022**	**12/12/2022**
As, tot rec, mg/L	Dry	Dry	Dry	Dry
Ca, diss, mg/L				
Fe, tot, mg/L				
FlowStreamInst, cfs				
HCO3, mg/L				
Hg, tot rec, ug/L				
Mg, diss, mg/L				
Mn, tot rec, mg/L				
Na, diss, mg/L				
NH3 as N, diss, mg/L				
NO2 + NO3, diss, mg/L				
NO2, diss, mg/L				
NO3, diss, mg/L				
P, tot, mg/L				
Pb, tot rec, mg/L				
pH (field)				
pH (lab)				
Se, tot rec, ug/L				
SO4, diss, mg/L				
Spec. Cond. (field), umhos/cm				
Spec. Cond. (lab), umhos/cm				
TDS, mg/L				
Temp (Celcius), degrees C				
TSS, mg/L				
Zn, tot rec, mg/L				

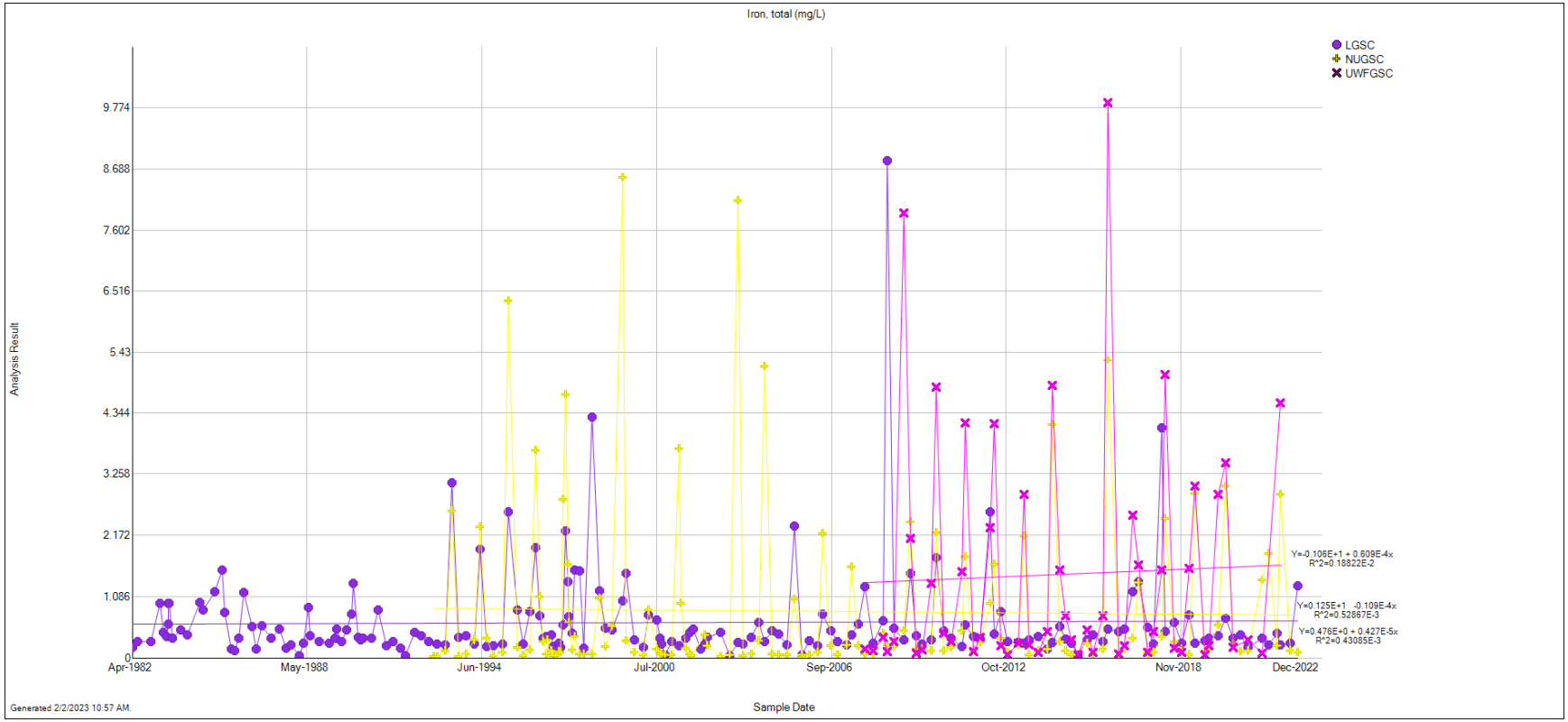
Exhibit 1B

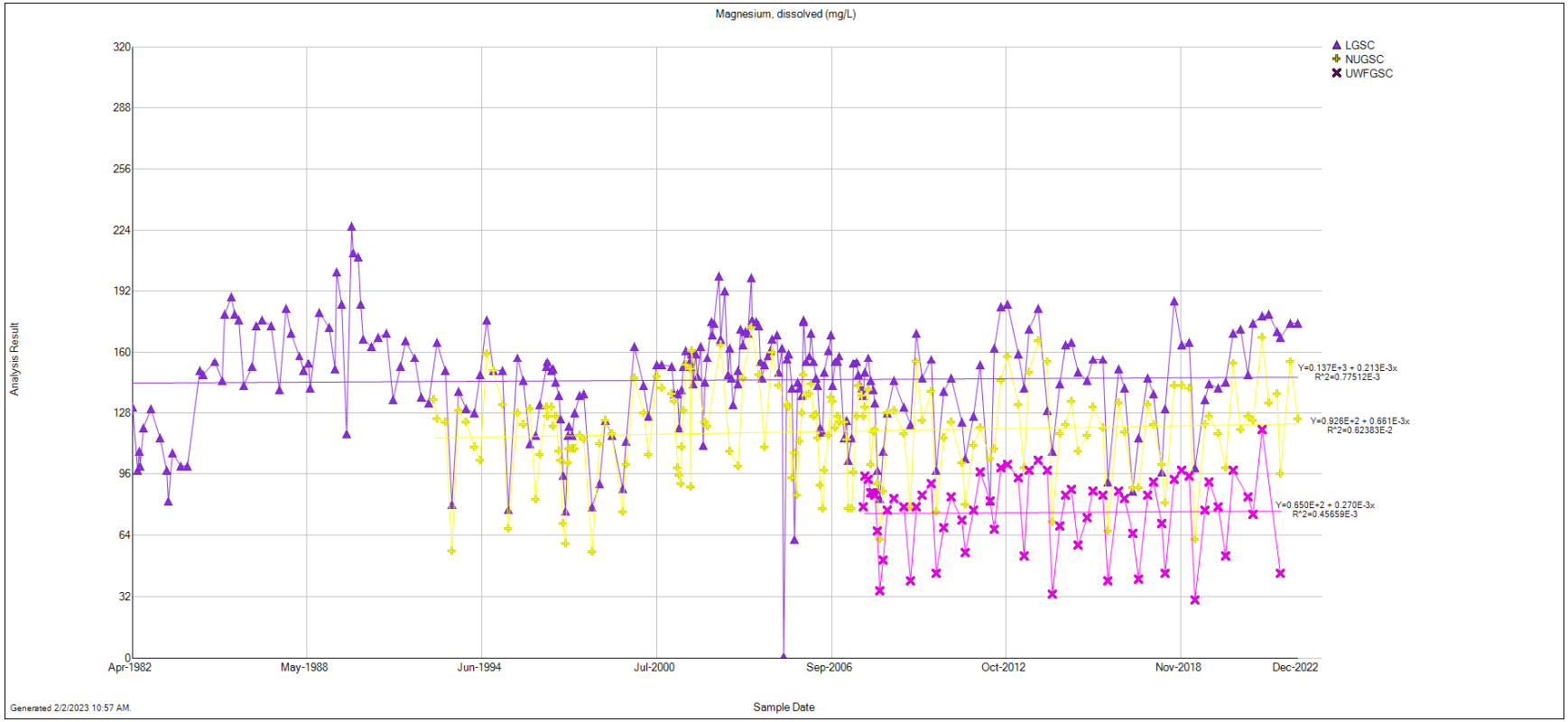
Surface Water Graphs

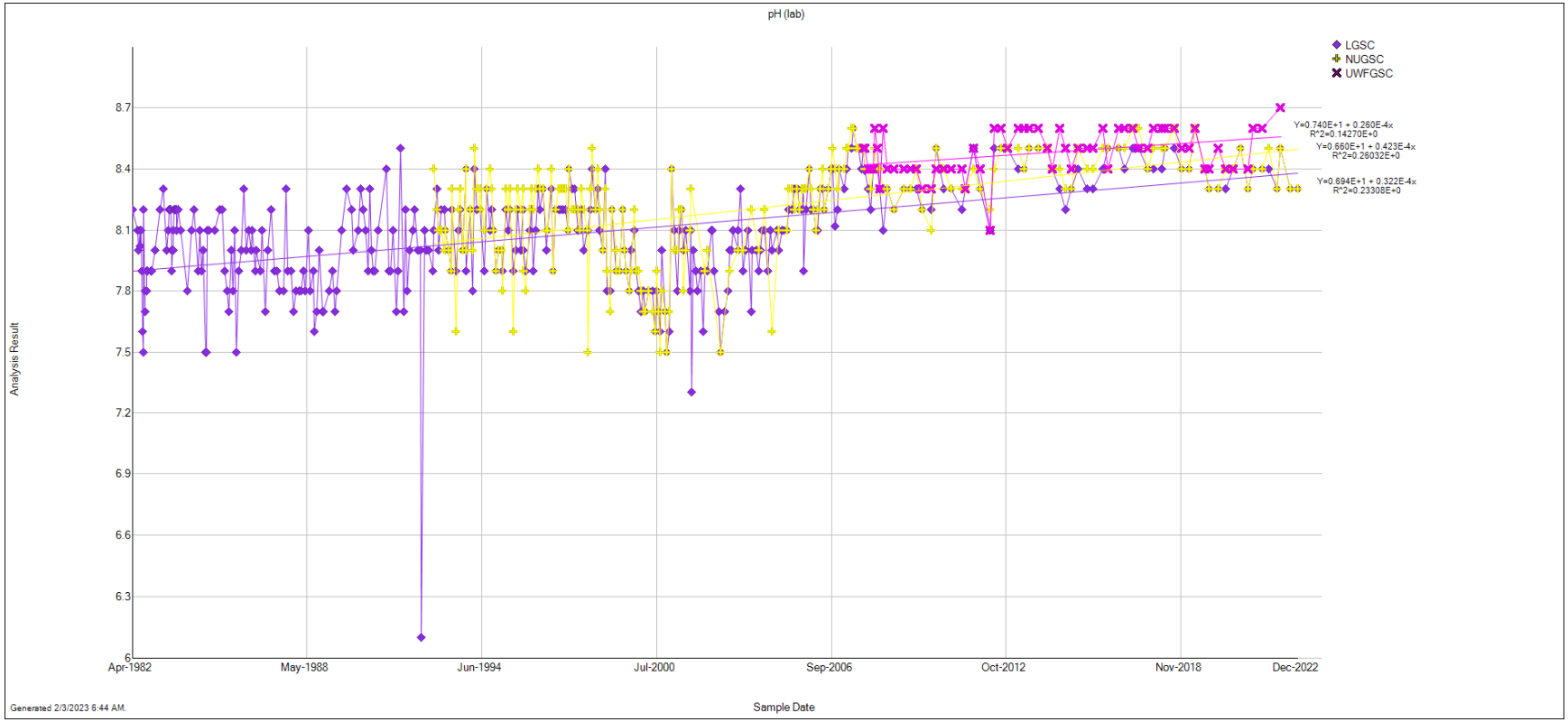

Calcium, dissolved (mg/L)
LGSC
NUGSC
UWFGSC
Y=0.129E+3 + 0.330E-3x
R^2=0.26774E-2
Y=0.111E+3 + 0.317E-3x
R^2=0.37717E-2
Y=0.111E+3 -0.352E-3x
R^2=0.13174E-2
Analysis Result
300
270
240
210
180
150
120
90
60
30
0
Apr-1982
May-1988
Jun-1994
Jul-2000
Sep-2006
Oct-2012
Nov-2018
Dec-2022
Generated 2/2/2023 10:57 AM.
Sample Date

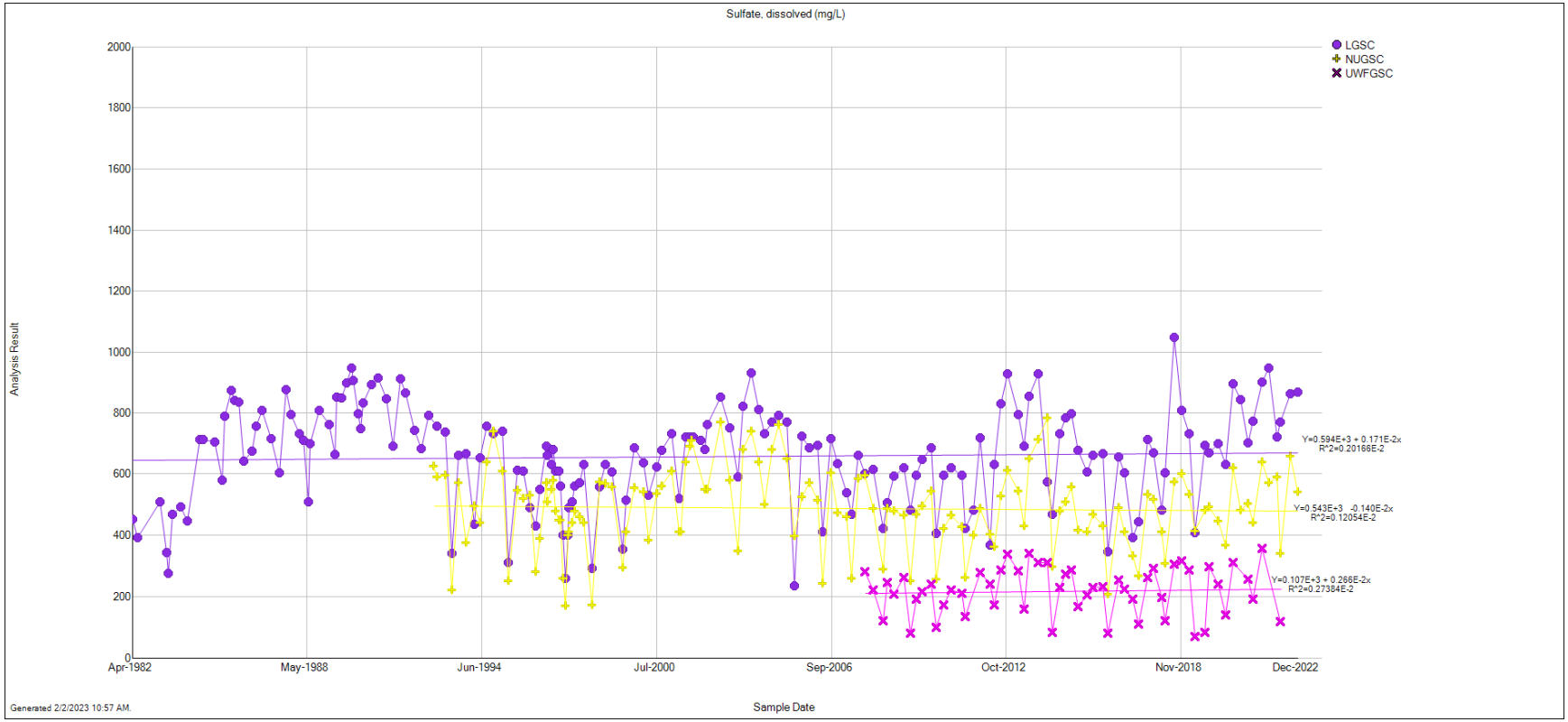

Electrical Conductivity (lab) (umhos/cm)
LGSC
NUGSC
UWFGSC
Y=0.638E+3 + 0.304E-1x
R^2=0.11724E+0
Y=0.144E+4 + 0.102E-2x
R^2=0.12390E-3
Y=0.479E+3 + 0.114E-1x
R^2=0.73417E-2
Analysis Result
4600
4140
3680
3220
2760
2300
1840
1380
920
460
0
Apr-1982
May-1988
Jun-1994
Jul-2000
Sep-2006
Oct-2012
Nov-2018
Dec-2022
Sample Date
Generated 2/2/2023 10:57 AM.

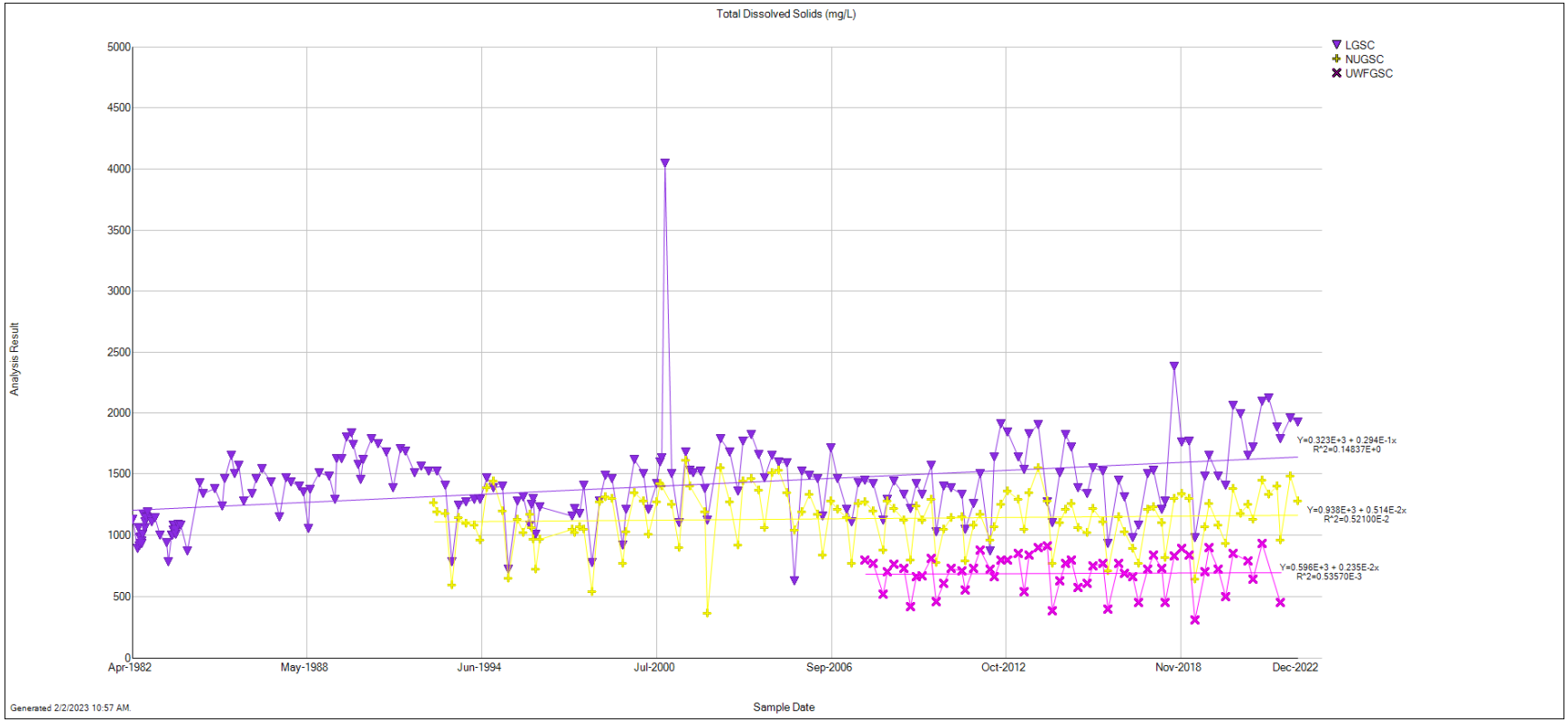

Flow, Stream Instantaneous (cfs)
LGSC
NUGSC
UWFGSC
Analysis Result
51.3
45.6
39.9
34.2
28.5
22.8
17.1
11.4
5.7
0
Jun-1982
Jul-1988
Aug-1994
Sep-2000
Sep-2006
Oct-2012
Nov-2018
Dec-2022
Y=0.384E+1 -0.286E-4x
R^2=0.71448E-3
Y=0.118E+2 -0.216E-3x
R^2=0.26927E-1
Y=0.511E+0 + 0.122E-4x
R^2=0.13572E-3
Generated 2/2/2023 10:57 AM.
Sample Date

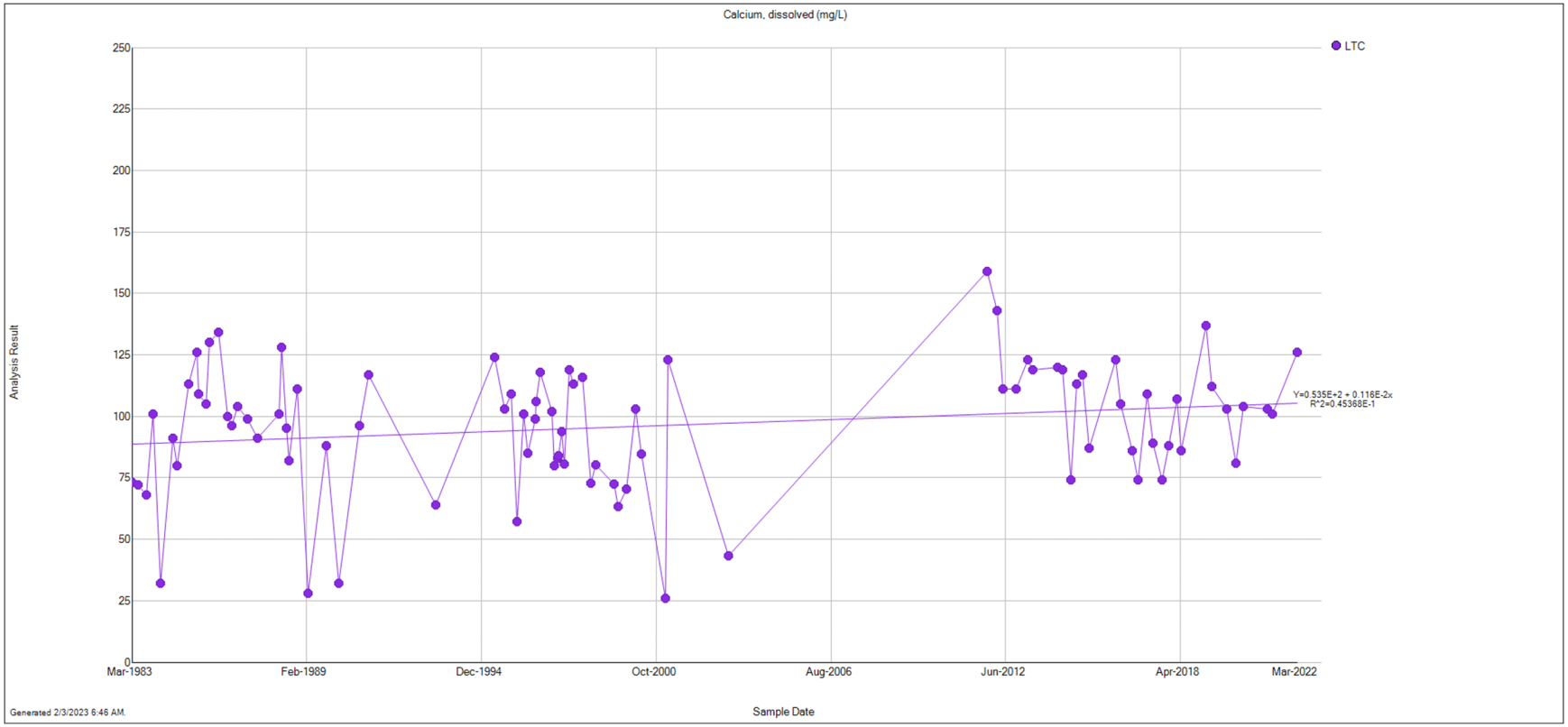

Iron, total (mg/L)
LGSC
NUGSC
UWFGSC
Analysis Result
9.774
8.688
7.602
6.516
5.43
4.344
3.258
2.172
1.086
0
Apr-1982
May-1988
Jun-1994
Jul-2000
Sep-2006
Oct-2012
Nov-2018
Dec-2022
Y=-0.106E+1 + 0.609E-4x
R^2=0.18822E-2
Y=0.125E+1 -0.109E-4x
R^2=0.52867E-3
Y=0.476E+0 + 0.427E-5x
R^2=0.43085E-3
Generated 2/2/2023 10:57 AM.
Sample Date

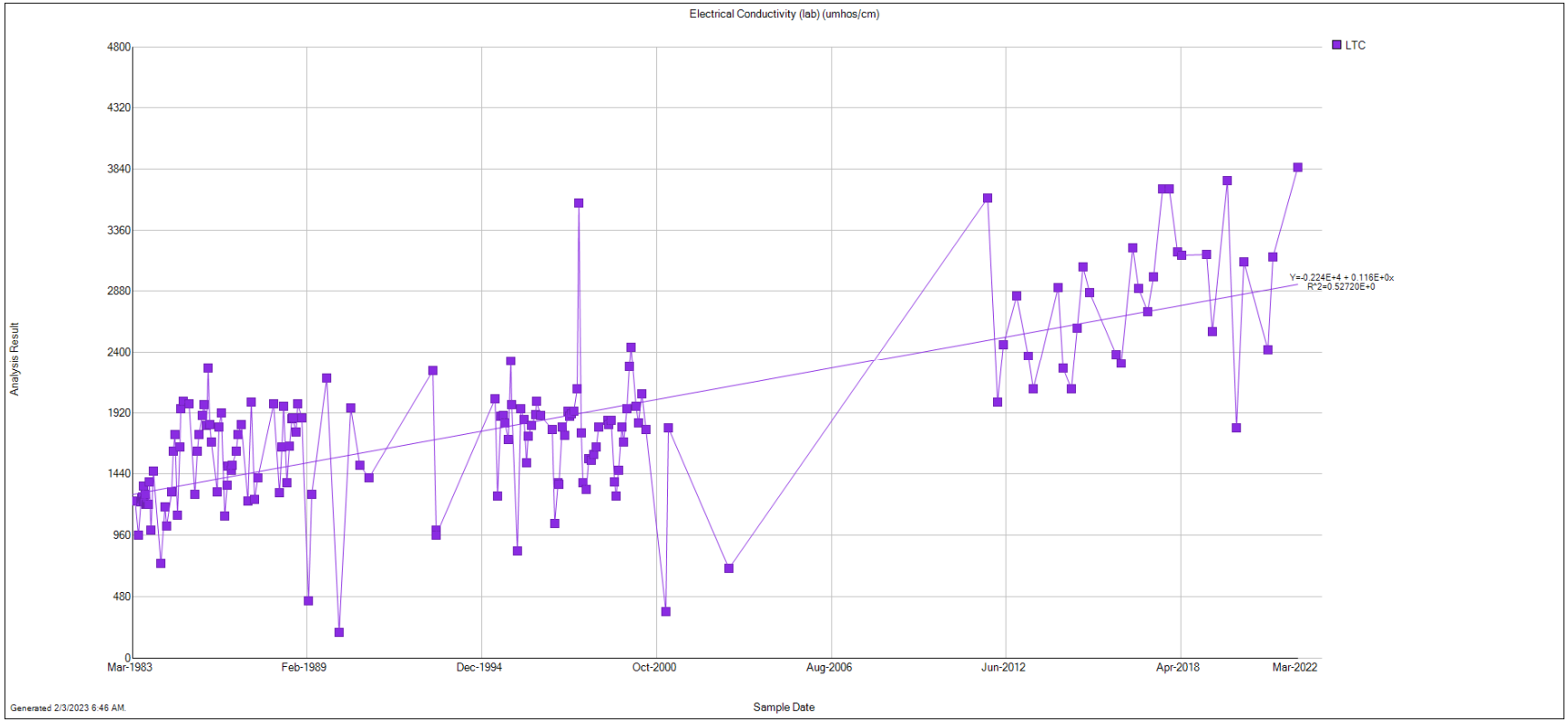

Magnesium, dissolved (mg/L)
LGSC
NUGSC
UWFGSC
Y=0.137E+3 + 0.213E-3x
R^2=0.77512E-3
Y=0.926E+2 + 0.661E-3x
R^2=0.62383E-2
Y=0.650E+2 + 0.270E-3x
R^2=0.45659E-3
Analysis Result
320
288
256
224
192
160
128
96
64
32
0
Apr-1982
May-1988
Jun-1994
Jul-2000
Sep-2006
Oct-2012
Nov-2018
Dec-2022
Sample Date
Generated 2/2/2023 10:57 AM.

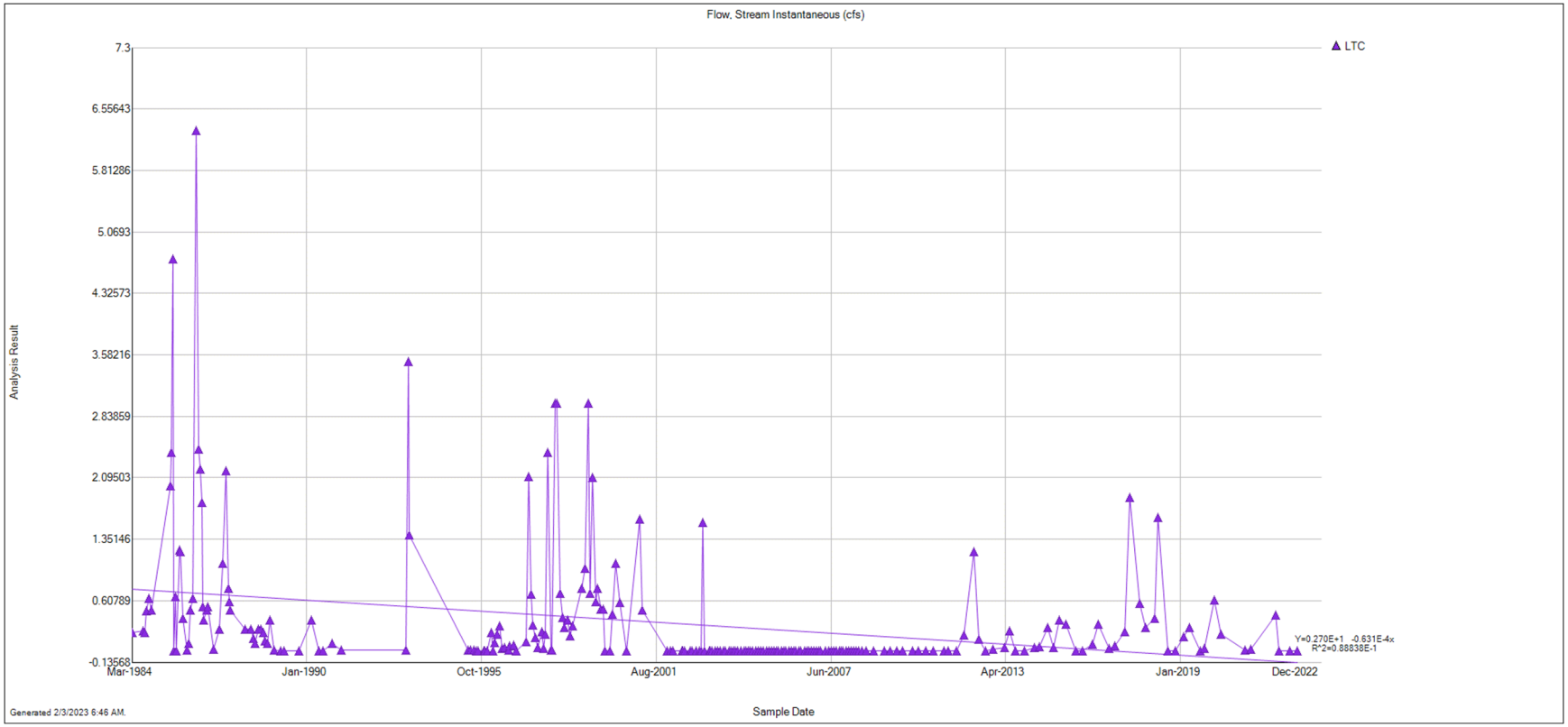

pH (lab)
LGSC
NUGSC
UWFGSC
Y=0.740E+1 + 0.260E-4x
R^2=0.14270E+0
Y=0.660E+1 + 0.423E-4x
R^2=0.26032E+0
Y=0.694E+1 + 0.322E-4x
R^2=0.23308E+0
Analysis Result
8.7
8.4
8.1
7.8
7.5
7.2
6.9
6.6
6.3
6
Apr-1982
May-1988
Jun-1994
Jul-2000
Sep-2006
Oct-2012
Nov-2018
Dec-2022
Generated 2/3/2023 6:44 AM.
Sample Date

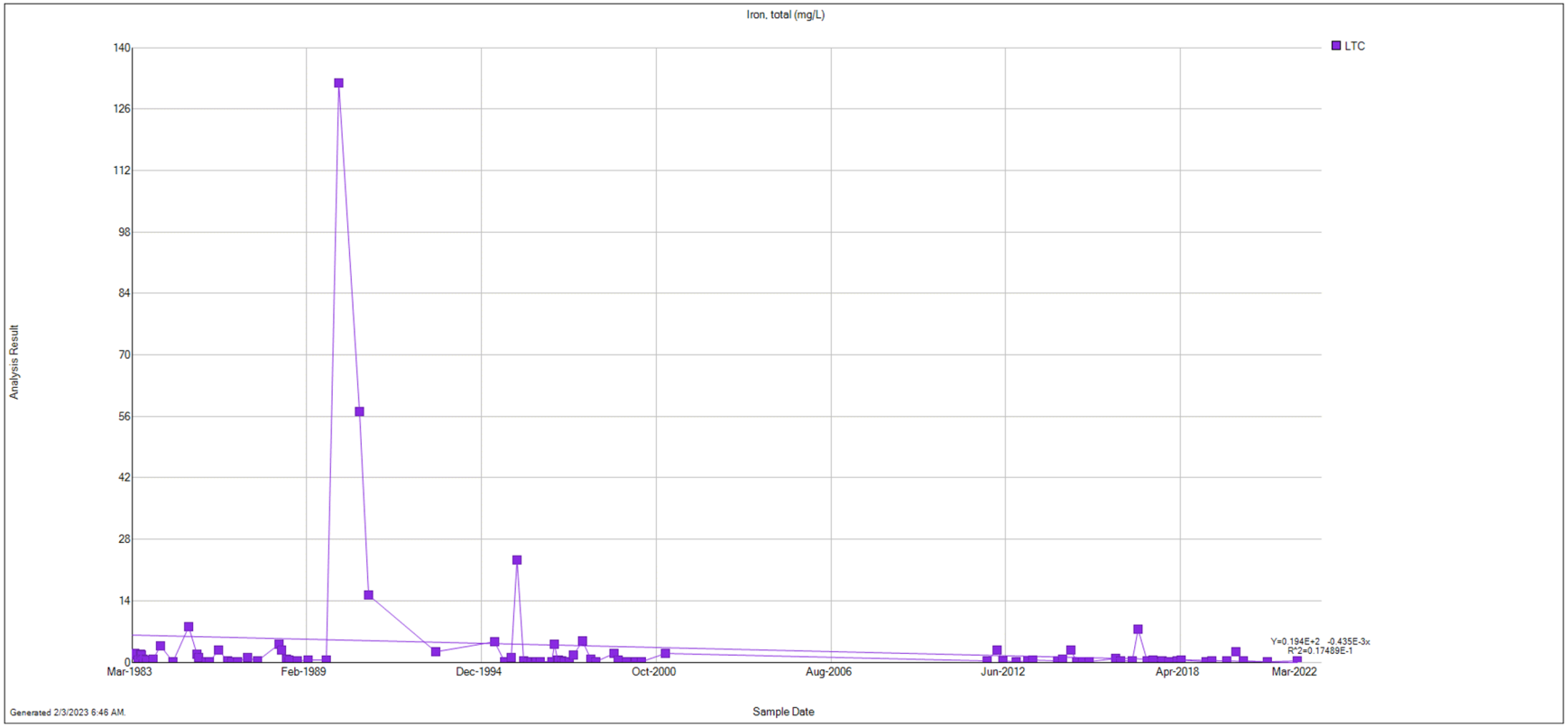

Sulfate, dissolved (mg/L)
LGSC
NUGSC
UWFGSC
Y=0.594E+3 + 0.171E-2x
R^2=0.20166E-2
Y=0.543E+3 -0.140E-2x
R^2=0.12054E-2
Y=0.107E+3 + 0.266E-2x
R^2=0.27384E-2
Analysis Result
Sample Date
Generated 2/2/2023 10:57 AM.
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Apr-1982
May-1988
Jun-1994
Jul-2000
Sep-2006
Oct-2012
Nov-2018
Dec-2022

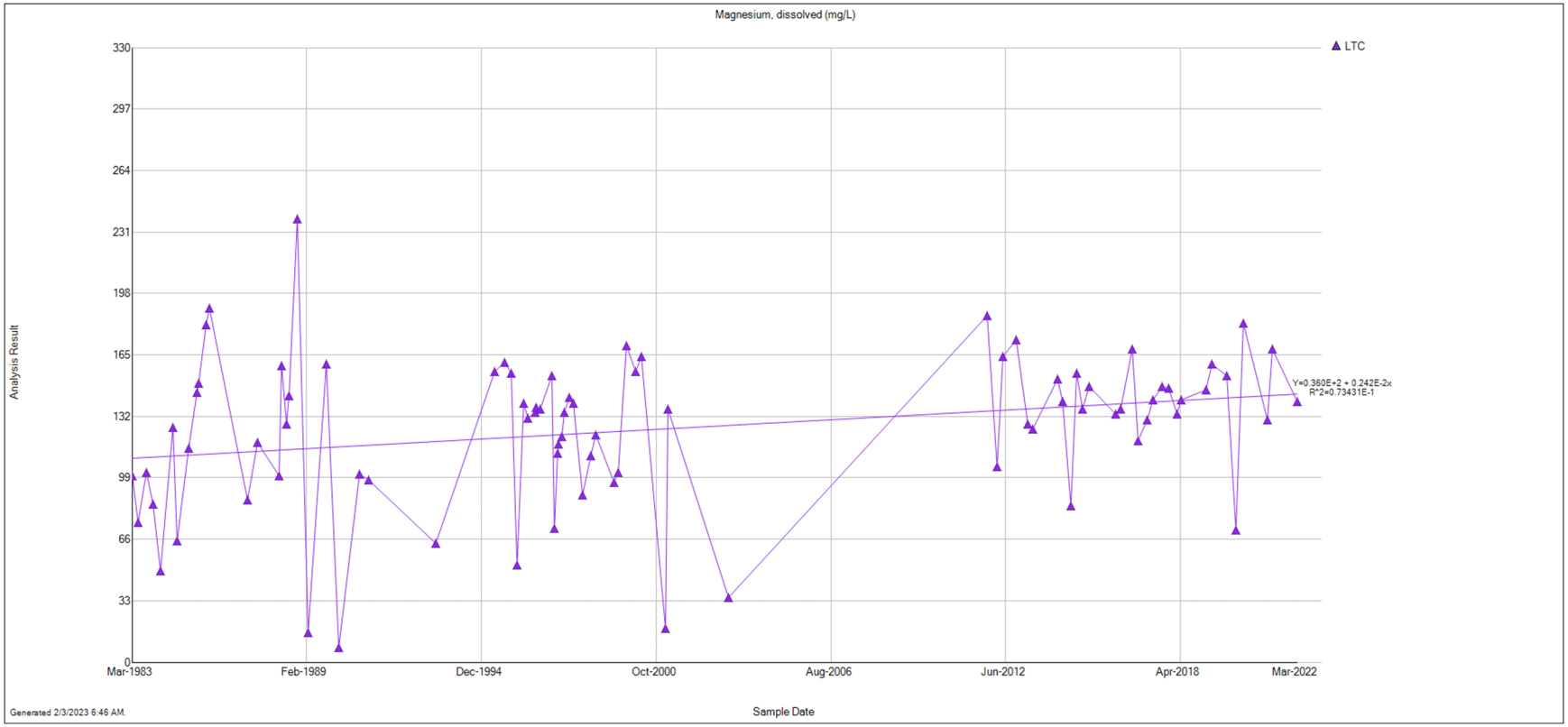

Total Dissolved Solids (mg/L)
LGSC
NUGSC
UWFGSC
Y=0.323E+3 + 0.294E-1x
R^2=0.14837E+0
Y=0.938E+3 + 0.514E-2x
R^2=0.52100E-2
Y=0.596E+3 + 0.235E-2x
R^2=0.53570E-3
Analysis Result
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
Apr-1982
May-1988
Jun-1994
Jul-2000
Sep-2006
Oct-2012
Nov-2018
Dec-2022
Generated 2/2/2023 10:57 AM.
Sample Date

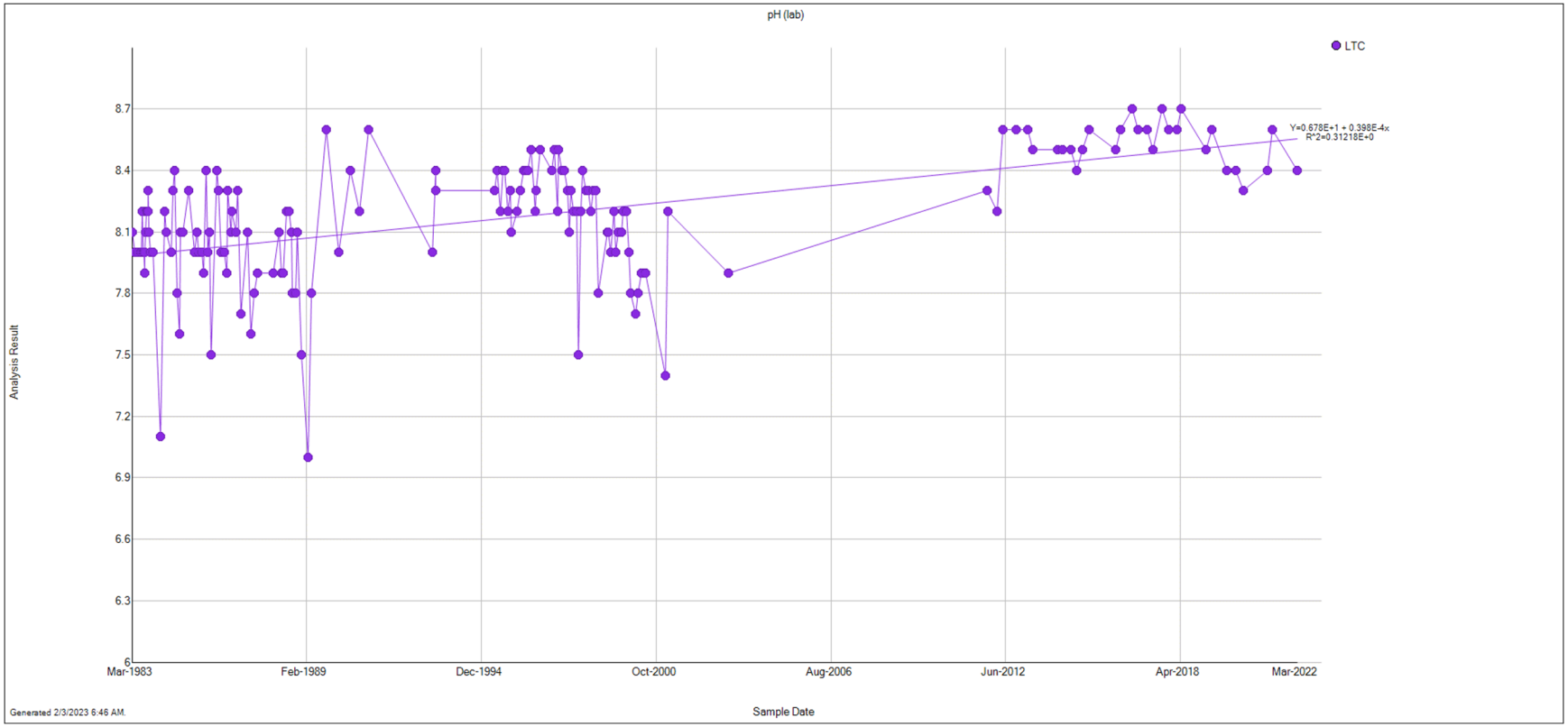

Calcium, dissolved (mg/L)
LTC
Y=0.535E+2 + 0.116E-2x
R^2=0.45368E-1
Analysis Result
250
225
200
175
150
125
100
75
50
25
0
Mar-1983
Feb-1989
Dec-1994
Oct-2000
Aug-2006
Jun-2012
Apr-2018
Mar-2022
Generated 2/3/2023 6:46 AM.
Sample Date

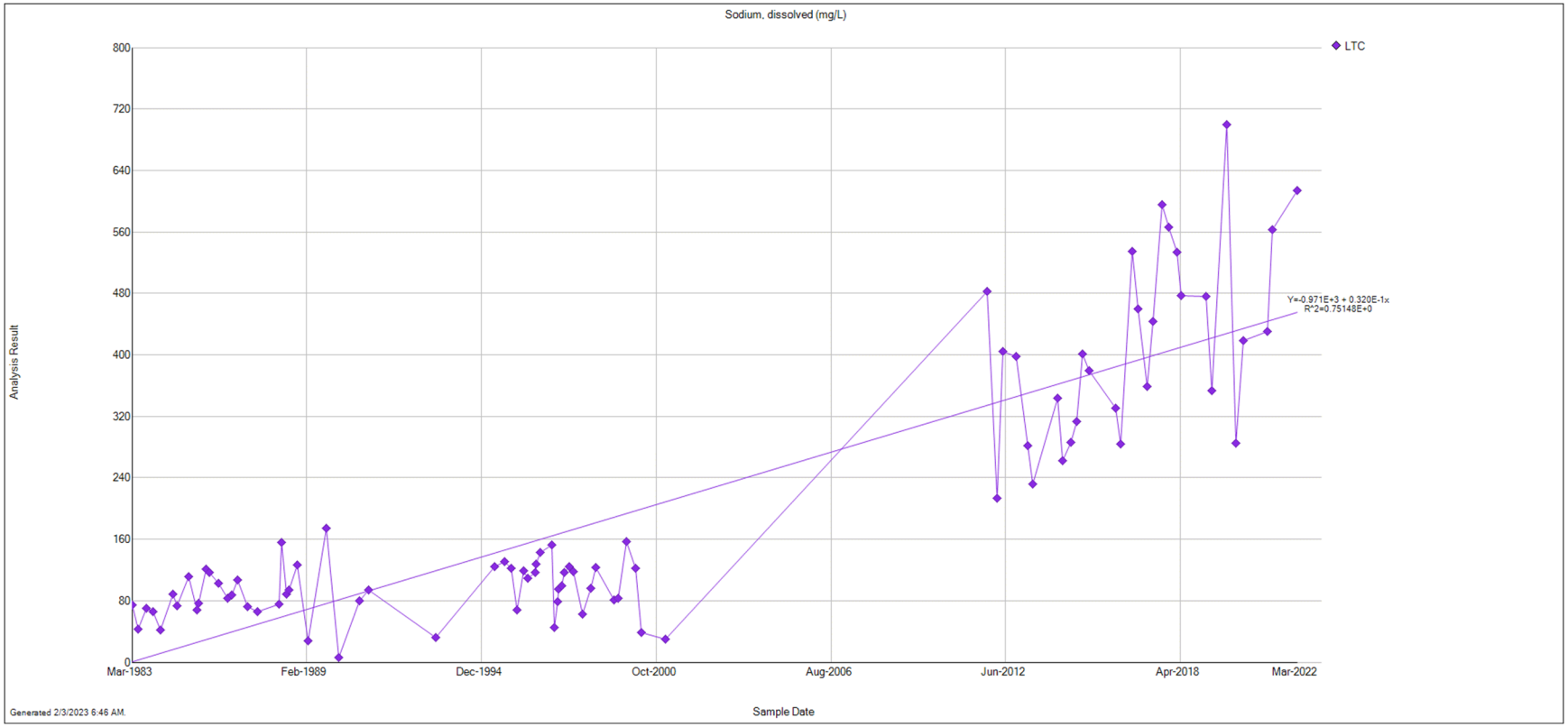

Electrical Conductivity (lab) (umhos/cm)
LTC
Y=-0.224E+4 + 0.116E+0x
R^2=0.52720E+0
Analysis Result
4800
4320
3840
3360
2880
2400
1920
1440
960
480
0
Mar-1983
Feb-1989
Dec-1994
Oct-2000
Aug-2006
Jun-2012
Apr-2018
Mar-2022
Generated 2/3/2023 6:46 AM.
Sample Date

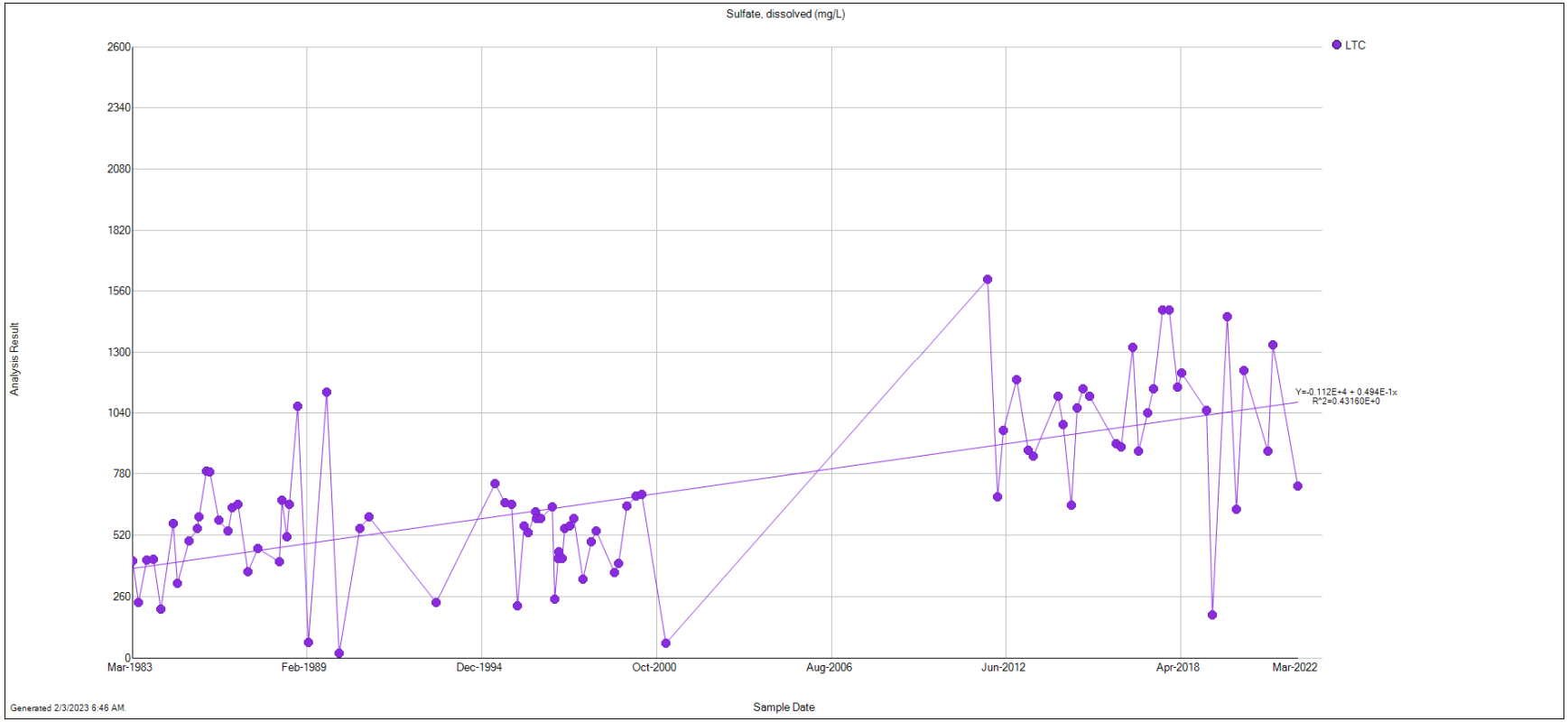

Flow, Stream Instantaneous (cfs)
LTC
7.3
6.55643
5.81286
5.0693
4.32573
3.58216
2.83859
2.09503
1.35146
0.60789
-0.13568
Analysis Result
Mar-1984
Jan-1990
Oct-1995
Aug-2001
Jun-2007
Apr-2013
Jan-2019
Dec-2022
Y=0.270E+1 -0.631E-4x
R^2=0.88838E-1
Generated 2/3/2023 6:46 AM.
Sample Date

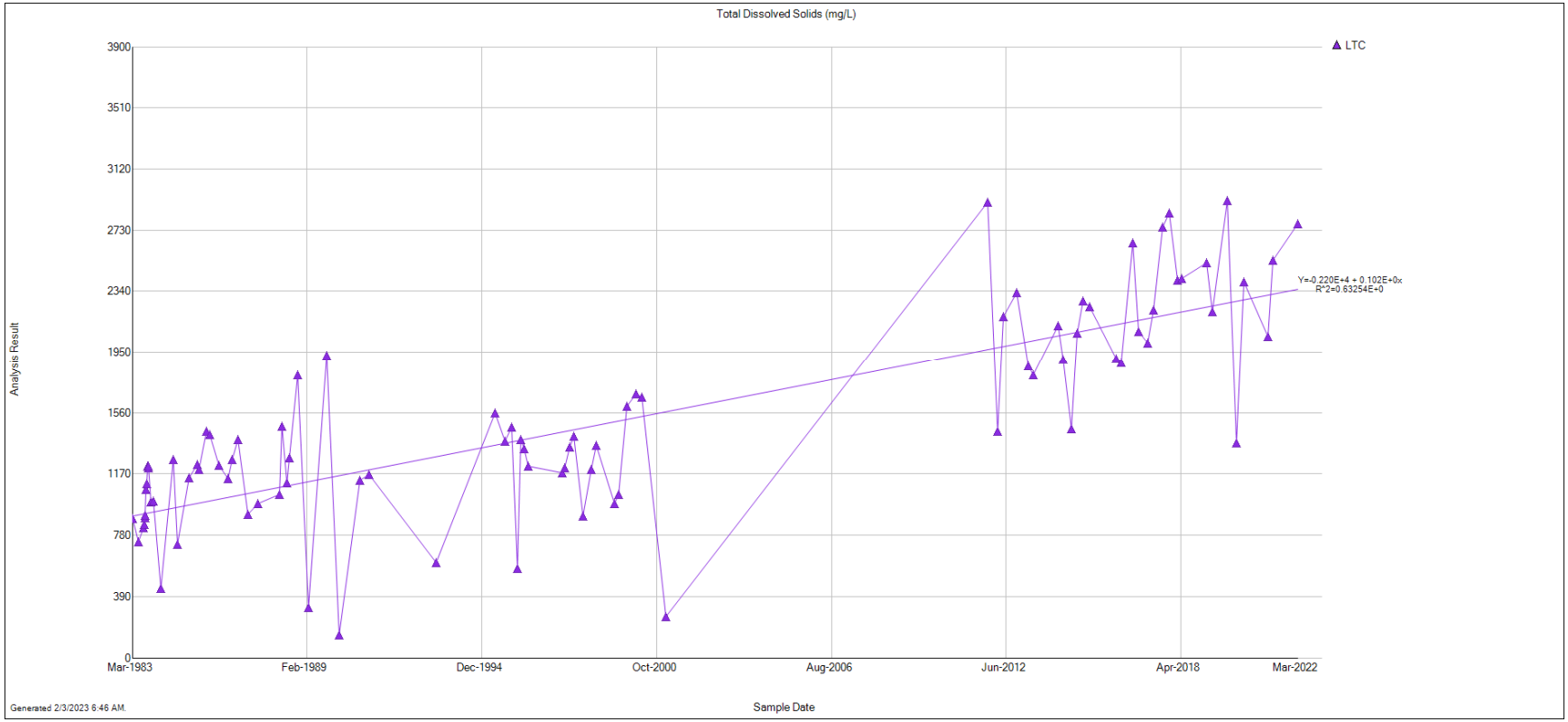

Iron, total (mg/L)
LTC
Analysis Result
140
126
112
98
84
70
56
42
28
14
0
Mar-1983
Feb-1989
Dec-1994
Oct-2000
Aug-2006
Jun-2012
Apr-2018
Mar-2022
Y=0.194E+2 -0.435E-3x
R^2=0.17489E-1
Generated 2/3/2023 6:46 AM.
Sample Date

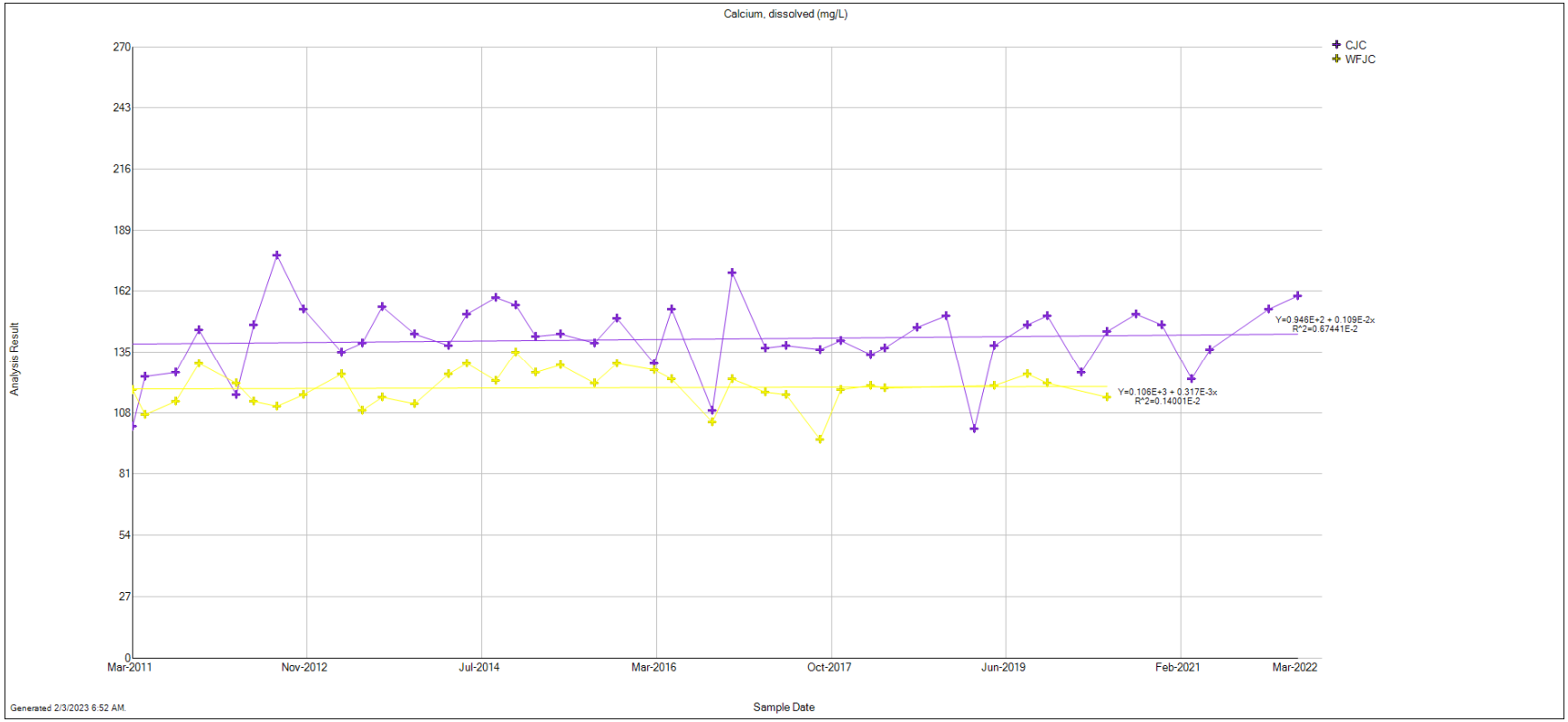

Magnesium, dissolved (mg/L)
LTC
Y=0.360E+2 + 0.242E-2x
R^2=0.73431E-1
Analysis Result
330
297
264
231
198
165
132
99
66
33
0
Mar-1983
Feb-1989
Dec-1994
Oct-2000
Aug-2006
Jun-2012
Apr-2018
Mar-2022
Sample Date
Generated 2/3/2023 6:46 AM.

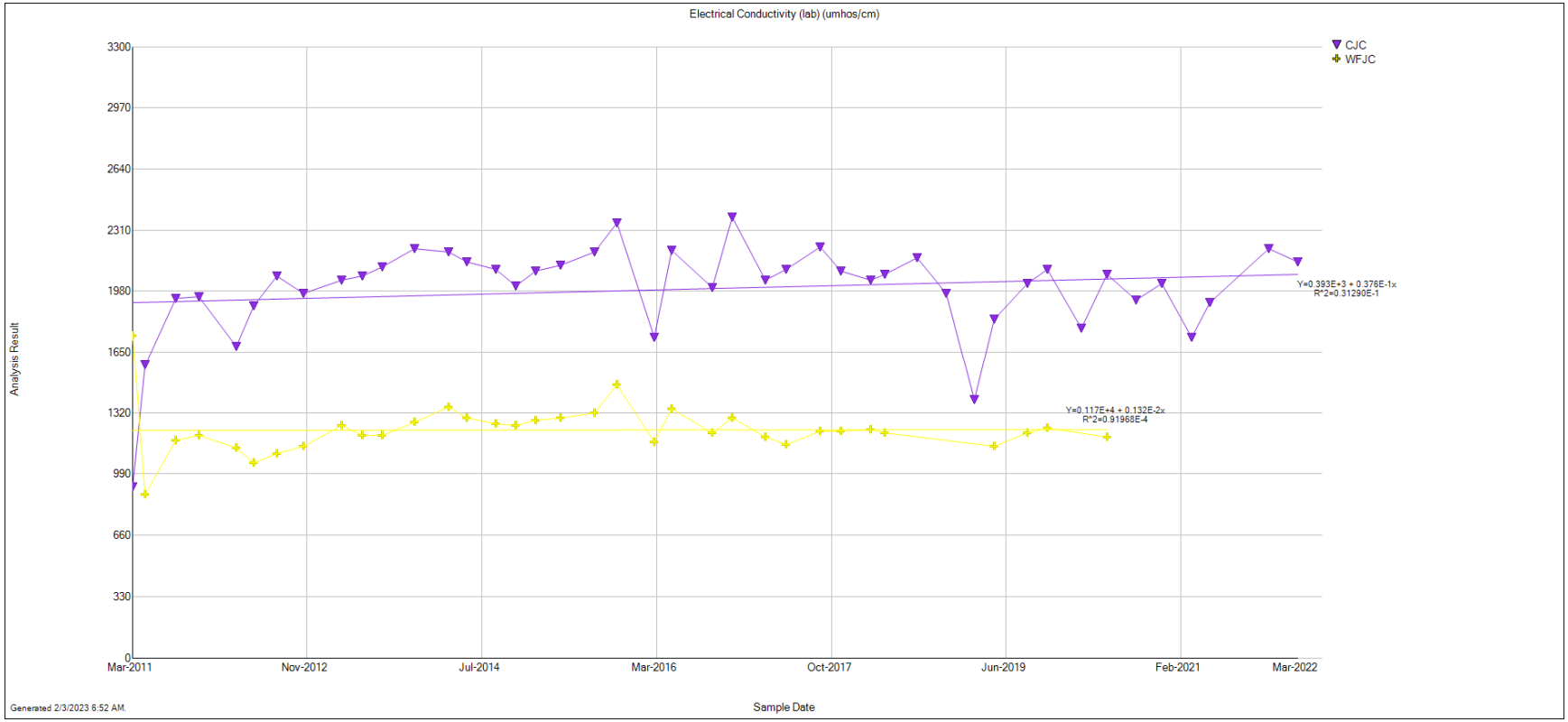

pH (lab)
LTC
Y=0.678E+1 + 0.398E-4x
R^2=0.31218E+0
Analysis Result
8.7
8.4
8.1
7.8
7.5
7.2
6.9
6.6
6.3
6
Mar-1983
Feb-1989
Dec-1994
Oct-2000
Aug-2006
Jun-2012
Apr-2018
Mar-2022
Generated 2/3/2023 6:46 AM.
Sample Date

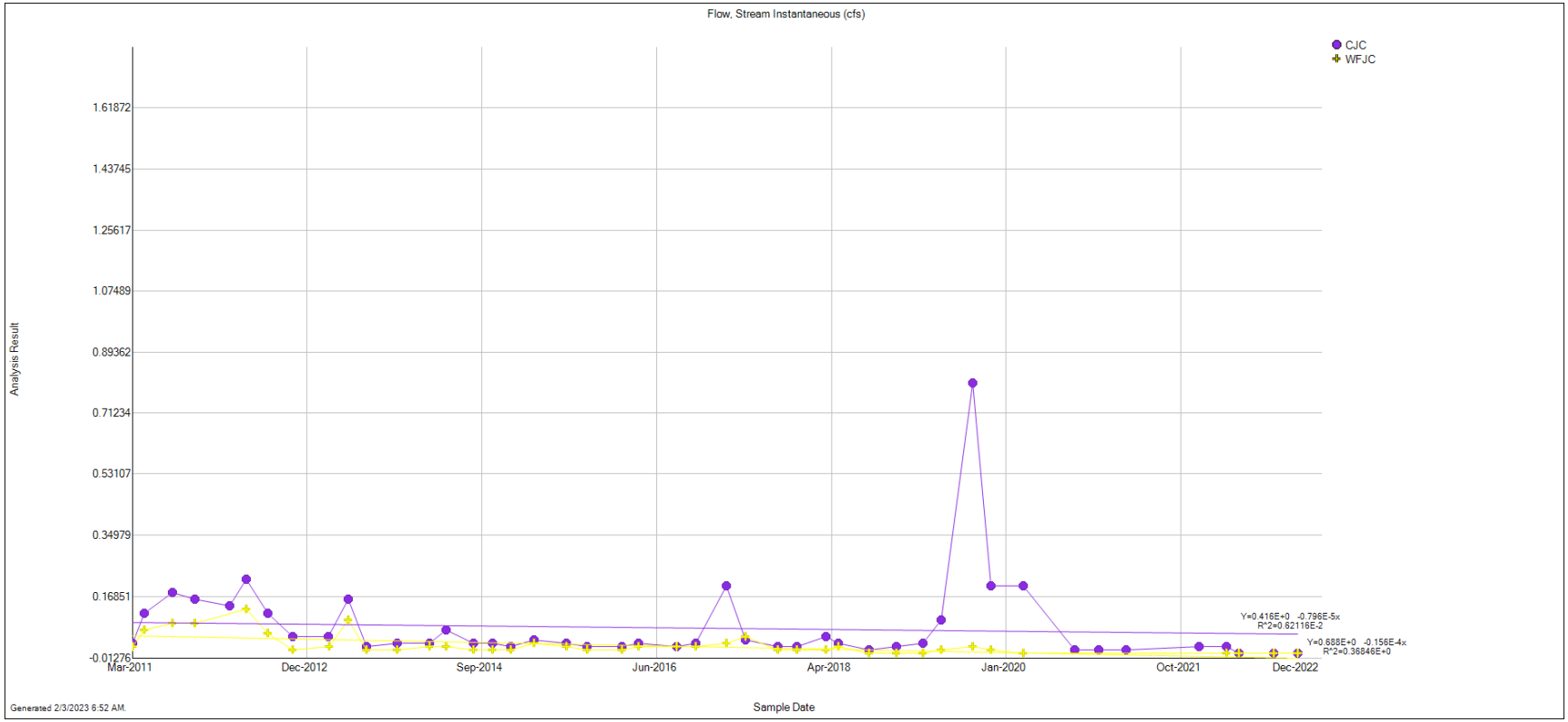

Sodium, dissolved (mg/L)
LTC
Y=-0.971E+3 + 0.320E-1x
R^2=0.75148E+0
Analysis Result
800
720
640
560
480
400
320
240
160
80
0
Mar-1983
Feb-1989
Dec-1994
Oct-2000
Aug-2006
Jun-2012
Apr-2018
Mar-2022
Generated 2/3/2023 6:46 AM.
Sample Date

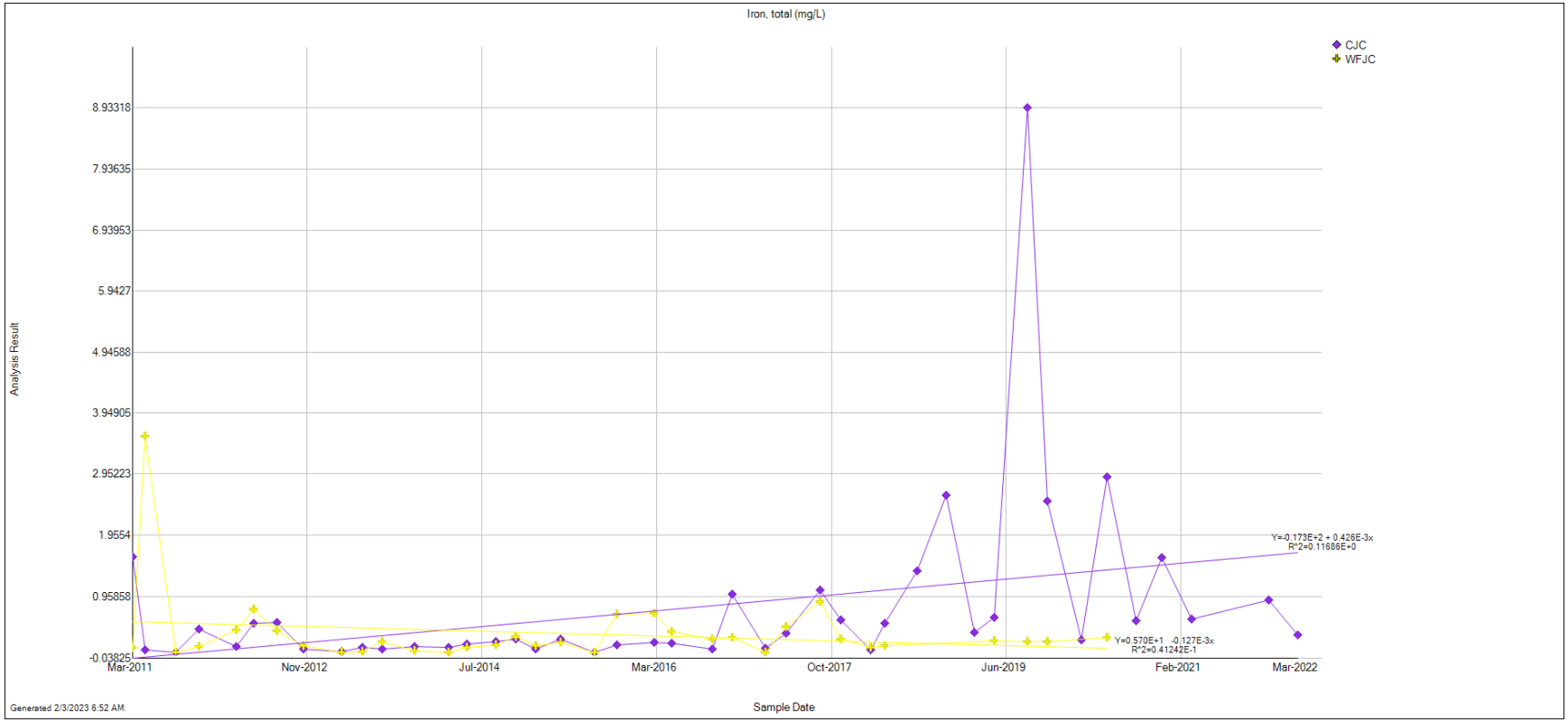

Sulfate, dissolved (mg/L)
LTC
Y=-0.112E+4 + 0.494E-1x
R^2=0.43160E+0
Analysis Result
2600
2340
2080
1820
1560
1300
1040
780
520
260
0
Mar-1983
Feb-1989
Dec-1994
Oct-2000
Aug-2006
Jun-2012
Apr-2018
Mar-2022
Generated 2/3/2023 6:46 AM.
Sample Date

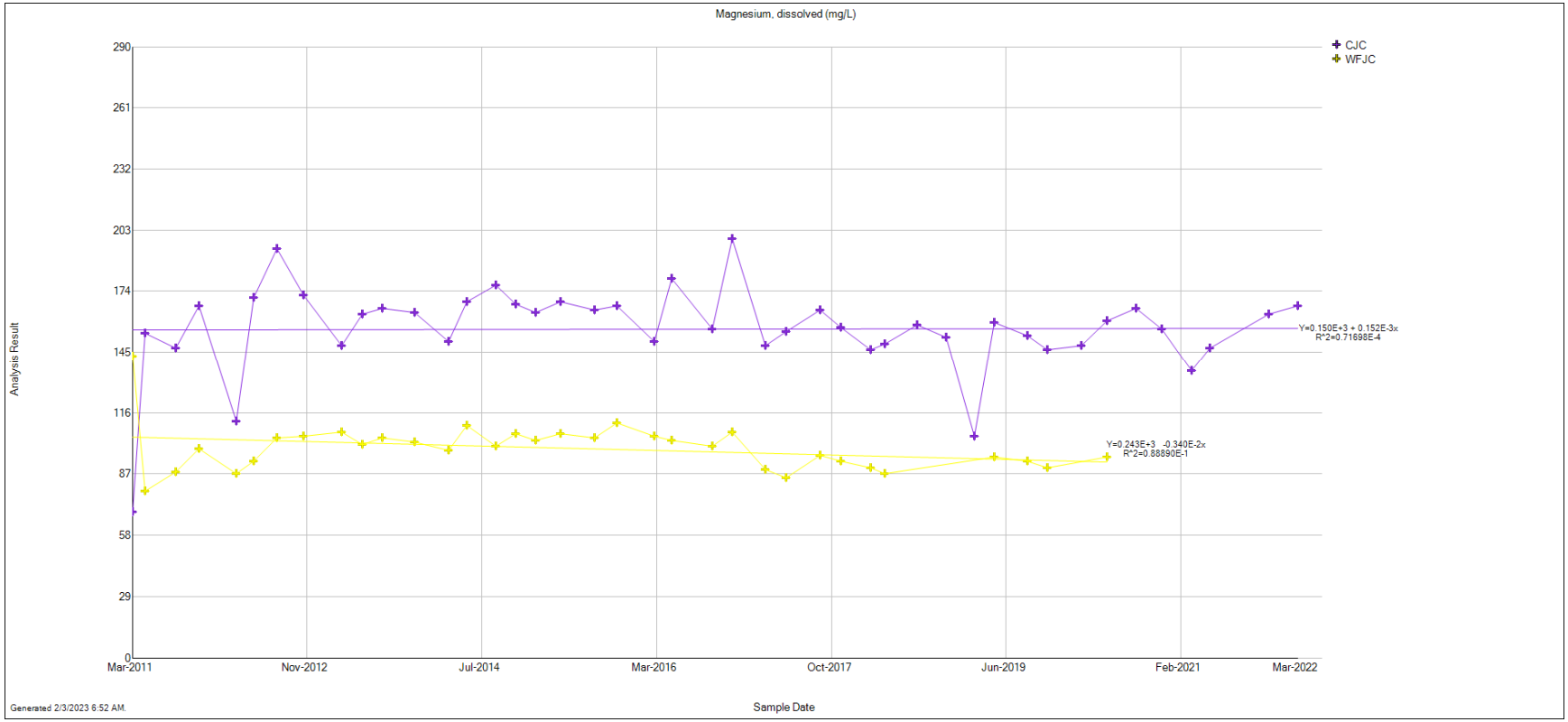

Total Dissolved Solids (mg/L)
LTC
Y=-0.220E+4 + 0.102E+0x
R^2=0.63254E+0
Analysis Result
3900
3510
3120
2730
2340
1950
1560
1170
780
390
0
Mar-1983
Feb-1989
Dec-1994
Oct-2000
Aug-2006
Jun-2012
Apr-2018
Mar-2022
Generated 2/3/2023 6:46 AM.
Sample Date

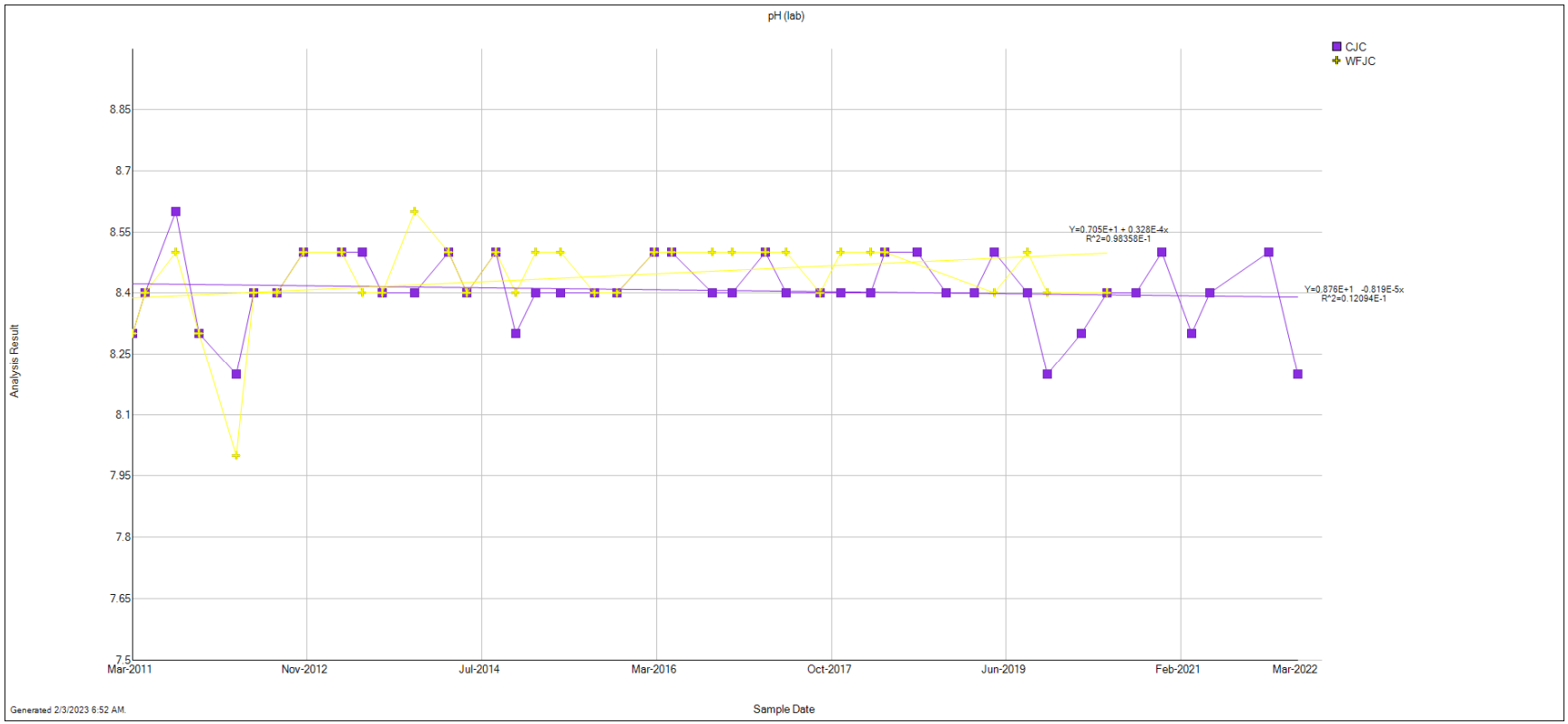

Calcium, dissolved (mg/L)
CJC
WFJC
Y=0.946E+2 + 0.109E-2x
R^2=0.67441E-2
Y=0.106E+3 + 0.317E-3x
R^2=0.14001E-2
Analysis Result
270
243
216
189
162
135
108
81
54
27
0
Mar-2011
Nov-2012
Jul-2014
Mar-2016
Oct-2017
Jun-2019
Feb-2021
Mar-2022
Generated 2/3/2023 6:52 AM.
Sample Date

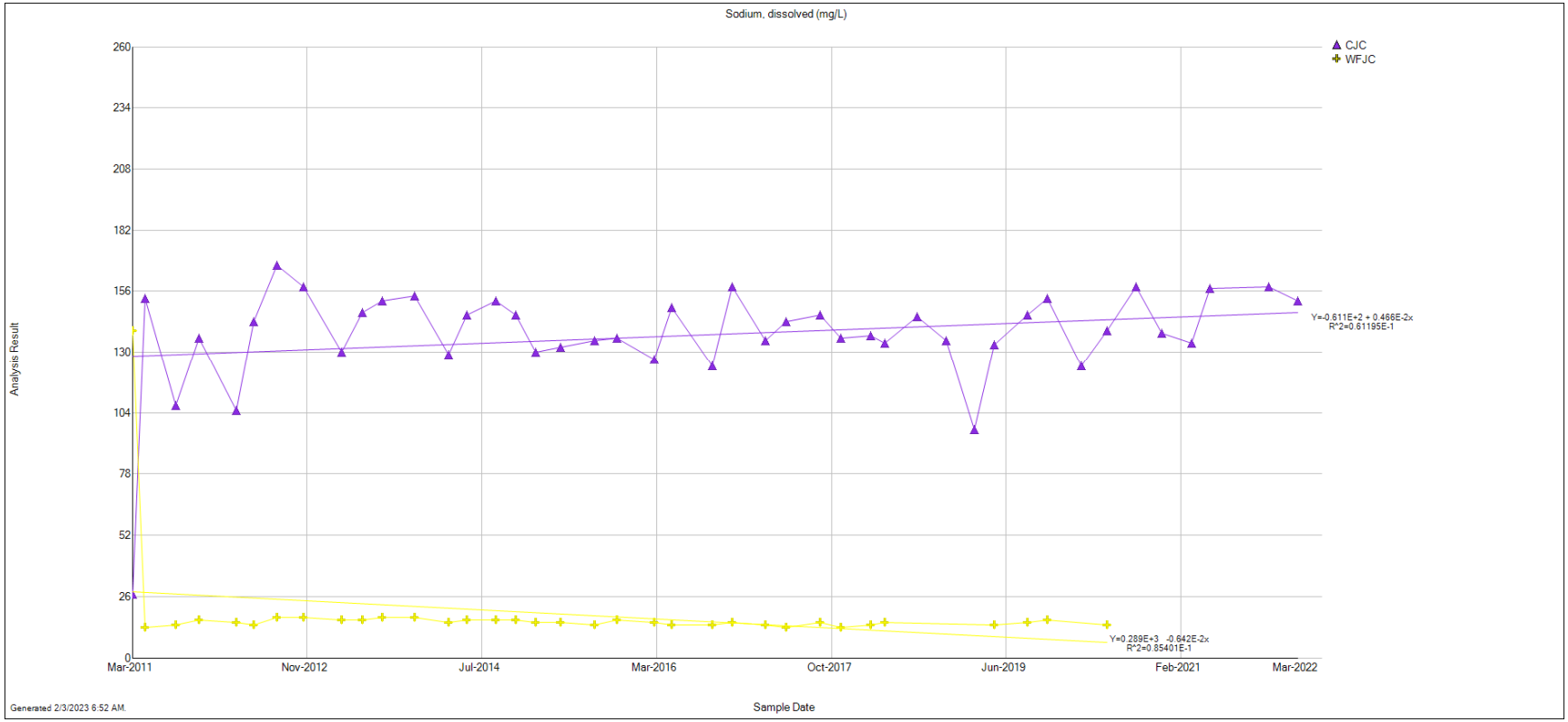

Electrical Conductivity (lab) (umhos/cm)
CJC
WFJC
Y=0.393E+3 + 0.376E-1x
R^2=0.31290E-1
Y=0.117E+4 + 0.132E-2x
R^2=0.91968E-4
Analysis Result
3300
2970
2640
2310
1980
1650
1320
990
660
330
0
Mar-2011
Nov-2012
Jul-2014
Mar-2016
Oct-2017
Jun-2019
Feb-2021
Mar-2022
Generated 2/3/2023 6:52 AM.
Sample Date

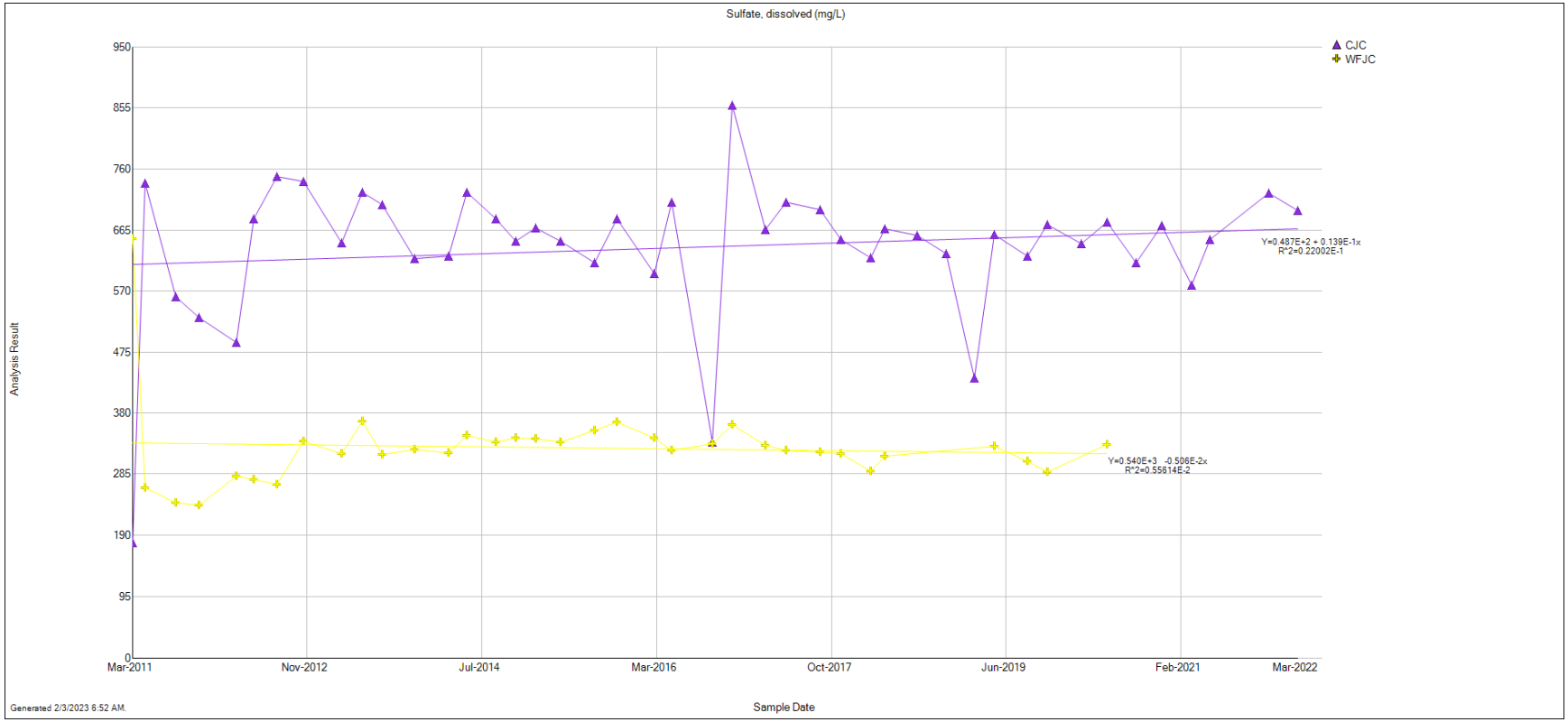

Flow, Stream Instantaneous (cfs)
CJC
WFJC
1.61872
1.43745
1.25617
1.07489
0.89362
0.71234
0.53107
0.34979
0.16851
-0.01276
Analysis Result
Mar-2011
Dec-2012
Sep-2014
Jun-2016
Apr-2018
Jan-2020
Oct-2021
Dec-2022
Sample Date
Y=0.416E+0 -0.796E-5x
R^2=0.62116E-2
Y=0.688E+0 -0.156E-4x
R^2=0.36846E+0
Generated 2/3/2023 6:52 AM.

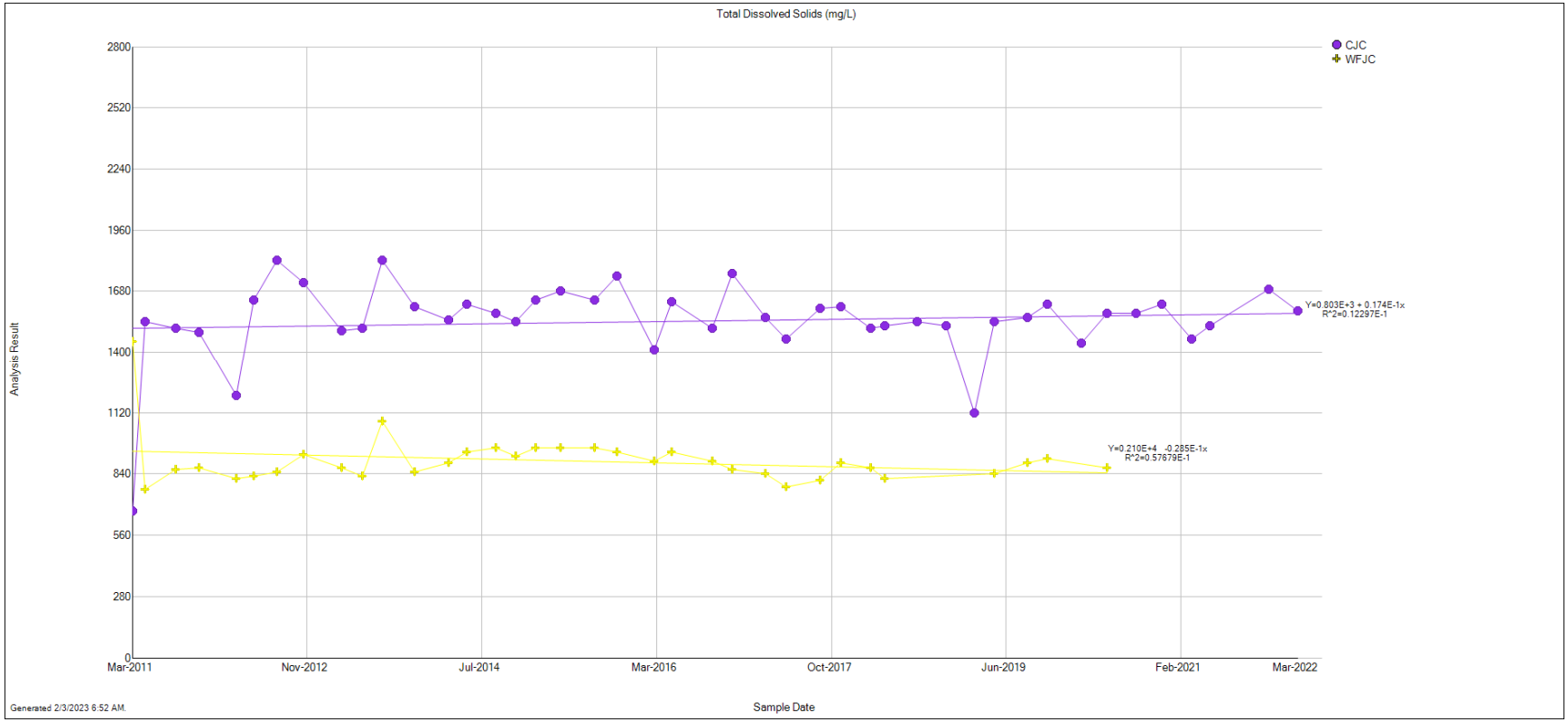

Iron, total (mg/L)
CJC
WFJC
8.93318
7.93635
6.93953
5.9427
4.94588
3.94905
2.95223
1.9554
0.95858
-0.03825
Analysis Result
Mar-2011
Nov-2012
Jul-2014
Mar-2016
Oct-2017
Jun-2019
Feb-2021
Mar-2022
Sample Date
Y=-0.173E+2 + 0.426E-3x
R^2=0.11689E+0
Y=0.570E+1 -0.127E-3x
R^2=0.41242E-1
Generated 2/3/2023 6:52 AM.

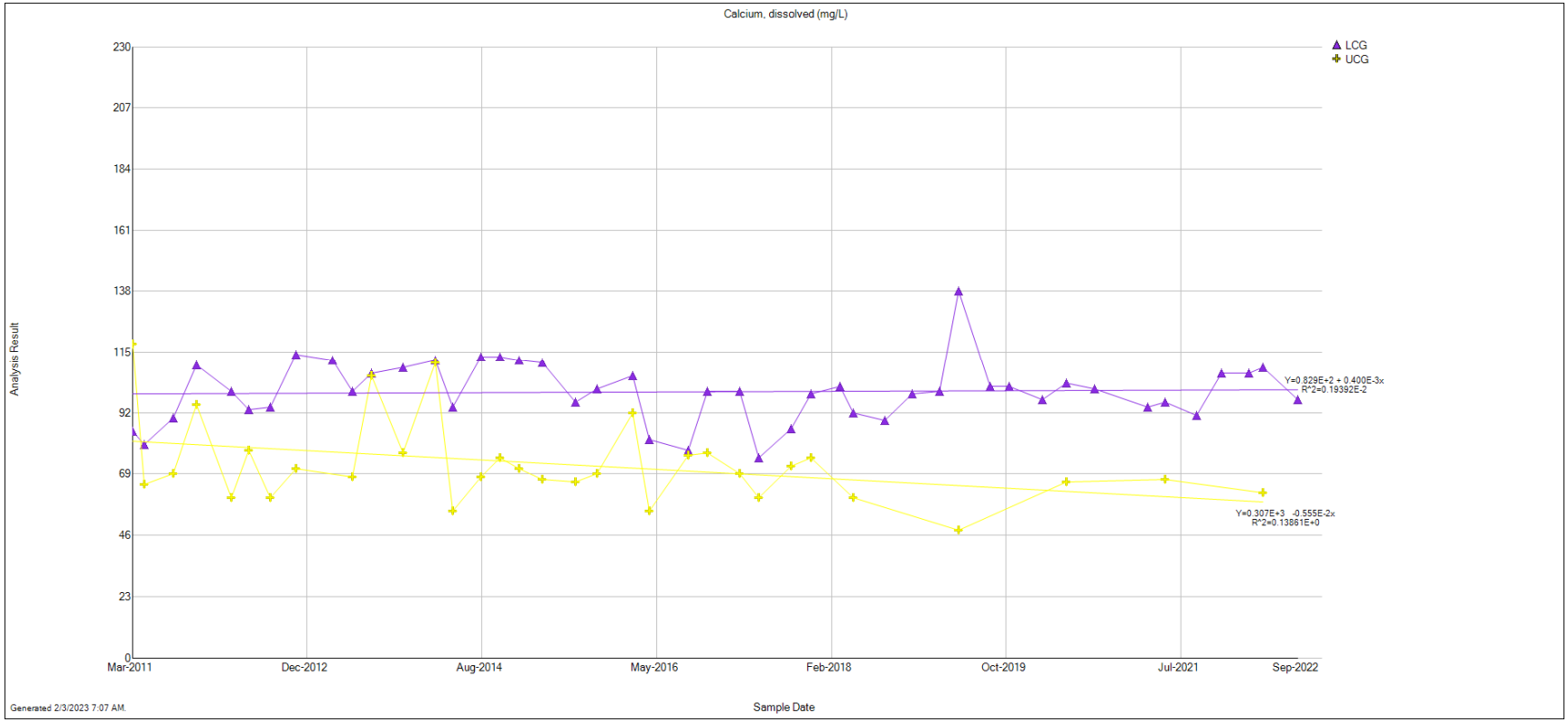

Magnesium, dissolved (mg/L)
CJC
WFJC
290
261
232
203
174
145
116
87
58
29
0
Analysis Result
Mar-2011
Nov-2012
Jul-2014
Mar-2016
Oct-2017
Jun-2019
Feb-2021
Mar-2022
Sample Date
Y=0.150E+3 + 0.152E-3x
R^2=0.71698E-4
Y=0.243E+3 -0.340E-2x
R^2=0.88890E-1
Generated 2/3/2023 6:52 AM.

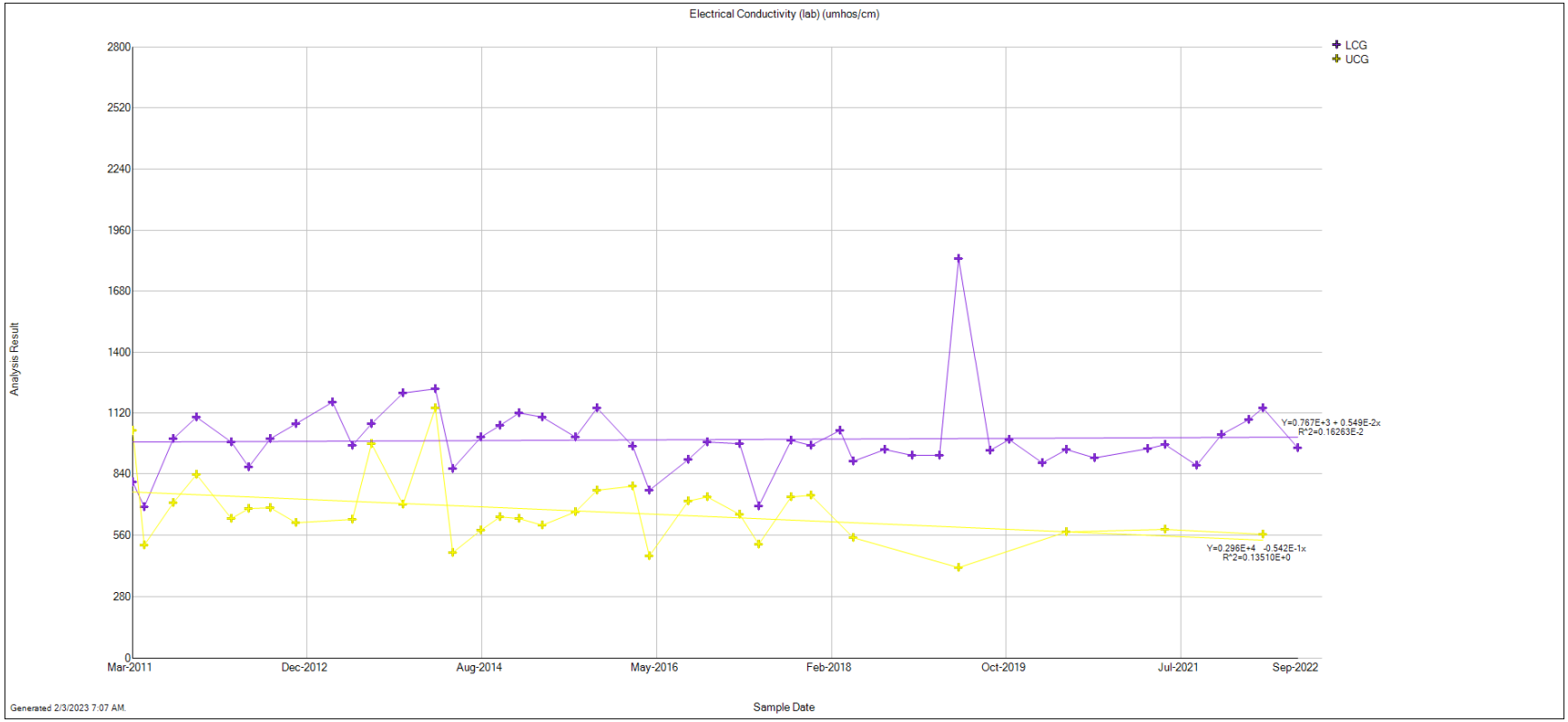

pH (lab)
CJC
WFJC
Y=0.705E+1 + 0.328E-4x
R^2=0.98358E-1
Y=0.876E+1 -0.819E-5x
R^2=0.12094E-1
Analysis Result
8.85
8.7
8.55
8.4
8.25
8.1
7.95
7.8
7.65
7.5
Mar-2011
Nov-2012
Jul-2014
Mar-2016
Oct-2017
Jun-2019
Feb-2021
Mar-2022
Generated 2/3/2023 6:52 AM.
Sample Date

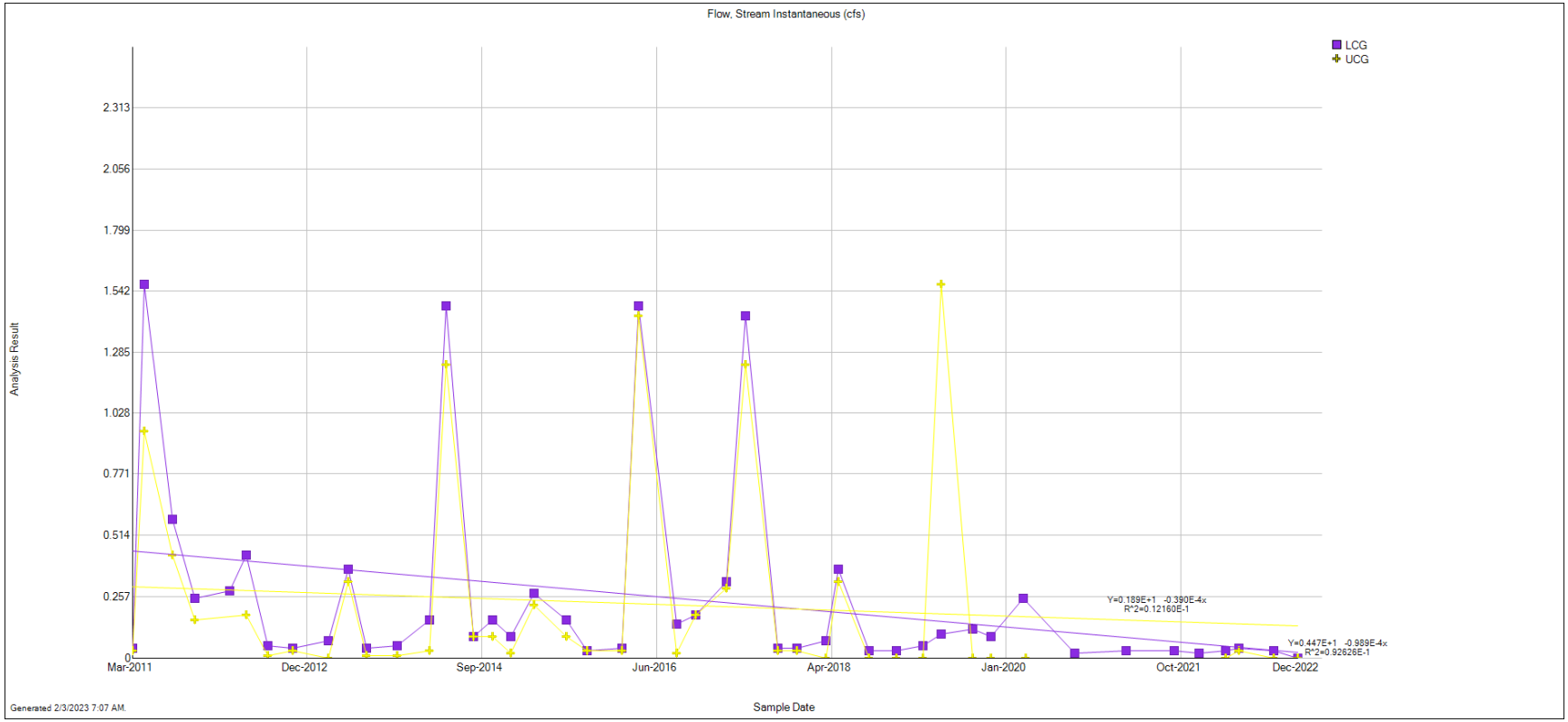

Sodium, dissolved (mg/L)
CJC
WFJC
Y=0.611E+2 + 0.466E-2x
R^2=0.61195E-1
Y=0.289E+3 -0.642E-2x
R^2=0.85401E-1
Analysis Result
260
234
208
182
156
130
104
78
52
26
0
Mar-2011
Nov-2012
Jul-2014
Mar-2016
Oct-2017
Jun-2019
Feb-2021
Mar-2022
Generated 2/3/2023 6:52 AM.
Sample Date

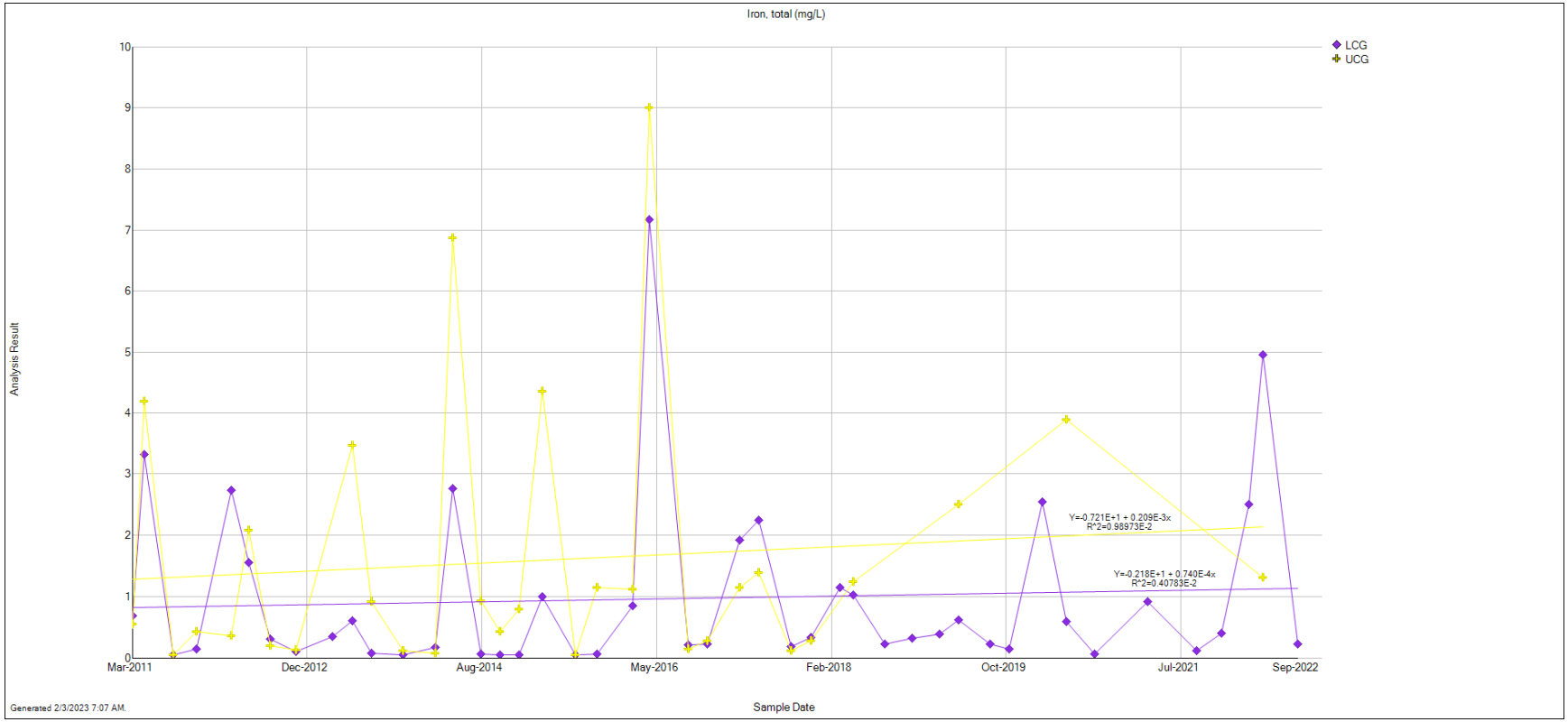

Sulfate, dissolved (mg/L)
CJC
WFJC
Y=0.487E+2 + 0.139E-1x
R^2=0.22002E-1
Y=0.540E+3 -0.506E-2x
R^2=0.55614E-2
Analysis Result
950
855
760
665
570
475
380
285
190
95
0
Mar-2011
Nov-2012
Jul-2014
Mar-2016
Oct-2017
Jun-2019
Feb-2021
Mar-2022
Generated 2/3/2023 6:52 AM.
Sample Date

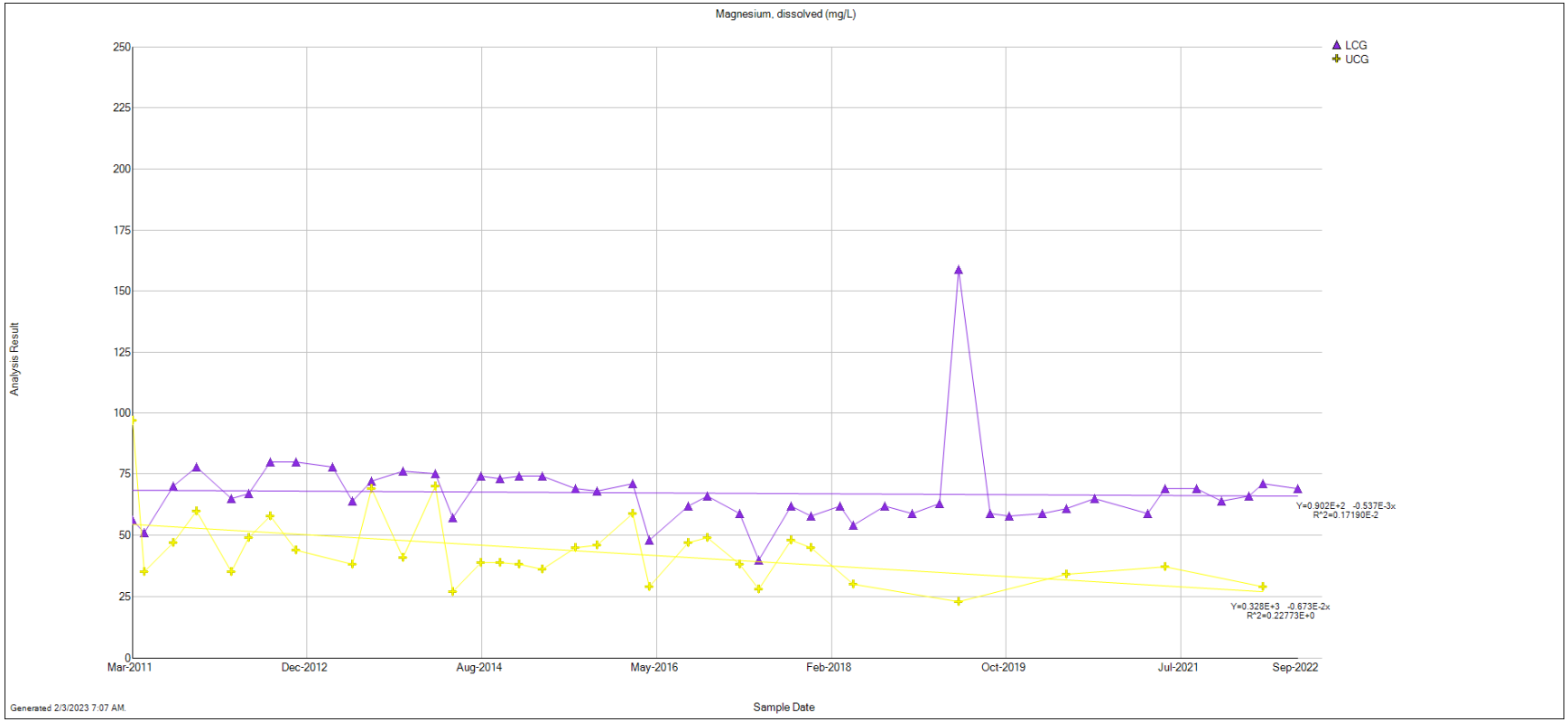

Total Dissolved Solids (mg/L)
CJC
WFJC
Y=0.803E+3 + 0.174E-1x
R^2=0.12297E-1
Y=0.210E+4 -0.285E-1x
R^2=0.57679E-1
Analysis Result
2800
2520
2240
1960
1680
1400
1120
840
560
280
0
Mar-2011
Nov-2012
Jul-2014
Mar-2016
Oct-2017
Jun-2019
Feb-2021
Mar-2022
Generated 2/3/2023 6:52 AM.
Sample Date

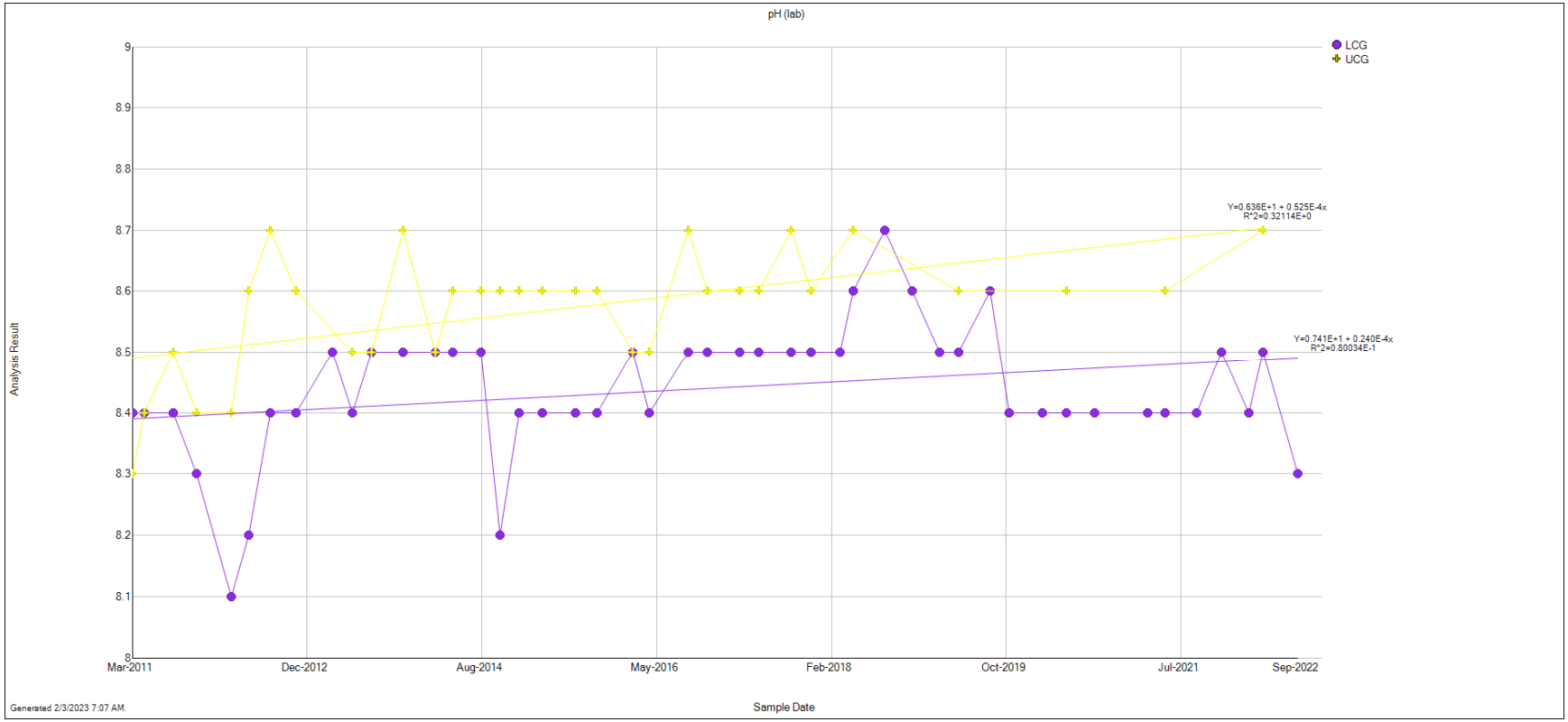

Calcium, dissolved (mg/L)
LCG
UCG
230
207
184
161
138
115
92
69
46
23
0
Analysis Result
Y=0.829E+2 + 0.400E-3x
R^2=0.19392E-2
Y=0.307E+3 -0.555E-2x
R^2=0.13861E+0
Mar-2011
Dec-2012
Aug-2014
May-2016
Feb-2018
Oct-2019
Jul-2021
Sep-2022
Generated 2/3/2023 7:07 AM.
Sample Date

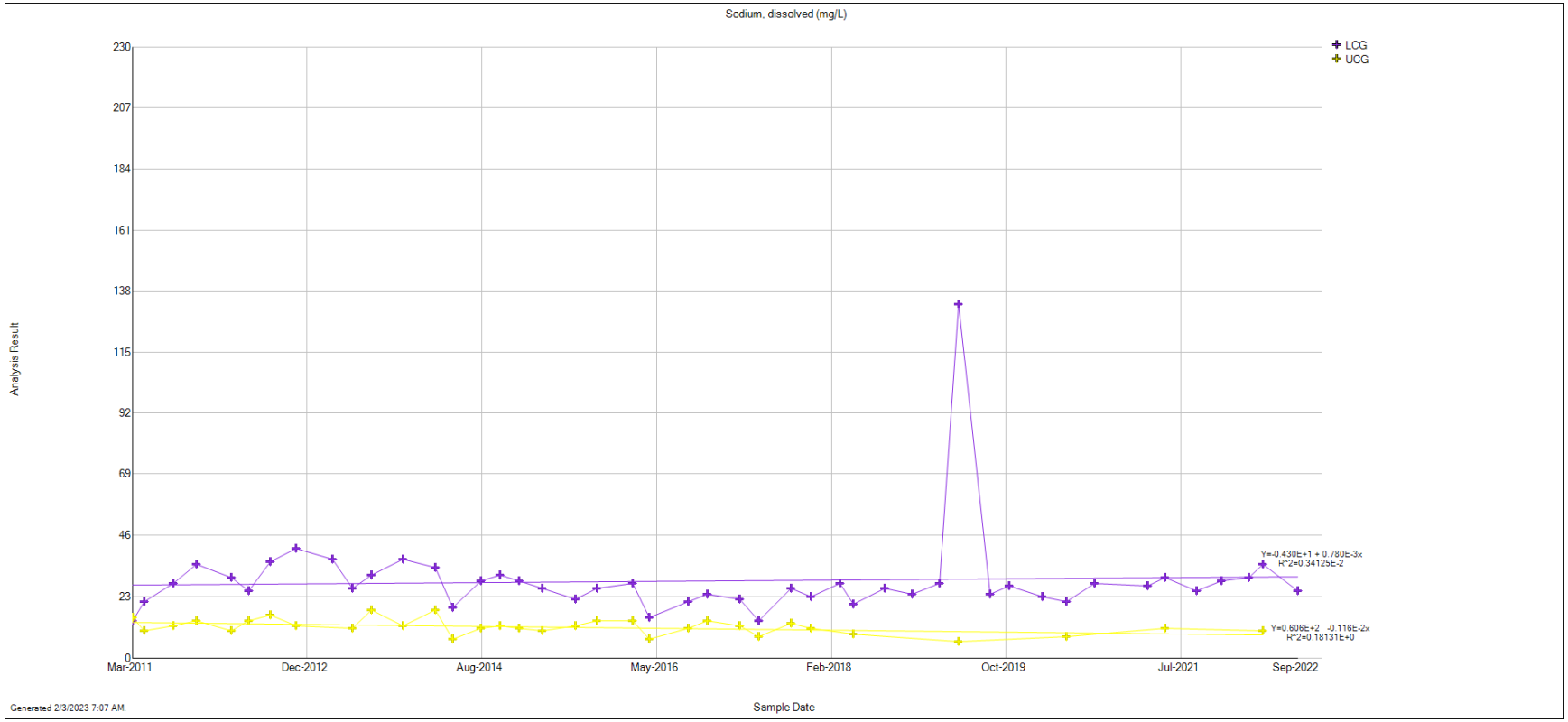

Electrical Conductivity (lab) (umhos/cm)
LCG
UCG
Analysis Result
2800
2520
2240
1960
1680
1400
1120
840
560
280
0
Mar-2011
Dec-2012
Aug-2014
May-2016
Feb-2018
Oct-2019
Jul-2021
Sep-2022
Y=0.767E+3 + 0.549E-2x
R^2=0.16263E-2
Y=0.296E+4 -0.542E-1x
R^2=0.13510E+0
Generated 2/3/2023 7:07 AM.
Sample Date

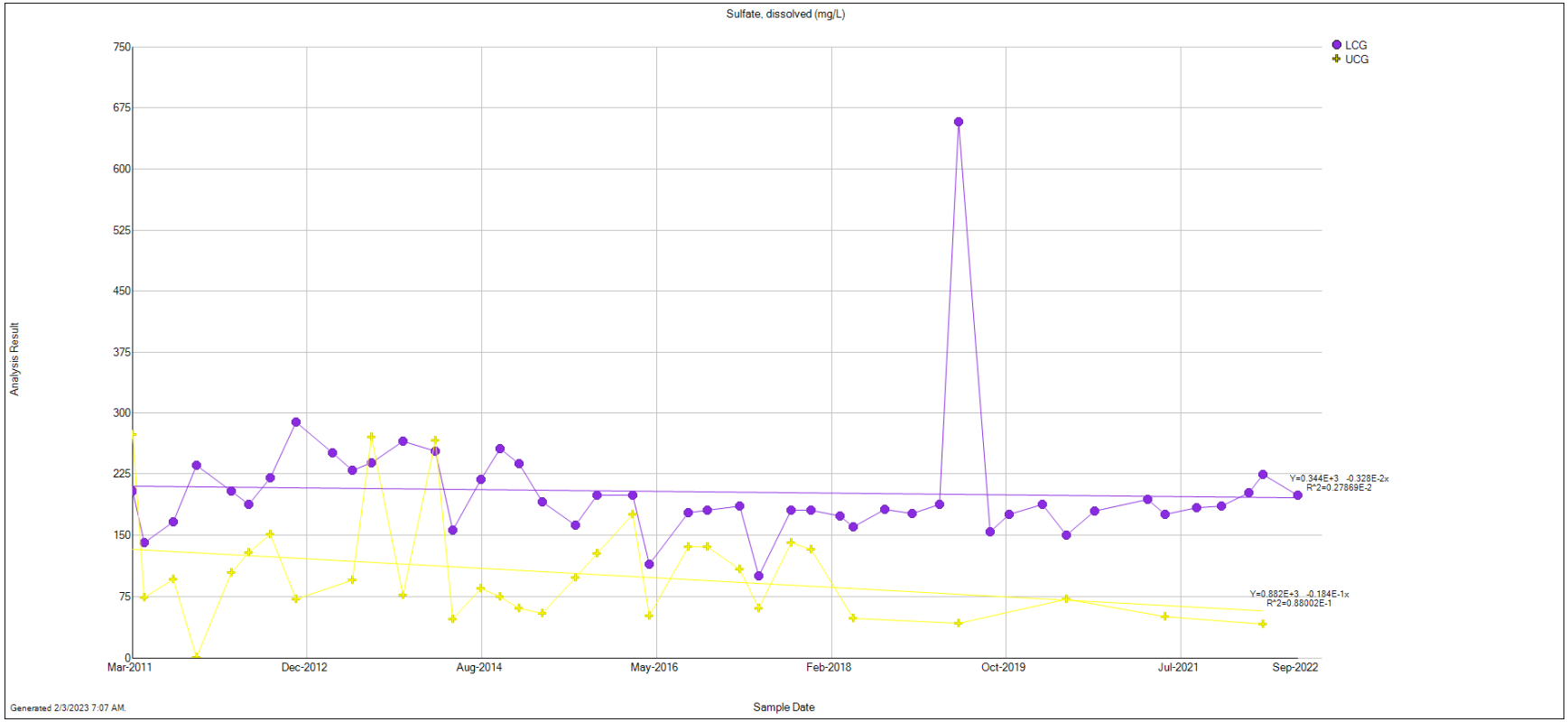

Flow, Stream Instantaneous (cfs)
LCG
UCG
2.313
2.056
1.799
1.542
1.285
1.028
0.771
0.514
0.257
0
Analysis Result
Mar-2011
Dec-2012
Sep-2014
Jun-2016
Apr-2018
Jan-2020
Oct-2021
Dec-2022
Sample Date
Y=0.189E+1 -0.390E-4x
R^2=0.12160E-1
Y=0.447E+1 -0.989E-4x
R^2=0.92626E-1
Generated 2/3/2023 7:07 AM.


Iron, total (mg/L)
LCG
UCG
Analysis Result
10
9
8
7
6
5
4
3
2
1
0
Mar-2011
Dec-2012
Aug-2014
May-2016
Feb-2018
Oct-2019
Jul-2021
Sep-2022
Y=-0.721E+1 + 0.209E-3x
R^2=0.98973E-2
Y=-0.218E+1 + 0.740E-4x
R^2=0.40783E-2
Generated 2/3/2023 7:07 AM.
Sample Date


Magnesium, dissolved (mg/L)
LCG
UCG
Analysis Result
250
225
200
175
150
125
100
75
50
25
0
Mar-2011
Dec-2012
Aug-2014
May-2016
Feb-2018
Oct-2019
Jul-2021
Sep-2022
Y=0.902E+2 -0.537E-3x
R^2=0.17190E-2
Y=0.328E+3 -0.673E-2x
R^2=0.22773E+0
Generated 2/3/2023 7:07 AM.
Sample Date


pH (lab)
LCG
UCG
Y=0.636E+1 + 0.525E-4x
R^2=0.32114E+0
Y=0.741E+1 + 0.240E-4x
R^2=0.80034E-1
Analysis Result
9
8.9
8.8
8.7
8.6
8.5
8.4
8.3
8.2
8.1
8
Mar-2011
Dec-2012
Aug-2014
May-2016
Feb-2018
Oct-2019
Jul-2021
Sep-2022
Generated 2/3/2023 7:07 AM.
Sample Date


Sodium, dissolved (mg/L)
LCG
UCG
Analysis Result
230
207
184
161
138
115
92
69
46
23
0
Mar-2011
Dec-2012
Aug-2014
May-2016
Feb-2018
Oct-2019
Jul-2021
Sep-2022
Y=-0.430E+1 + 0.780E-3x
R^2=0.34125E-2
Y=0.606E+2 -0.116E-2x
R^2=0.18131E+0
Generated 2/3/2023 7:07 AM.
Sample Date


Sulfate, dissolved (mg/L)
LCG
UCG
Y=0.344E+3 -0.328E-2x
R^2=0.27869E-2
Y=0.882E+3 -0.184E-1x
R^2=0.88002E-1
Analysis Result
750
675
600
525
450
375
300
225
150
75
0
Mar-2011
Dec-2012
Aug-2014
May-2016
Feb-2018
Oct-2019
Jul-2021
Sep-2022
Generated 2/3/2023 7:07 AM.
Sample Date

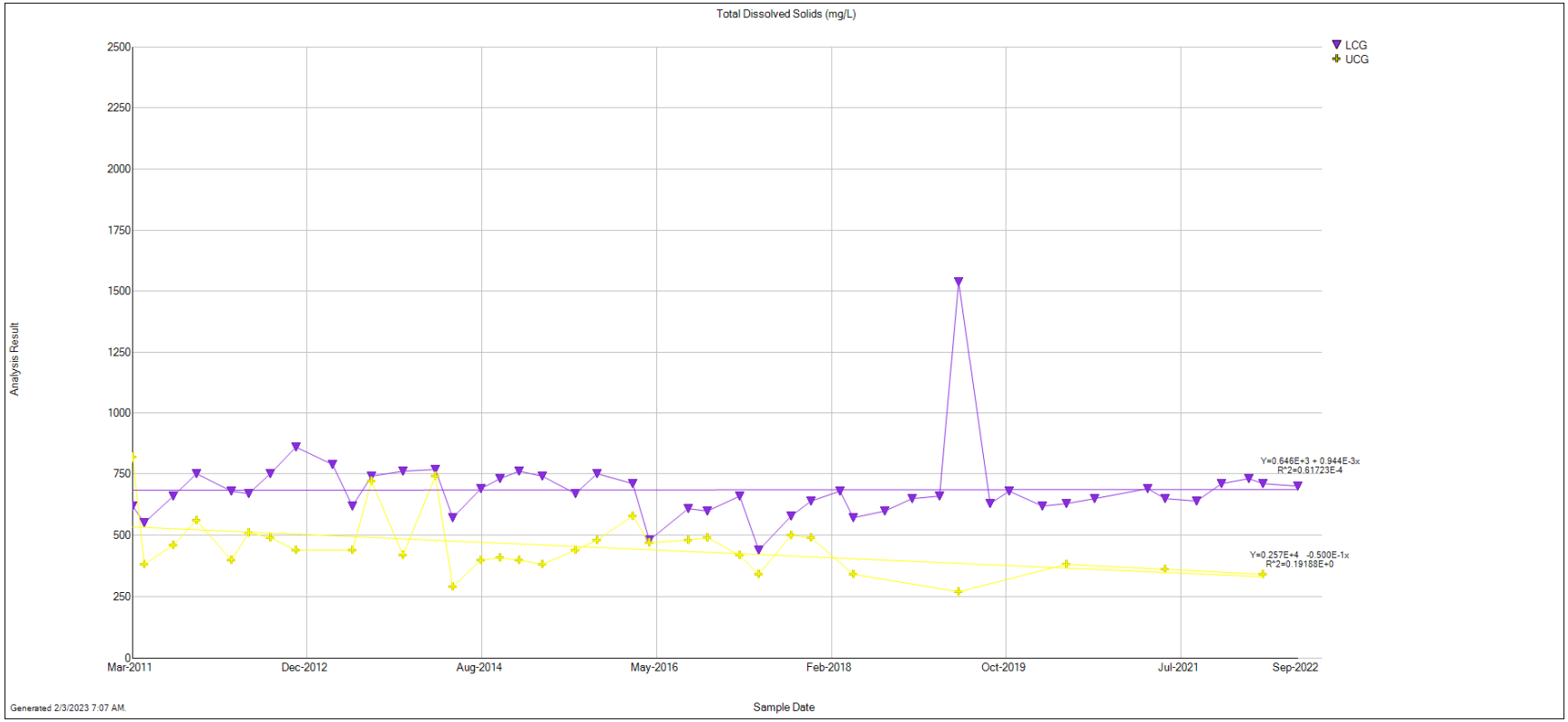

Total Dissolved Solids (mg/L)
LCG
UCG
Y=0.646E+3 + 0.944E-3x
R^2=0.61723E-4
Y=0.257E+4 -0.500E-1x
R^2=0.19188E+0
Analysis Result
Sample Date
Generated 2/3/2023 7:07 AM.
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
Mar-2011
Dec-2012
Aug-2014
May-2016
Feb-2018
Oct-2019
Jul-2021
Sep-2022

Exhibit 1C

Ground Water Data

Water Year January 1, 2022 to December 31, 2022

Colowyo Mine
Well A-6
Water Year 1/1/2022 - 12/31/2022

	Sample Date			
	3/22/2022	**5/11/2022**	**9/14/2022**	**12/12/2022**
As, diss, mg/L	<0.000092	<0.00062	<0.00062	<0.00062
Ca, diss, mg/L	60	59	59	55
Fe, diss, mg/L	<0.0044	<0.0044	<0.0044	<0.0044
Elevation SWL, ft MSL	6900.3	6900.6	6894.3	6894.5
HCO3, mg/L	680	680	610	620
Hg, diss, mg/L	<0.000046	<0.000046	<0.000030	<0.000030
Mg, diss, mg/L	52	49	50	47
Mn, diss, mg/L	0.04	0.04	0.04	0.03
Na, diss, mg/L	140	150	140	140
NH3 as N, diss, mg/L	1.6	1.5	1.7	0.6
NO3, diss, mg/L	<0.012	0.7	<0.012	0.6
Ortho PO4 as P, mg/l	<0.036	<0.036	<0.036	<0.036
Pb, diss, mg/L	<0.00030	<0.00016	<0.00016	<0.00016
pH (field)	7.3	7.3	7.3	7.4
pH (lab)	8.2	8.2	8	8.2
Se, diss, mg/L	<0.00013	<0.00017	<0.00017	<0.00017
SO4, diss, mg/L	140	140	130	140
Spec. Cond. (field), umhos/cm	1250	1210	1210	1210
Spec. Cond. (lab), umhos/cm	1150	1240	1080	1110
TDS, mg/L	710	740	390	680
Temp (Celcius), degrees C	8.9	10.1	9.3	9.4
Zn, diss, mg/L	<0.0060	<0.0060	<0.0060	<0.0060

Colowyo Mine
Well A-7
Water Year 1/1/2022 - 12/31/2022

	Sample Date			
	3/22/2022	**5/11/2022**	**9/14/2022**	**12/12/2022**
As, diss, mg/L	<0.000092	<0.00062	<0.00062	<0.00062
Ca, diss, mg/L	150	140	130	140
Fe, diss, mg/L	<0.0044	<0.0044	<0.0044	<0.0044
Elevation SWL, ft MSL	6883.6	6883.4	6889.6	6885.2
HCO3, mg/L	550	560	500	520
Hg, diss, mg/L	<0.000046	<0.000046	<0.000030	<0.000030
Mg, diss, mg/L	130	130	120	120
Mn, diss, mg/L	<0.00087	<0.00087	<0.00087	<0.00087
Na, diss, mg/L	57	61	68	56
NH3 as N, diss, mg/L	<0.029	<0.029	<0.029	<0.029
NO3, diss, mg/L	2.5	3.3	1.6	2.6
Ortho PO4 as P, mg/l	<0.054	<0.054	<0.054	0.8
Pb, diss, mg/L	<0.00030	<0.00016	<0.00016	<0.00016
pH (field)	7.3	7.3	7.4	7.4
pH (lab)	8	8.1	8	8.1
Se, diss, mg/L	0.011	0.011	<0.00017	0.012
SO4, diss, mg/L	490	450	390	510
Spec. Cond. (field), umhos/cm	1840	1740	1710	1770
Spec. Cond. (lab), umhos/cm	1680	1810	1500	1680
TDS, mg/L	1300	1300	1300	1300
Temp (Celcius), degrees C	7.8	9.8	9.1	8.5
Zn, diss, mg/L	<0.0060	<0.0060	<0.0060	<0.0060

Colowyo Mine
Well A-8
Water Year 1/1/2022 - 12/31/2022

	Sample Date			
	3/22/2022	**5/11/2022**	**9/14/2022**	**12/12/2022**
As, diss, mg/L	Dry	<0.00062	Dry	Dry
Ca, diss, mg/L		100		
Fe, diss, mg/L		<0.0044		
Elevation SWL, ft MSL		7103.22		
HCO3, mg/L		490		
Hg, diss, mg/L		<0.00046		
Mg, diss, mg/L		86		
Mn, diss, mg/L		<0.00087		
Na, diss, mg/L		15		
NH3 as N, diss, mg/L		<0.029		
NO3, diss, mg/L		3.2		
Ortho PO4 as P, mg/l		<0.036		
Pb, diss, mg/L		<0.00016		
pH (field)		7.6		
pH (lab)		8.3		
Se, diss, mg/L		0.006		
SO4, diss, mg/L		240.00000		
Spec. Cond. (field), umhos/cm		1240		
Spec. Cond. (lab), umhos/cm		1230		
TDS, mg/L		810		
Temp (Celcius), degrees C		10.80000		
Zn, diss, mg/L		<0.006		

Colowyo Mine
Well Gossard
Water Year 1/1/2022 - 12/31/2022

	Sample Date			
	3/24/2022	**5/11/2022**	**9/14/2022**	**12/12/2022**
As, diss, mg/L	<0.000092	<0.00062	<0.00062	<0.00062
Ca, diss, mg/L	95	87	84	110
Fe, diss, mg/L	<0.0044	<0.0044	<0.0044	<0.0044
Elevation SWL, ft MSL	6331.05	6332.03	6330.74	6331.09
HCO3, mg/L	610	530	480	580
Hg, diss, mg/L	<0.000046	<0.000046	<0.000030	<0.000030
Mg, diss, mg/L	120	120	130	130
Mn, diss, mg/L	<0.00087	<0.00087	<0.00087	<0.00087
Na, diss, mg/L	180	180	170	190
NH3 as N, diss, mg/L	<0.029	<0.029	<0.029	<0.029
NO3, diss, mg/L	0.7	3.2	1.4	0.6
Ortho PO4 as P, mg/l	<0.054	<0.054	<0.054	<0.054
Pb, diss, mg/L	<0.00030	<0.00016	<0.00016	<0.00016
pH (field)	7.7	8	7.9	7.8
pH (lab)	8.2	8.5	8.3	8.2
Se, diss, mg/L	<0.00013	<0.00017	<0.00017	<0.00017
SO4, diss, mg/L	450	440	650	580
Spec. Cond. (field), umhos/cm	1960	1930	1980	2070
Spec. Cond. (lab), umhos/cm	1840	1970	1610	1950
TDS, mg/L	1250	1330	1450	1440
Temp (Celcius), degrees C	10.2	11.1	11.8	10.4
Zn, diss, mg/L	<0.0060	<0.0060	<0.0060	<0.0060

Colowyo Mine
LGSW-1
Water Year 1/1/2022 - 12/31/2022

	Sample Date			
	3/22/2022	**5/11/2022**	**9/14/2022**	**12/12/2022**
As, diss, mg/L	<0.005	<0.005	<0.005	<0.005
Fe, diss, mg/L	<0.05	<0.05	<0.05	<0.05
Hg, diss, mg/L	<0.001	<0.001	<0.001	<0.001
Mn, diss, mg/L	<0.02	0.04	0.2	0.2
NO2 + NO3, diss, mg/L	<0.384	0.5	<0.01	<0.01
NO2, diss, mg/L	<0.1	<0.1	<0.1	<0.1
NO3, diss, mg/L	0.2	0.2	<0.1	<0.1
pH (field), SU	7.5	7.6	7.5	7.6
Se, diss, mg/L	<0.005	<0.005	<0.005	<0.005
SO4, diss, mg/L	821	867	908	913
TDS, mg/L	1870*	2010*	2240*	1980*
Zn, diss, mg/L	<0.01	0.01	<0.01	0.02

*Exceeded Table 16 Value (Volume 2C, Exhibit 7, Item 19)
< = Analytical Result was not detected at the reporting limit

Colowyo Mine
LWCW-1
Water Year 1/1/2022 - 12/31/2022

	Sample Date			
	3/22/2022	**5/11/2022**	**9/14/2022**	**12/12/2022**
As, diss, mg/L	0.01	<0.003	0.021*	<0.003
Fe, diss, mg/L	<.05	<0.05	<0.05	<0.05
Hg, diss, mg/L	<0.001	<0.001	<0.001	<0.001
Mn, diss, mg/L	0.42	0.18	0.3	0.05
NO2 + NO3, diss, mg/L	0.4	0.9	0.4	0.3
NO2, diss, mg/L	<0.1	<0.1	<0.1	<0.1
NO3, diss, mg/L	0.3	0.9	0.4	0.3
pH (field), SU	7.4	7.5	7.4	7.6
Se, diss, mg/L	0.006	<0.005	<0.005	<0.005
SO4, diss, mg/L	648	634	646	616
TDS, mg/L	1560	1640	1590	1600
Zn, diss, mg/L	<0.01	<0.01	<0.01	<0.01

*Exceeded Table 16 Value (Volume 2C, Exhibit 7, Item 19)
< = Analytical Result was not detected at the reporting limit

Colowyo Mine
Well MC-04-01
Water Year 1/1/2022 - 12/31/2022

	Sample Date			
	3/22/2022	**5/11/2022**	**9/14/2022**	**12/12/2022**
As, diss, mg/L	<0.000092	<0.00062	<0.00062	<0.00062
Ca, diss, mg/L	84	55	83	80
Fe, diss, mg/L	<0.0044	<0.0044	<0.0044	<0.0044
Elevation SWL, ft MSL	25.6	20.3	28	27.9
HCO3, mg/L	410	240	380	370
Hg, diss, mg/L	<0.000046	<0.000046	<0.000030	<0.000030
Mg, diss, mg/L	47	27	53	49
Mn, diss, mg/L	<0.00087	<0.00087	<0.00087	<0.00087
Na, diss, mg/L	16	21	29	15
NH3 as N, diss, mg/L	<0.029	<0.029	<0.029	<0.029
NO3, diss, mg/L	1.7	0.4	1	1.3
Ortho PO4 as P, mg/l	<0.11	<0.018	<0.036	<0.054
Pb, diss, mg/L	<0.00030	<0.00016	<0.00016	<0.00016
pH (field)	7.7	7.4	7.3	7.3
pH (lab)	8.1	8.2	8	8.2
Se, diss, mg/L	<0.00013	<0.00017	<0.00017	<0.00017
SO4, diss, mg/L	120	91	150	130
Spec. Cond. (field), umhos/cm	900	960	950	900
Spec. Cond. (lab), umhos/cm	859	607	840	800
TDS, mg/L	570	370	630	540
Temp (Celcius), degrees C	6.8	8.3	8.3	6.9
Zn, diss, mg/L	<0.0060	<0.0060	<0.0060	<0.0060

Colowyo Mine
Well MC-04-02
Water Year 1/1/2022 - 12/31/2022

	Sample Date			
	3/22/2022	**5/11/2022**	**9/14/2022**	**12/12/2022**
As, diss, mg/L	<0.000092	<0.00062	<0.00062	<0.00062
Ca, diss, mg/L	94	120	130	76
Fe, diss, mg/L	<0.0044	<0.0044	<0.0044	<0.0044
Elevation SWL, ft MSL	12	12.6	13.4	13.9
HCO3, mg/L	610	630	580	570
Hg, diss, mg/L	<0.000046	<0.000046	<0.000030	<0.000030
Mg, diss, mg/L	55	70	83	47
Mn, diss, mg/L	0.05	0.36	0.45	0.04
Na, diss, mg/L	120	67	41	150
NH3 as N, diss, mg/L	<0.029	<0.029	<0.029	<0.029
NO3, diss, mg/L	<0.036	0.5	<0.012	<0.012
Ortho PO4 as P, mg/l	<0.036	<0.036	<0.036	<0.036
Pb, diss, mg/L	<0.00030	<0.00016	<0.00016	<0.00016
pH (field)	7.6	7.4	7.2	7.5
pH (lab)	8.2	8.2	8	8.2
Se, diss, mg/L	<0.00013	<0.00017	<0.00017	<0.00017
SO4, diss, mg/L	210	230	240	210
Spec. Cond. (field), umhos/cm	1340	1360	1360	1310
Spec. Cond. (lab), umhos/cm	1280	1380	1190	1220
TDS, mg/L	830	880	900	820
Temp (Celcius), degrees C	7.6	10.3	10.1	9.4
Zn, diss, mg/L	<0.0060	<0.0060	<0.0060	<0.0060

Colowyo Mine
Well MJ-95-01
Water Year 1/1/2022 - 12/31/2022

	Sample Date			
	3/24/2022	**5/11/2022**	**9/14/2022**	**12/12/2022**
As, diss, mg/L	<0.000092	<0.00062	<0.00062	<0.00062
Ca, diss, mg/L	120	120	130	120
Fe, diss, mg/L	<0.0044	<0.0044	<0.0044	<0.0044
Elevation SWL, ft MSL	16.5	14.3	16.8	16.6
HCO3, mg/L	650	690	590	620
Hg, diss, mg/L	<0.000046	<0.000046	<0.000030	<0.000030
Mg, diss, mg/L	93	90	93	91
Mn, diss, mg/L	0.05	0.04	0.04	0.04
Na, diss, mg/L	31	32	30	31
NH3 as N, diss, mg/L	1.9	1.8	1.9	1.8
NO3, diss, mg/L	<0.012	0.6	0.7	<0.012
Ortho PO4 as P, mg/l	<0.036	<0.036	<0.036	<0.11
Pb, diss, mg/L	<0.00030	<0.00016	<0.00016	<0.00016
pH (field)	7.2	7.1	7.1	7.2
pH (lab)	8	8.2	7.9	8
Se, diss, mg/L	<0.00013	<0.00017	<0.00017	<0.00017
SO4, diss, mg/L	240	230	240	240
Spec. Cond. (field), umhos/cm	1470	1390	1390	1390
Spec. Cond. (lab), umhos/cm	1320	1420	1140	1280
TDS, mg/L	850	890	930	860
Temp (Celcius), degrees C	9.4	9.8	9.1	8.5
Zn, diss, mg/L	<0.0060	<0.0060	<0.0060	<0.0060

Colowyo Mine
Well MJ-95-03
Water Year 1/1/2022 - 12/31/2022

	Sample Date			
	3/24/2022	**5/11/2022**	**9/14/2022**	**12/12/2022**
As, diss, mg/L	<0.000092	<0.00062	<0.00062	<0.00062
Ca, diss, mg/L	130	150	160	150
Fe, diss, mg/L	<0.0044	<0.0044	<0.0044	<0.0044
Elevation SWL, ft MSL	20.8	20.6	22	21.6
HCO3, mg/L	580	660	640	710
Hg, diss, mg/L	<0.000046	<0.000046	<0.000030	<0.000030
Mg, diss, mg/L	160	180	200	190
Mn, diss, mg/L	<0.00087	<0.00087	<0.00087	0.04
Na, diss, mg/L	150	150	140	150
NH3 as N, diss, mg/L	<0.029	<0.029	<0.029	<0.029
NO3, diss, mg/L	12	1.7	0.7	0.1
Ortho PO4 as P, mg/l	<0.054	<0.054	<0.054	0.1
Pb, diss, mg/L	<0.00030	<0.00016	<0.00016	<0.00016
pH (field)	7.5	7.6	7.4	7.5
pH (lab)	8.1	8.3	8.1	8.1
Se, diss, mg/L	0.056	0.007	<0.00017	<0.00017
SO4, diss, mg/L	740	780	810	790
Spec. Cond. (field), umhos/cm	2390	2380	2410	2390
Spec. Cond. (lab), umhos/cm	2240	2480	1960	2250
TDS, mg/L	1700	1800	1900	1800
Temp (Celcius), degrees C	10.6	11.7	11.1	10.4
Zn, diss, mg/L	<0.0060	<0.0060	<0.0060	<0.0060

Colowyo Mine
Well MLC-04-01
Water Year 1/1/2022 - 12/31/2022

	Sample Date			
	3/22/2022	**5/11/2022**	**9/14/2022**	**12/12/2022**
As, diss, mg/L	<0.000092	<0.00062	<0.00062	<0.00062
Ca, diss, mg/L	52	86	54	49
Fe, diss, mg/L	0.06	<0.0044	<0.0044	0.05
Elevation SWL, ft MSL	48.6	47.9	48.5	48.5
HCO3, mg/L	230	400	210	210
Hg, diss, mg/L	<0.000046	<0.000046	<0.000030	<0.000030
Mg, diss, mg/L	27	54	29	24
Mn, diss, mg/L	<0.00087	<0.00087	<0.00087	<0.00087
Na, diss, mg/L	17	19	17	15
NH3 as N, diss, mg/L	<0.029	<0.029	<0.029	<0.029
NO3, diss, mg/L	0.2	1.5	0.6	0.2
Ortho PO4 as P, mg/l	<0.018	<0.018	<0.018	<0.036
Pb, diss, mg/L	<0.00030	<0.00016	<0.00016	<0.00016
pH (field)	7.7	7.9	7.5	7.8
pH (lab)	8.1	8.2	8.1	8
Se, diss, mg/L	<0.00013	<0.00017	<0.00017	<0.00017
SO4, diss, mg/L	90	160	94	78
Spec. Cond. (field), umhos/cm	620	610	600	590
Spec. Cond. (lab), umhos/cm	561	942	550	492
TDS, mg/L	350	620	380	310
Temp (Celcius), degrees C	11.4	11.1	11.1	9.6
Zn, diss, mg/L	<0.0060	<0.0060	0.02	0.01

Colowyo Mine
Well MT-95-02
Water Year 1/1/2022 - 12/31/2022

	Sample Date			
	3/24/2022	**5/11/2022**	**9/14/2022**	**12/12/2022**
As, diss, mg/L	Dry	<0.00062	<0.00062	<0.00062
Ca, diss, mg/L		220	210	230
Fe, diss, mg/L		<0.0044	<0.0044	<0.0044
Elevation SWL, ft MSL		6435.59	6434.99	6435.57
HCO3, mg/L		860	750	810
Hg, diss, mg/L		<0.000046	<0.000030	<0.000030
Mg, diss, mg/L		210	200	210
Mn, diss, mg/L		<0.00087	<0.00087	<0.00087
Na, diss, mg/L		360	330	390
NH3 as N, diss, mg/L		<0.029	<0.029	<0.029
NO3, diss, mg/L		0.8	1.5	0.72
Ortho PO4 as P, mg/l		<0.11	<0.92	<0.11
Pb, diss, mg/L		<0.00016	<0.00016	<0.00016
pH (field)		7.2	7.2	7.2
pH (lab)		8.1	7.9	8
Se, diss, mg/L		<0.00017	<0.00017	<0.00017
SO4, diss, mg/L		980	1100	1000
Spec. Cond. (field), umhos/cm		3630	3580	3620
Spec. Cond. (lab), umhos/cm		3790	3130	3510
TDS, mg/L		2850	2880	2910
Temp (Celcius), degrees C		12	11.5	10.8
Zn, diss, mg/L		<0.0060	<0.0060	<0.0060

Colowyo Mine
Well NGSW
Water Year 1/1/2022 - 12/31/2022

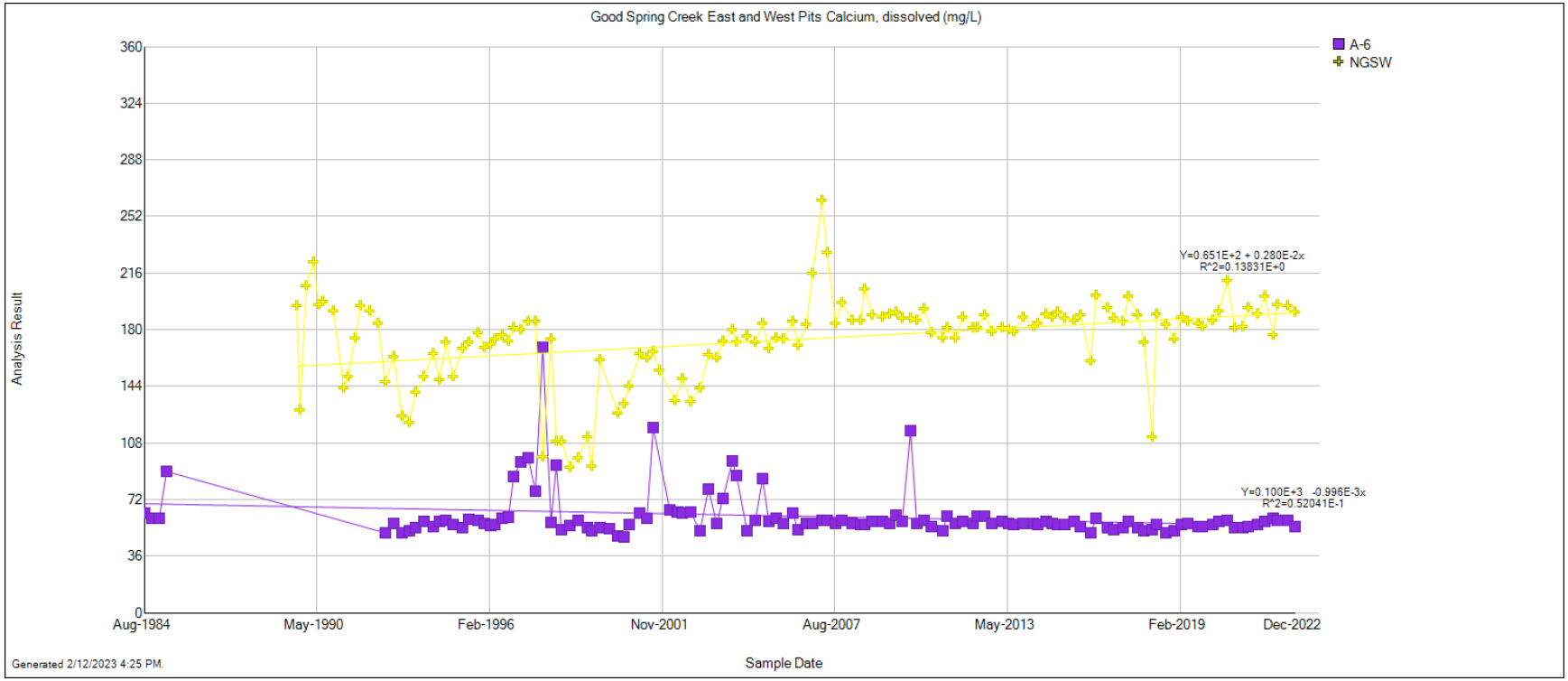
	Sample Date			
	3/22/2022	**5/11/2022**	**9/14/2022**	**12/12/2022**
As, diss, mg/L	<0.000092	<0.00062	<0.00062	<0.00062
Ca, diss, mg/L	180	200	200	190
Fe, diss, mg/L	<0.0044	<0.0044	<0.0044	<0.0044
Elevation SWL, ft MSL	6532.2	6531.2	6535.3	6535.3
HCO3, mg/L	800	820	690	720
Hg, diss, mg/L	<0.000046	<0.000046	<0.000030	<0.000030
Mg, diss, mg/L	180	190	190	180
Mn, diss, mg/L	<0.00087	0.08	1.1	0.24
Na, diss, mg/L	190	190	160	160
NH3 as N, diss, mg/L	<0.029	<0.029	<0.029	<0.029
NO3, diss, mg/L	0.2	0.2	<0.018	0.1
Ortho PO4 as P, mg/l	<0.11	<0.11	<0.29	<0.47
Pb, diss, mg/L	<0.00030	<0.00016	<0.00016	<0.00016
pH (field)	7.3	7.3	7.2	7.4
pH (lab)	8	8.2	8	8.1
Se, diss, mg/L	<0.00013	<0.00017	<0.00017	<0.00017
SO4, diss, mg/L	890	910	920	850
Spec. Cond. (field), umhos/cm	2750	2650	2620	2580
Spec. Cond. (lab), umhos/cm	2510	2770	2330	2410
TDS, mg/L	2100	2100	2100	2000
Temp (Celcius), degrees C	8.4	10.3	9.8	9.8
Zn, diss, mg/L	<0.0060	<0.0060	<0.0060	<0.0060

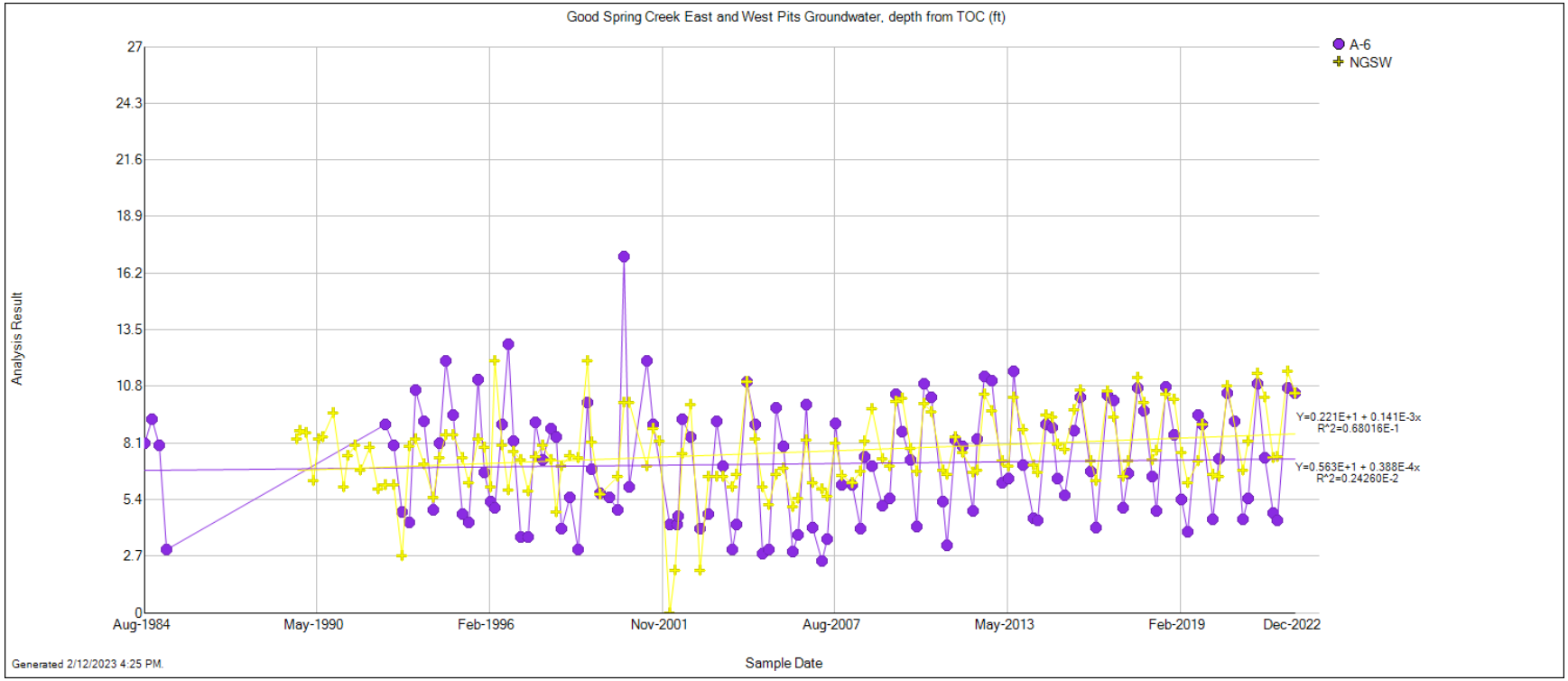
Colowyo Mine
Well Trout Creek
Water Year 1/1/2022 - 12/31/2022

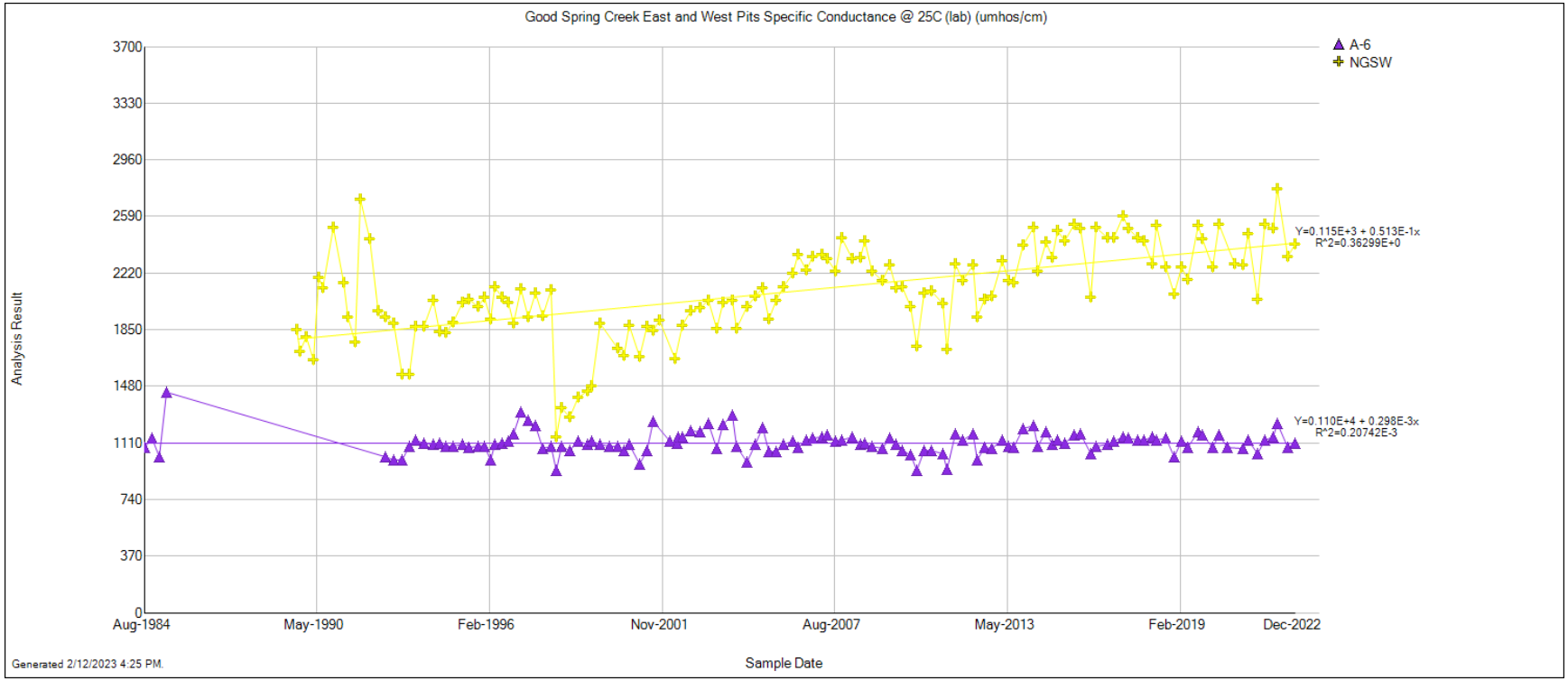
	Sample Date			
	3/24/2022	**5/11/2022**	**9/14/2022**	**12/12/2022**
As, diss, mg/L	<0.000092	<0.00062	<0.00062	<0.00062
Ca, diss, mg/L	4	4	4	4
Fe, diss, mg/L	0.06	0.07	0.09	0.08
Elevation SWL, ft MSL	*	*	*	*
HCO3, mg/L	290	300	260	260
Hg, diss, mg/L	<0.000046	<0.000046	<0.000030	<0.000030
Mg, diss, mg/L	14	14	13	13
Mn, diss, mg/L	<0.00087	<0.00087	<0.00087	<0.00087
Na, diss, mg/L	230	230	230	250
NH3 as N, diss, mg/L	1.9	1.8	1.9	1.8
NO3, diss, mg/L	<0.012	<0.012	<0.012	<0.012
Ortho PO4 as P, mg/l	<0.036	<0.036	<0.036	0.3
Pb, diss, mg/L	<0.00030	<0.00016	<0.00016	<0.00016
pH (field)	9.4	9.4	9.4	9.4
pH (lab)	9.3	9.3	9.3	9.3
Se, diss, mg/L	<0.00013	<0.00017	<0.00017	<0.00017
SO4, diss, mg/L	210	210	210	210
Spec. Cond. (field), umhos/cm	1210	1180	1190	1200
Spec. Cond. (lab), umhos/cm	1120	1220	992	1090
TDS, mg/L	670	720	730	690
Temp (Celcius), degrees C	9.4	9.6	13.7	9.4
Zn, diss, mg/L	<0.0060	<0.0060	<0.0060	<0.0060

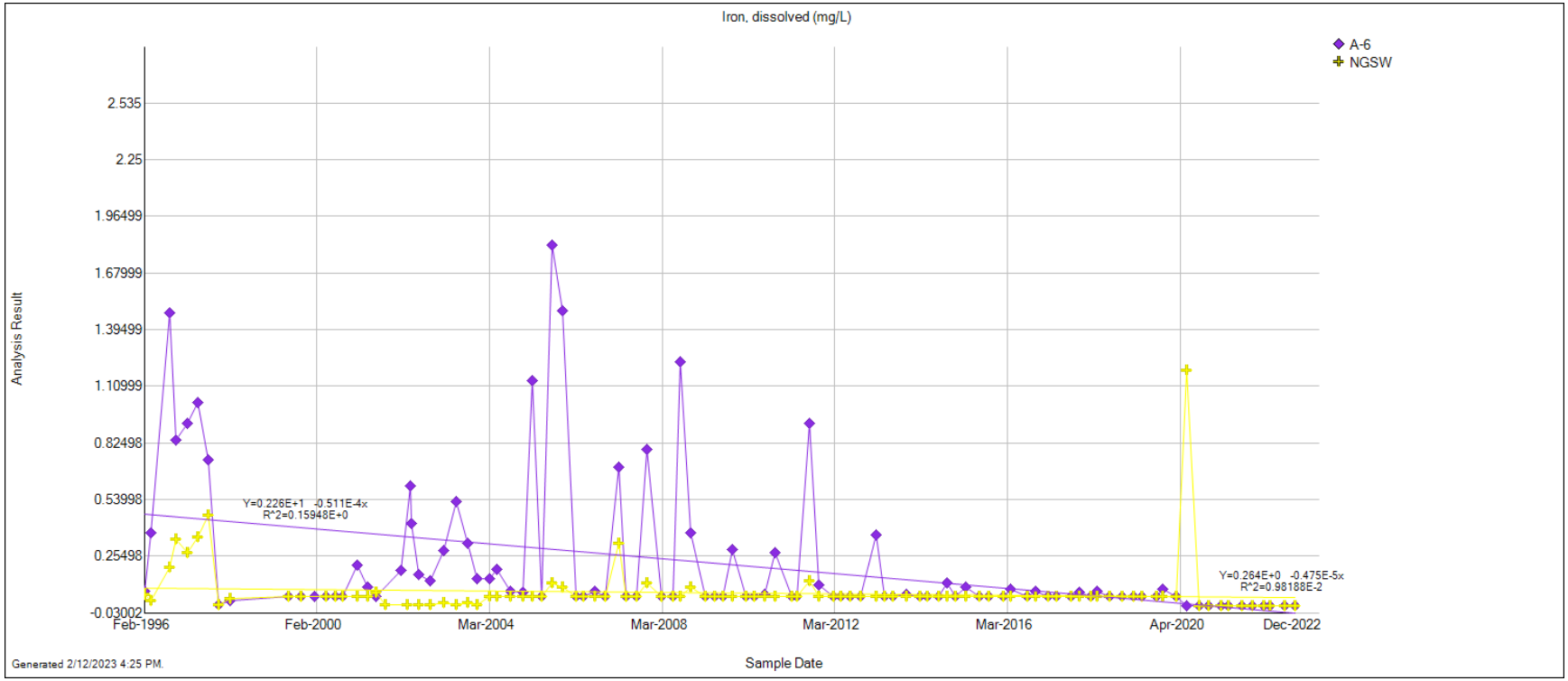
Exhibit 1D

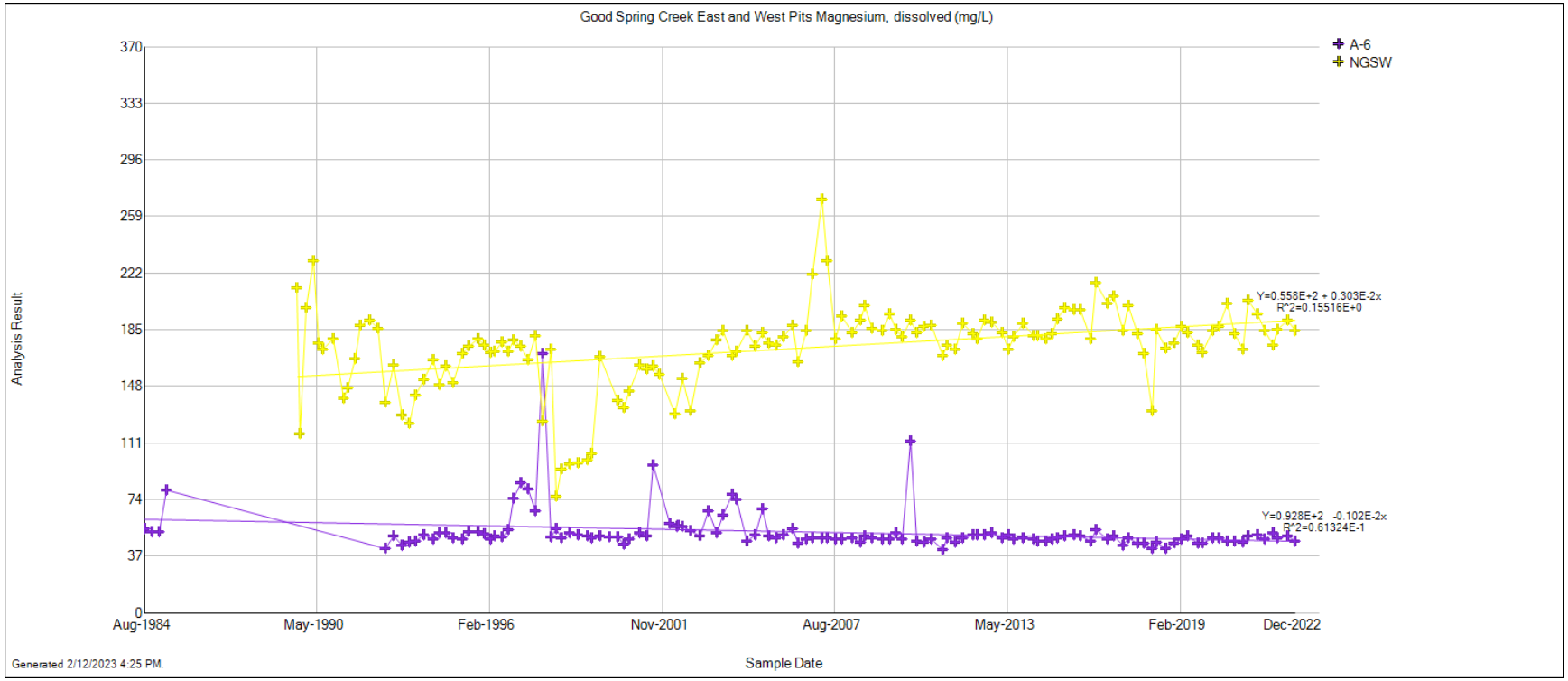
Ground Water Graphs

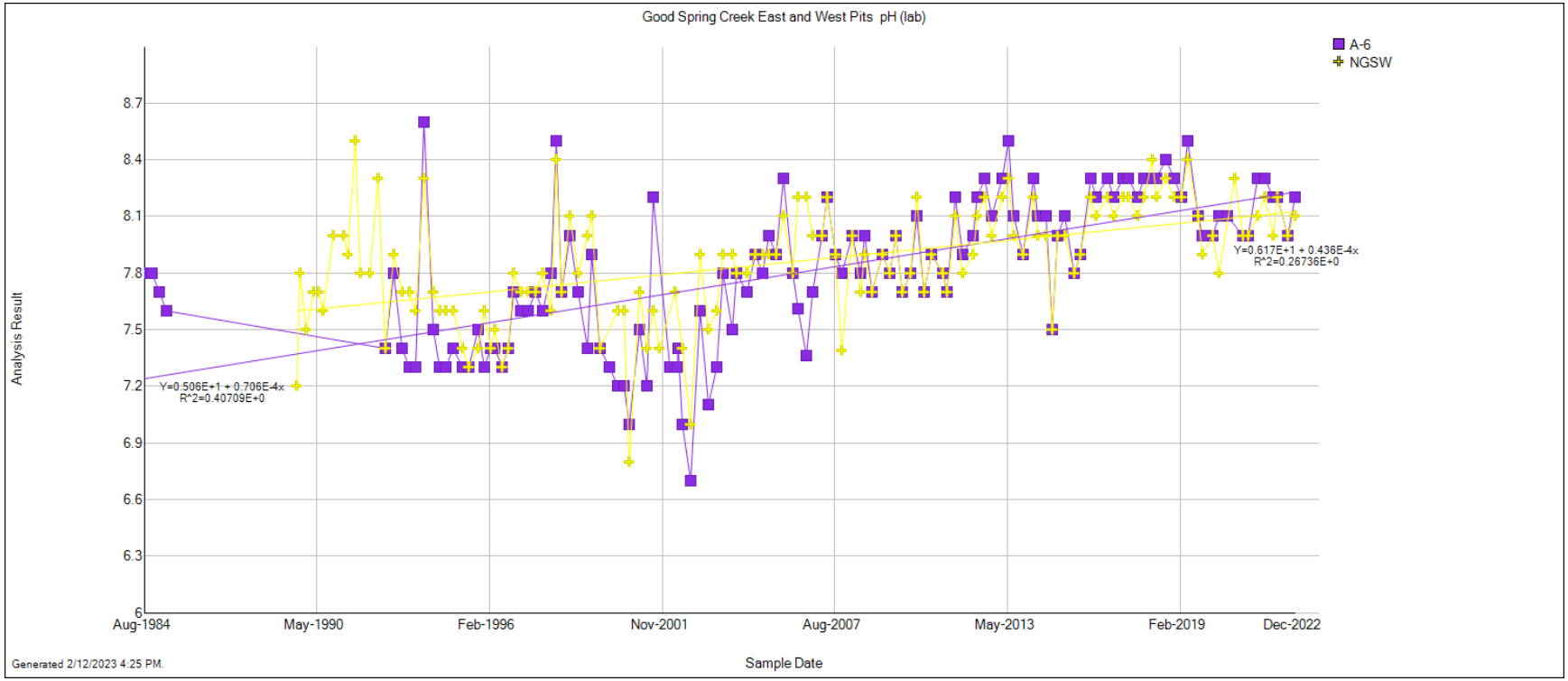

Good Spring Creek East and West Pits Calcium, dissolved (mg/L)
A-6
NGSW
Y=0.651E+2 + 0.280E-2x
R^2=0.13831E+0
Y=0.100E+3 -0.996E-3x
R^2=0.52041E-1
Analysis Result
360
324
288
252
216
180
144
108
72
36
0
Aug-1984
May-1990
Feb-1996
Nov-2001
Aug-2007
May-2013
Feb-2019
Dec-2022
Generated 2/12/2023 4:25 PM.
Sample Date

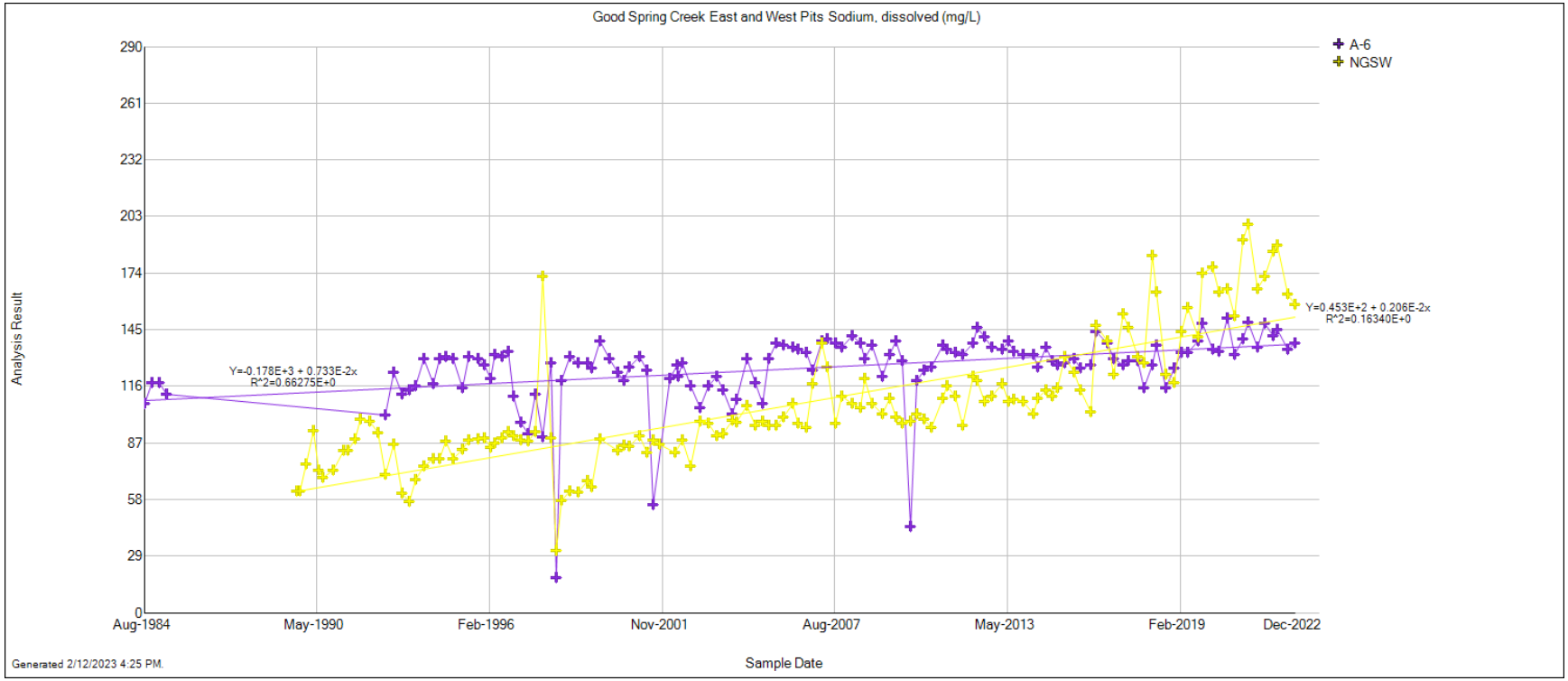

Good Spring Creek East and West Pits Groundwater, depth from TOC (ft)
A-6
NGSW
Analysis Result
27
24.3
21.6
18.9
16.2
13.5
10.8
8.1
5.4
2.7
0
Aug-1984
May-1990
Feb-1996
Nov-2001
Aug-2007
May-2013
Feb-2019
Dec-2022
Y=0.221E+1 + 0.141E-3x
R^2=0.68016E-1
Y=0.563E+1 + 0.388E-4x
R^2=0.24260E-2
Generated 2/12/2023 4:25 PM.
Sample Date

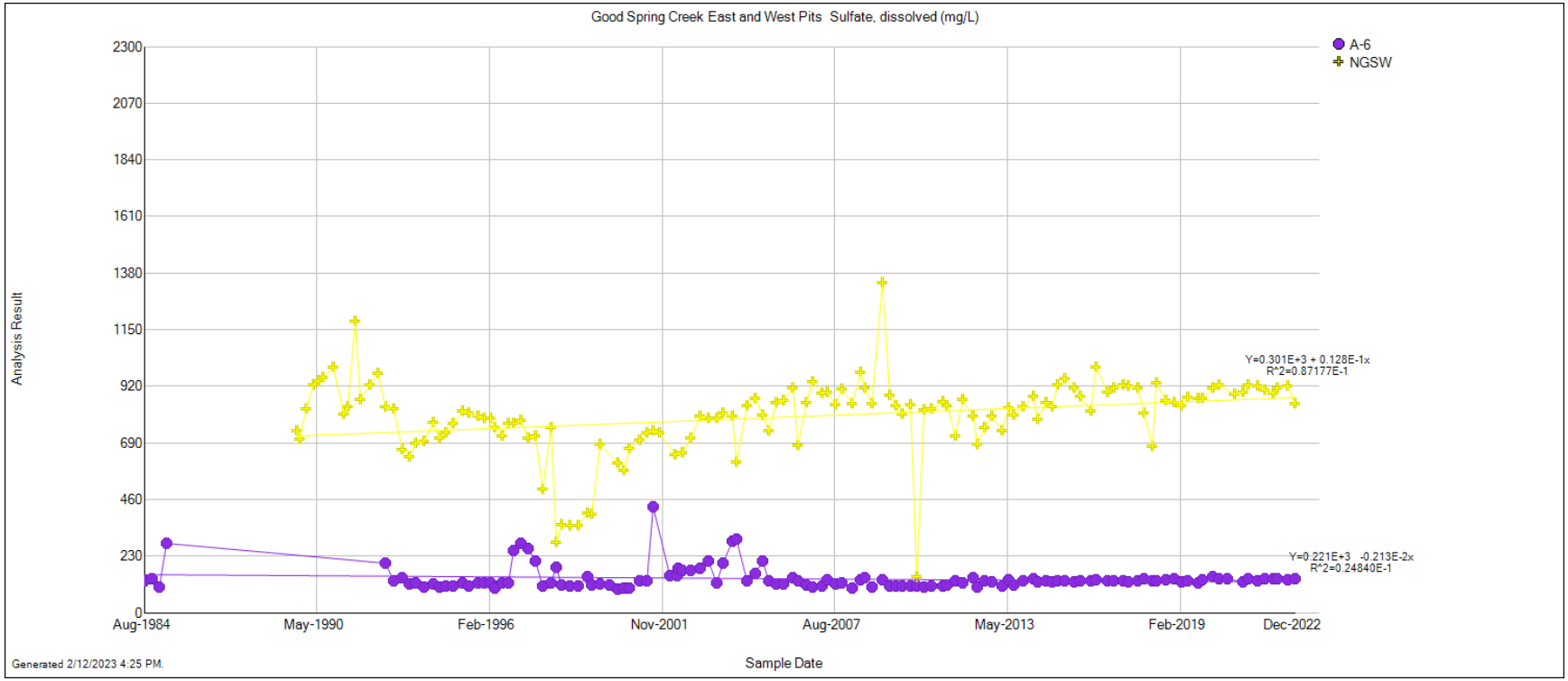

Good Spring Creek East and West Pits Specific Conductance @ 25C (lab) (umhos/cm)
A-6
NGSW
Y=0.115E+3 + 0.513E-1x
R^2=0.36299E+0
Y=0.110E+4 + 0.298E-3x
R^2=0.20742E-3
Analysis Result
3700
3330
2960
2590
2220
1850
1480
1110
740
370
0
Aug-1984
May-1990
Feb-1996
Nov-2001
Aug-2007
May-2013
Feb-2019
Dec-2022
Sample Date
Generated 2/12/2023 4:25 PM.

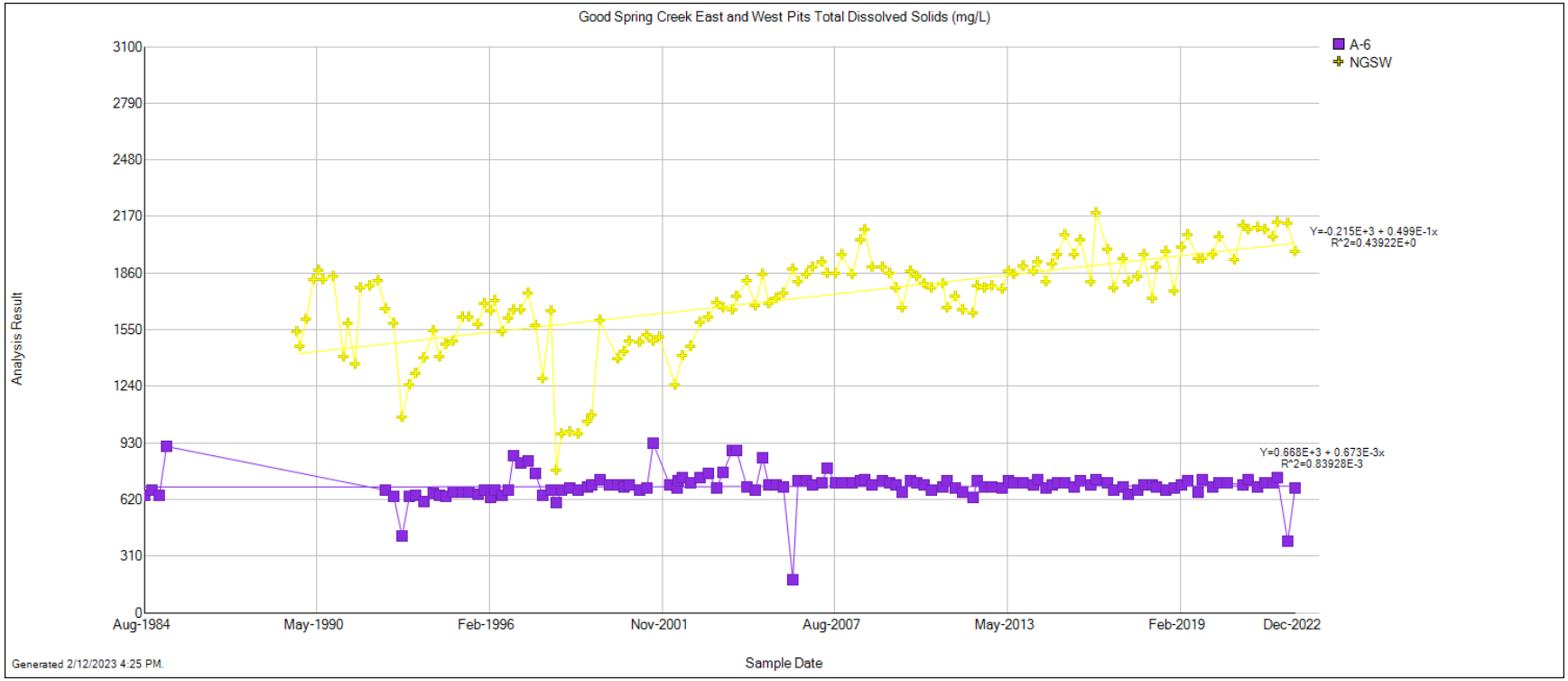

Iron, dissolved (mg/L)
A-6
NGSW
Analysis Result
2.535
2.25
1.96499
1.67999
1.39499
1.10999
0.82498
0.53998
0.25498
-0.03002
Y=0.226E+1 -0.511E-4x
R^2=0.15948E+0
Y=0.264E+0 -0.475E-5x
R^2=0.98188E-2
Feb-1996
Feb-2000
Mar-2004
Mar-2008
Mar-2012
Mar-2016
Apr-2020
Dec-2022
Generated 2/12/2023 4:25 PM.
Sample Date

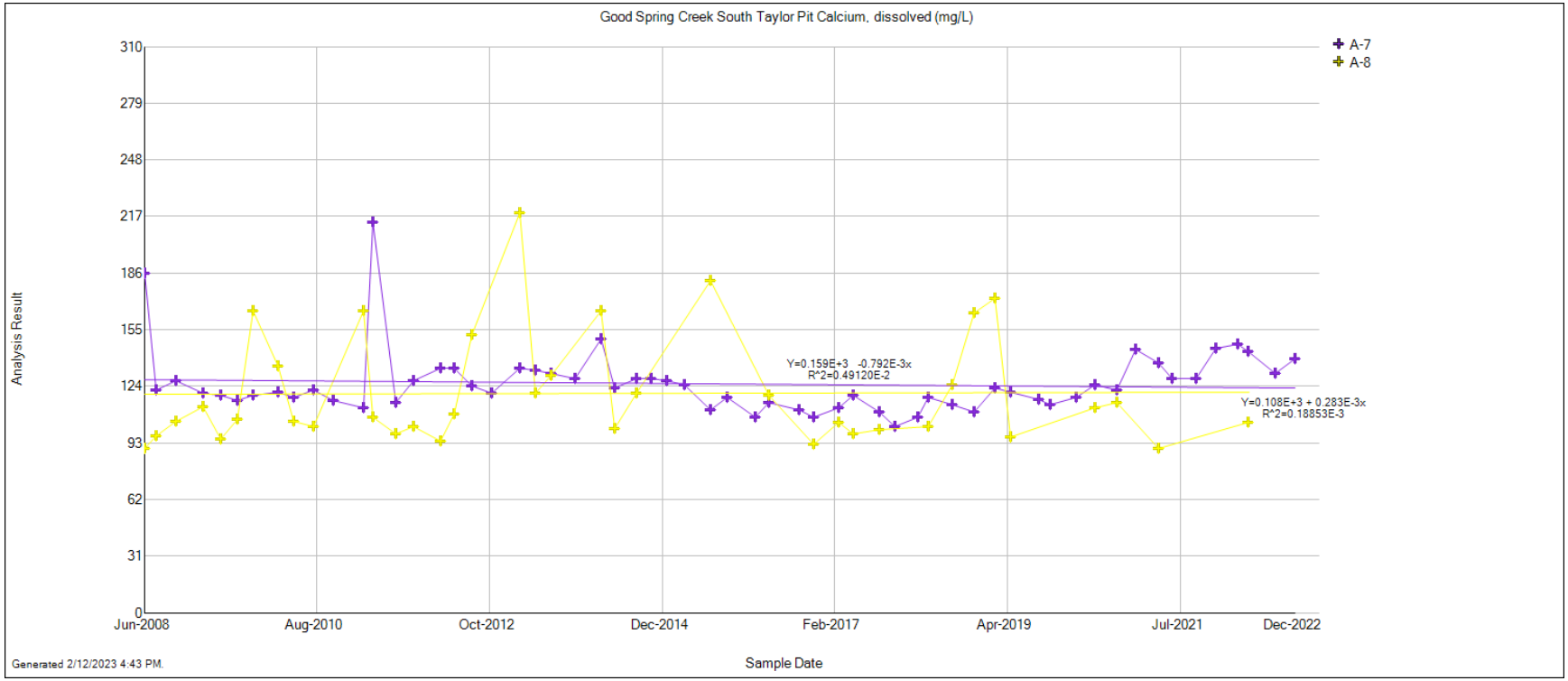

Good Spring Creek East and West Pits Magnesium, dissolved (mg/L)
A-6
NGSW
Y=0.558E+2 + 0.303E-2x
R^2=0.15516E+0
Y=0.928E+2 -0.102E-2x
R^2=0.61324E-1
Analysis Result
370
333
296
259
222
185
148
111
74
37
0
Aug-1984
May-1990
Feb-1996
Nov-2001
Aug-2007
May-2013
Feb-2019
Dec-2022
Sample Date
Generated 2/12/2023 4:25 PM.

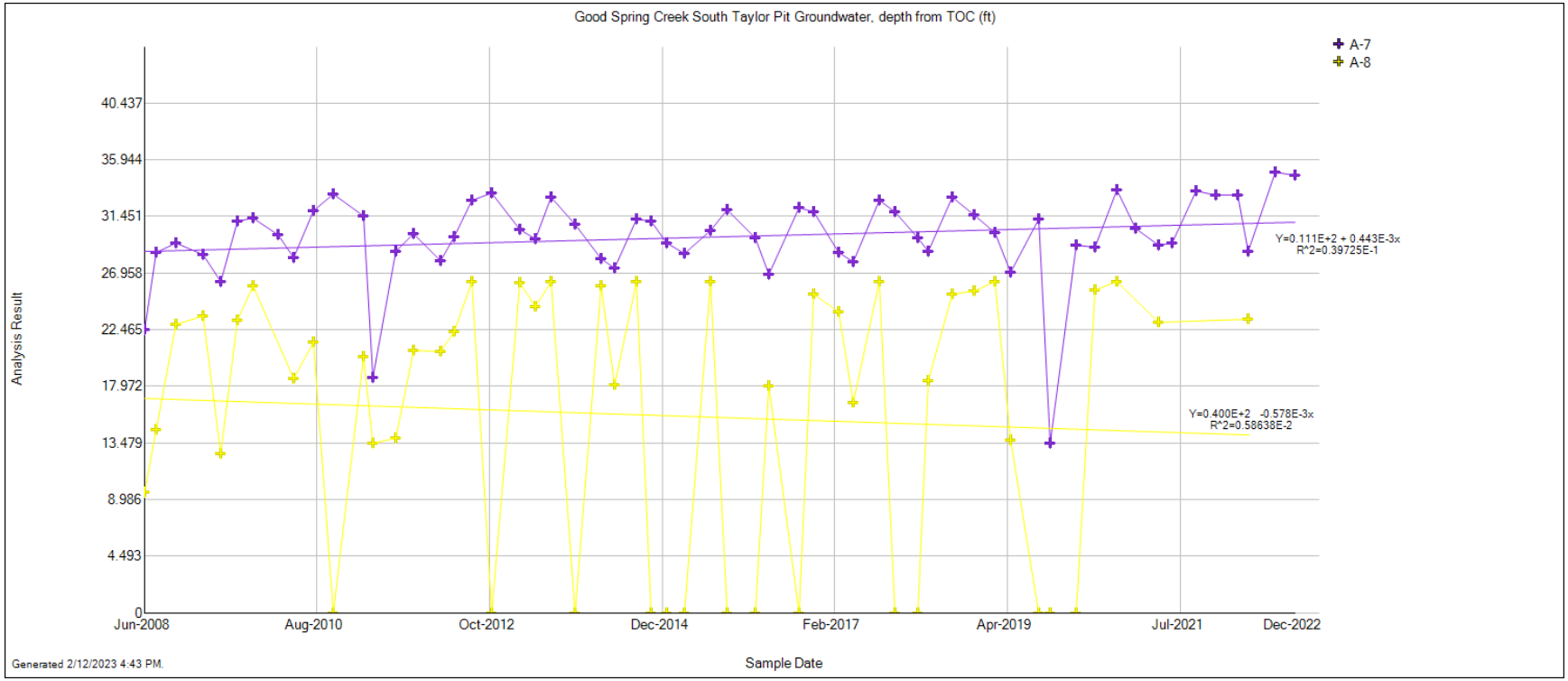

Good Spring Creek East and West Pits pH (lab)
A-6
NGSW
Analysis Result
8.7
8.4
8.1
7.8
7.5
7.2
6.9
6.6
6.3
6
Aug-1984
May-1990
Feb-1996
Nov-2001
Aug-2007
May-2013
Feb-2019
Dec-2022
Y=0.506E+1 + 0.706E-4x
R^2=0.40709E+0
Y=0.617E+1 + 0.436E-4x
R^2=0.26736E+0
Generated 2/12/2023 4:25 PM.
Sample Date

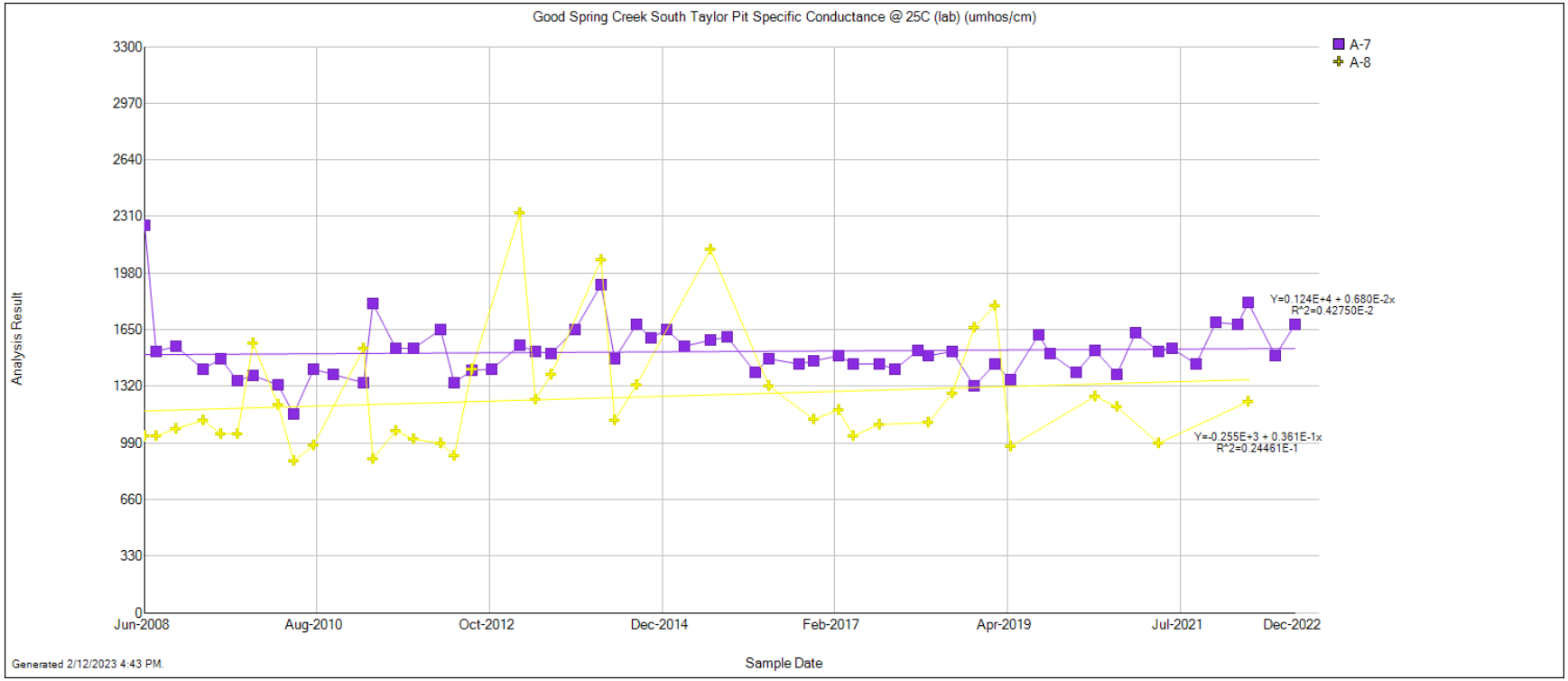

Good Spring Creek East and West Pits Sodium, dissolved (mg/L)
A-6
NGSW
Y=-0.178E+3 + 0.733E-2x
R^2=0.66275E+0
Y=0.453E+2 + 0.206E-2x
R^2=0.16340E+0
Analysis Result
290
261
232
203
174
145
116
87
58
29
0
Aug-1984
May-1990
Feb-1996
Nov-2001
Aug-2007
May-2013
Feb-2019
Dec-2022
Sample Date
Generated 2/12/2023 4:25 PM.

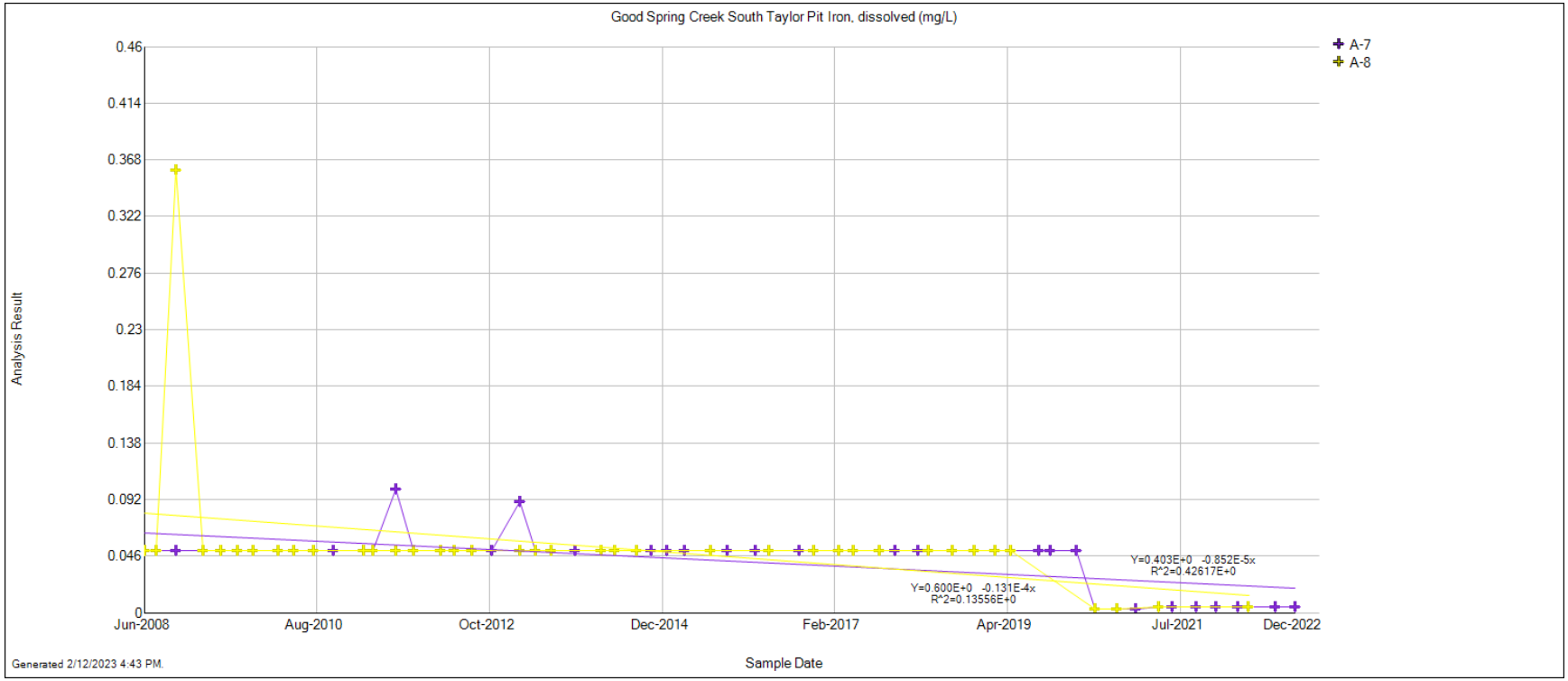

Good Spring Creek East and West Pits Sulfate, dissolved (mg/L)
A-6
NGSW
Y=0.301E+3 + 0.128E-1x
R^2=0.87177E-1
Y=0.221E+3 -0.213E-2x
R^2=0.24840E-1
Analysis Result
2300
2070
1840
1610
1380
1150
920
690
460
230
0
Aug-1984
May-1990
Feb-1996
Nov-2001
Aug-2007
May-2013
Feb-2019
Dec-2022
Sample Date
Generated 2/12/2023 4:25 PM.

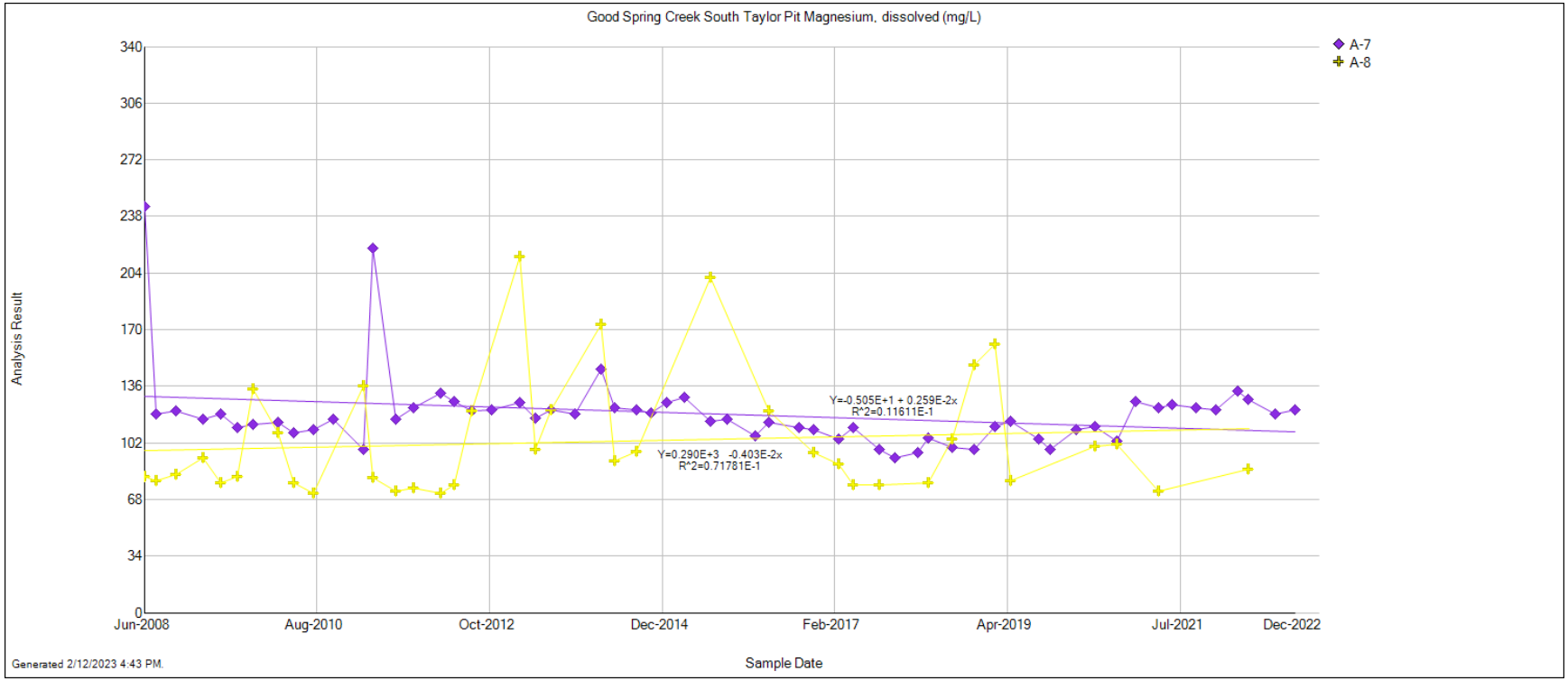

Good Spring Creek East and West Pits Total Dissolved Solids (mg/L)
A-6
NGSW
Y=-0.215E+3 + 0.499E-1x
R^2=0.43922E+0
Y=0.668E+3 + 0.673E-3x
R^2=0.83928E-3
Analysis Result
3100
2790
2480
2170
1860
1550
1240
930
620
310
0
Aug-1984
May-1990
Feb-1996
Nov-2001
Aug-2007
May-2013
Feb-2019
Dec-2022
Sample Date
Generated 2/12/2023 4:25 PM.

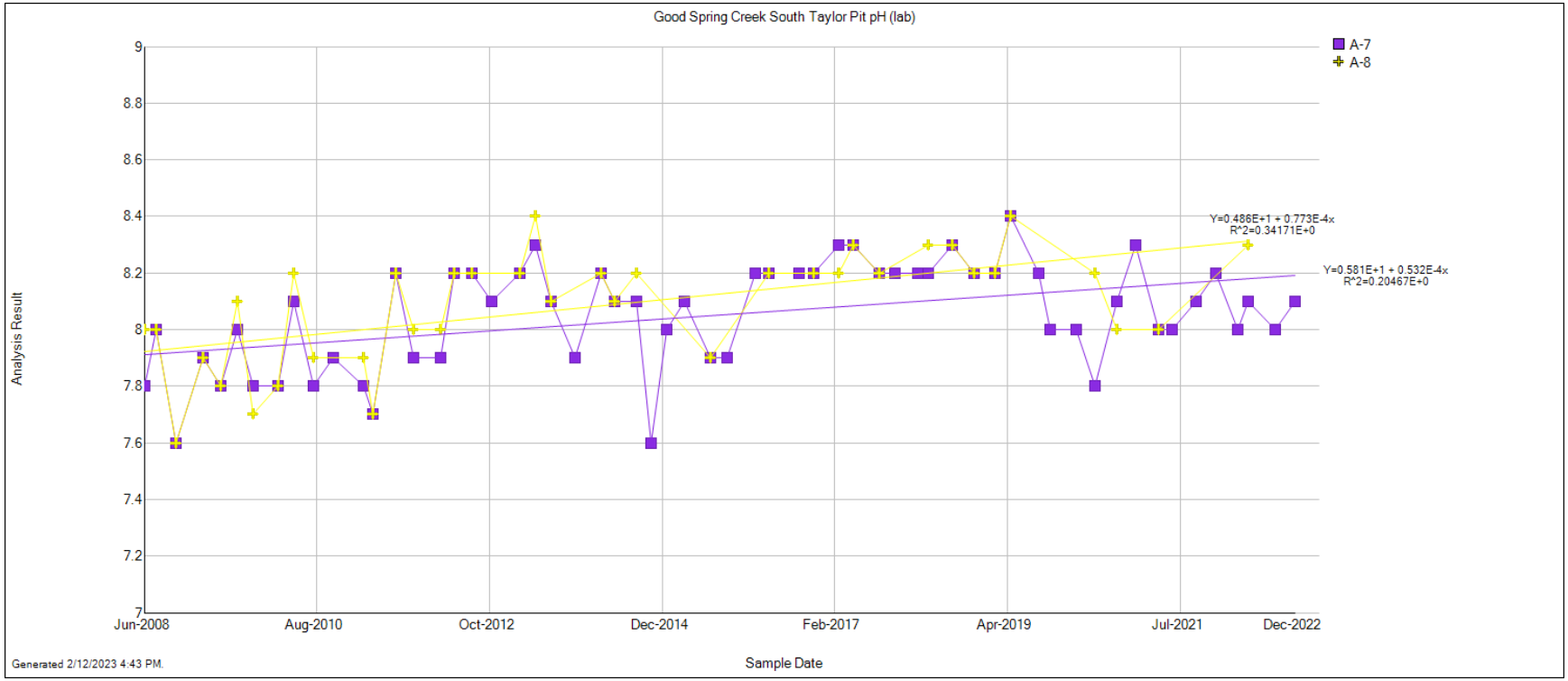

Good Spring Creek South Taylor Pit Calcium, dissolved (mg/L)
A-7
A-8
Analysis Result
310
279
248
217
186
155
124
93
62
31
0
Jun-2008
Aug-2010
Oct-2012
Dec-2014
Feb-2017
Apr-2019
Jul-2021
Dec-2022
Y=0.159E+3 -0.792E-3x
R^2=0.49120E-2
Y=0.108E+3 + 0.283E-3x
R^2=0.18853E-3
Generated 2/12/2023 4:43 PM.
Sample Date

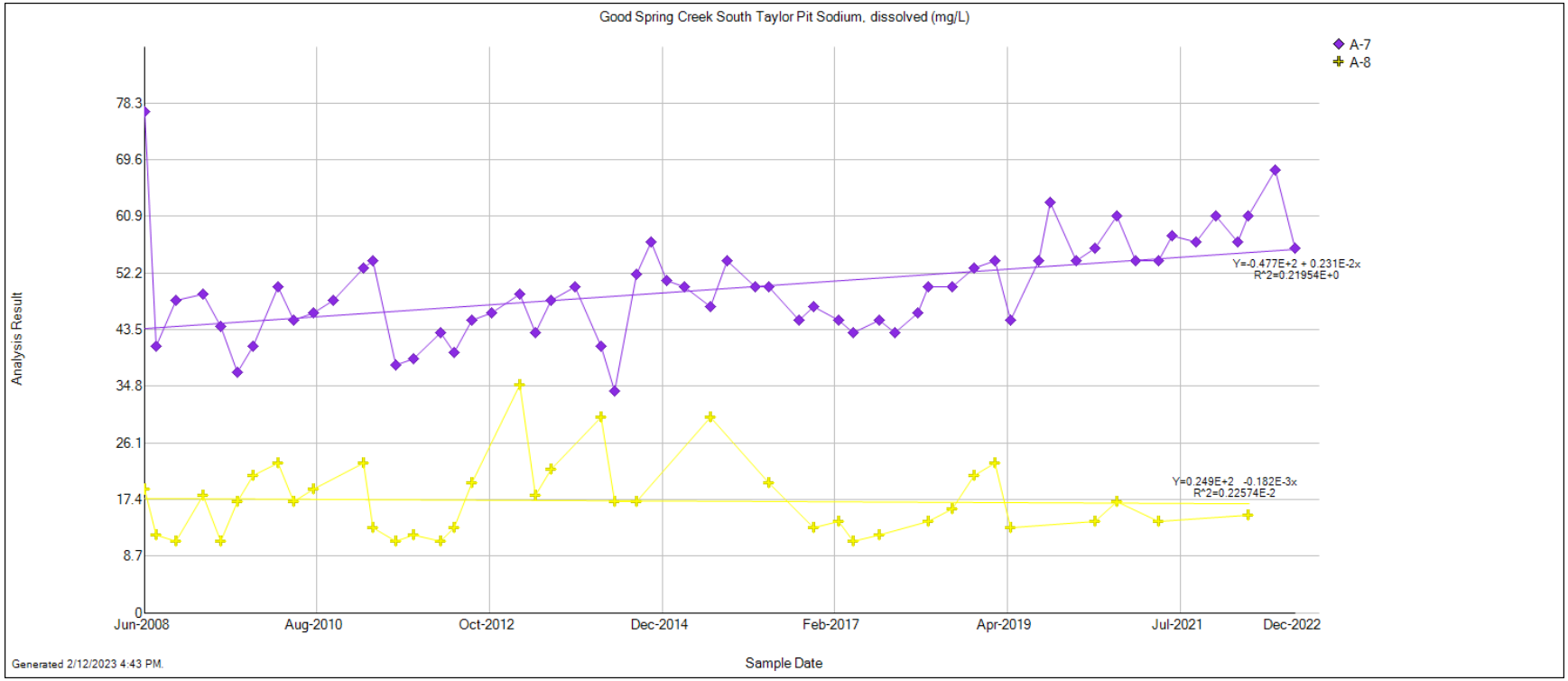

Good Spring Creek South Taylor Pit Groundwater, depth from TOC (ft)
A-7
A-8
Analysis Result
40.437
35.944
31.451
26.958
22.465
17.972
13.479
8.986
4.493
0
Jun-2008
Aug-2010
Oct-2012
Dec-2014
Feb-2017
Apr-2019
Jul-2021
Dec-2022
Y=0.111E+2 + 0.443E-3x
R^2=0.39725E-1
Y=0.400E+2 -0.578E-3x
R^2=0.58638E-2
Generated 2/12/2023 4:43 PM.
Sample Date

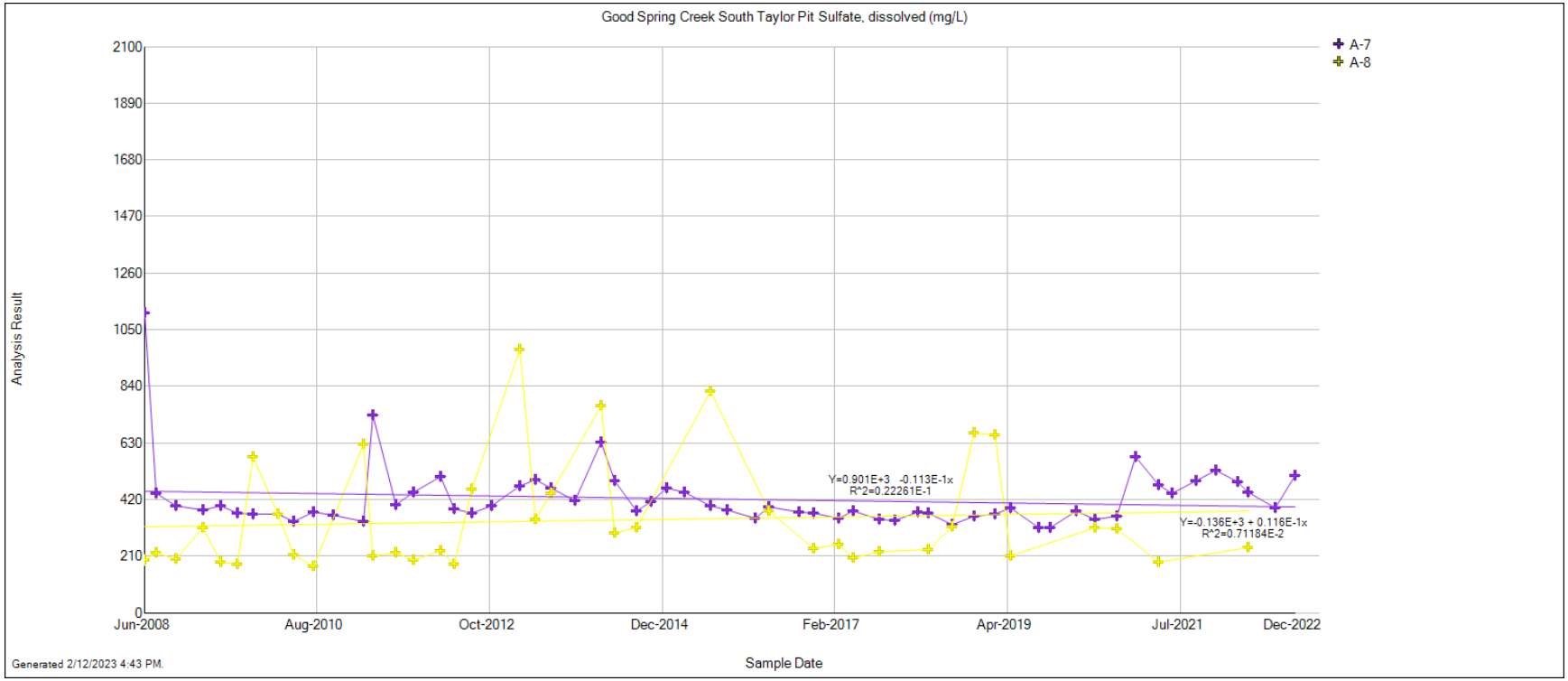

Good Spring Creek South Taylor Pit Specific Conductance @ 25C (lab) (umhos/cm)
A-7
A-8
Y=0.124E+4 + 0.680E-2x
R^2=0.42750E-2
Y=-0.255E+3 + 0.361E-1x
R^2=0.24461E-1
Analysis Result
3300
2970
2640
2310
1980
1650
1320
990
660
330
0
Jun-2008
Aug-2010
Oct-2012
Dec-2014
Feb-2017
Apr-2019
Jul-2021
Dec-2022
Generated 2/12/2023 4:43 PM.
Sample Date

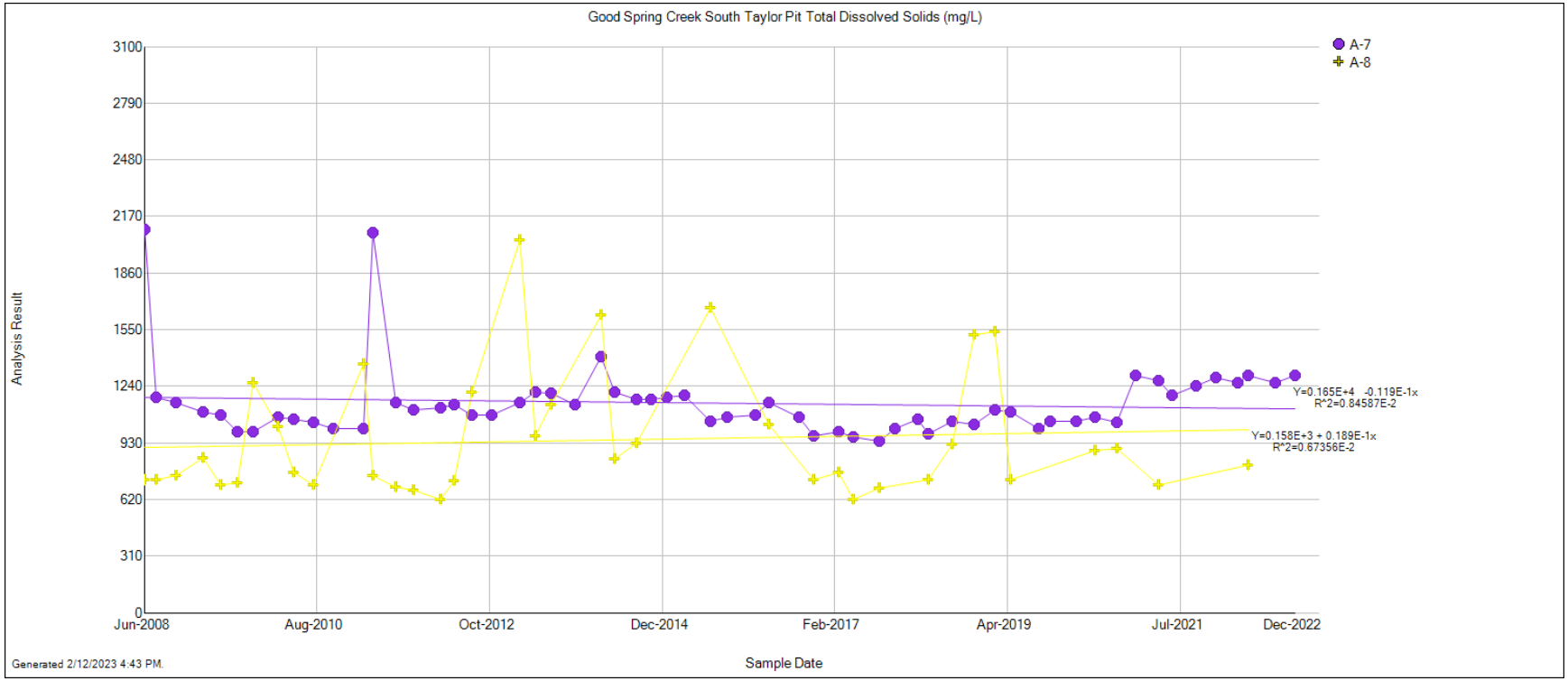

Good Spring Creek South Taylor Pit Iron, dissolved (mg/L)
A-7
A-8
0.46
0.414
0.368
0.322
0.276
0.23
0.184
0.138
0.092
0.046
0
Analysis Result
Jun-2008
Aug-2010
Oct-2012
Dec-2014
Feb-2017
Apr-2019
Jul-2021
Dec-2022
Sample Date
Y=0.403E+0 -0.852E-5x
R^2=0.42617E+0
Y=0.600E+0 -0.131E-4x
R^2=0.13556E+0
Generated 2/12/2023 4:43 PM.

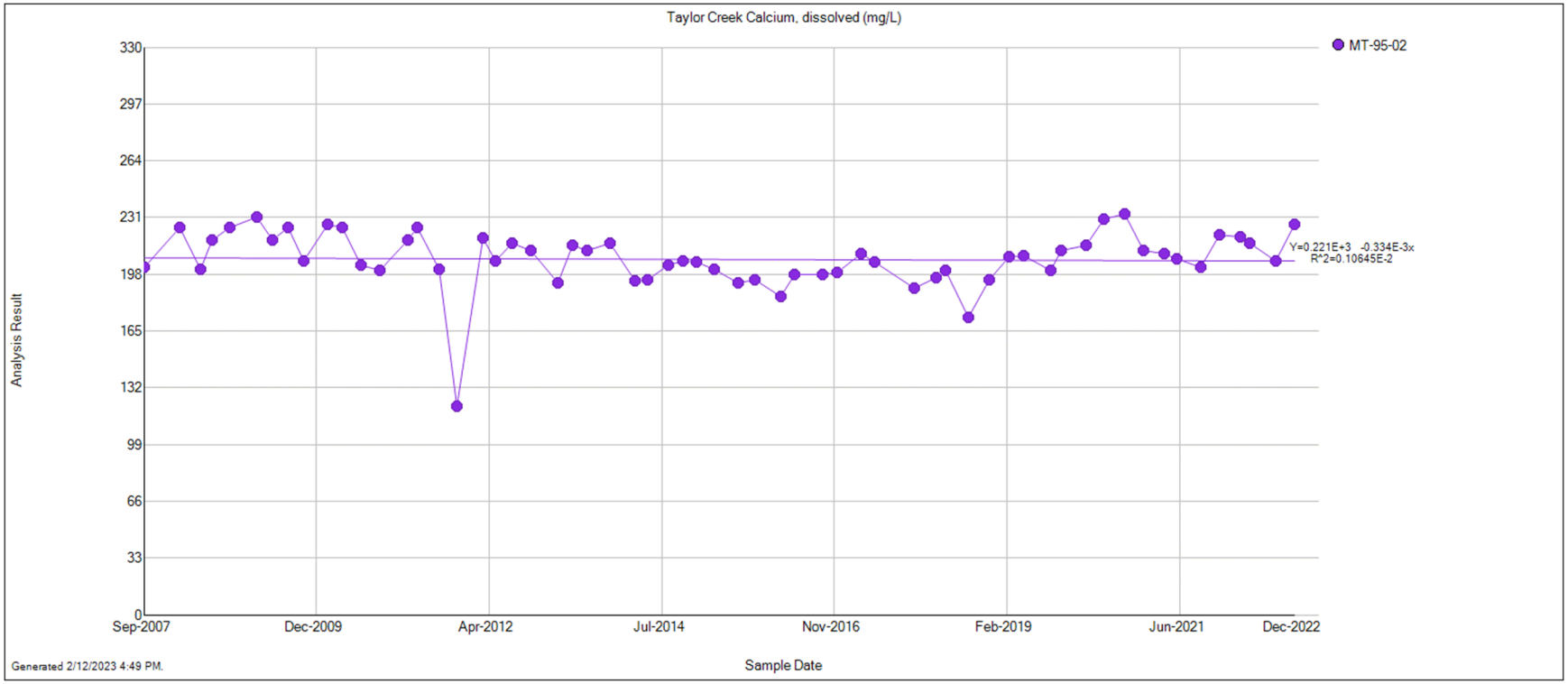

Good Spring Creek South Taylor Pit Magnesium, dissolved (mg/L)
A-7
A-8
Analysis Result
340
306
272
238
204
170
136
102
68
34
0
Jun-2008
Aug-2010
Oct-2012
Dec-2014
Feb-2017
Apr-2019
Jul-2021
Dec-2022
Y=-0.505E+1 + 0.259E-2x
R^2=0.11611E-1
Y=0.290E+3 -0.403E-2x
R^2=0.71781E-1
Generated 2/12/2023 4:43 PM.
Sample Date

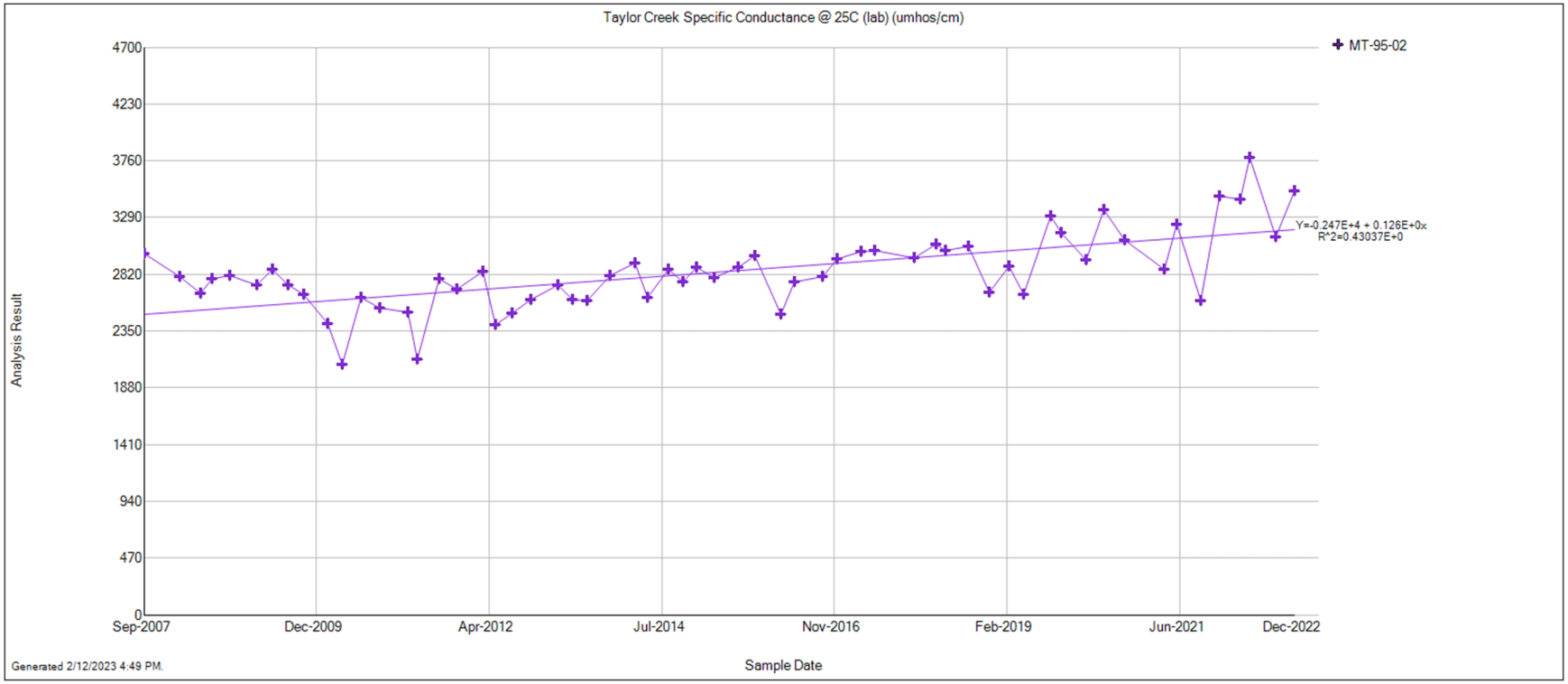

Good Spring Creek South Taylor Pit pH (lab)
A-7
A-8
Y=0.486E+1 + 0.773E-4x
R^2=0.34171E+0
Y=0.581E+1 + 0.532E-4x
R^2=0.20467E+0
Analysis Result
9
8.8
8.6
8.4
8.2
8
7.8
7.6
7.4
7.2
7
Jun-2008
Aug-2010
Oct-2012
Dec-2014
Feb-2017
Apr-2019
Jul-2021
Dec-2022
Generated 2/12/2023 4:43 PM.
Sample Date

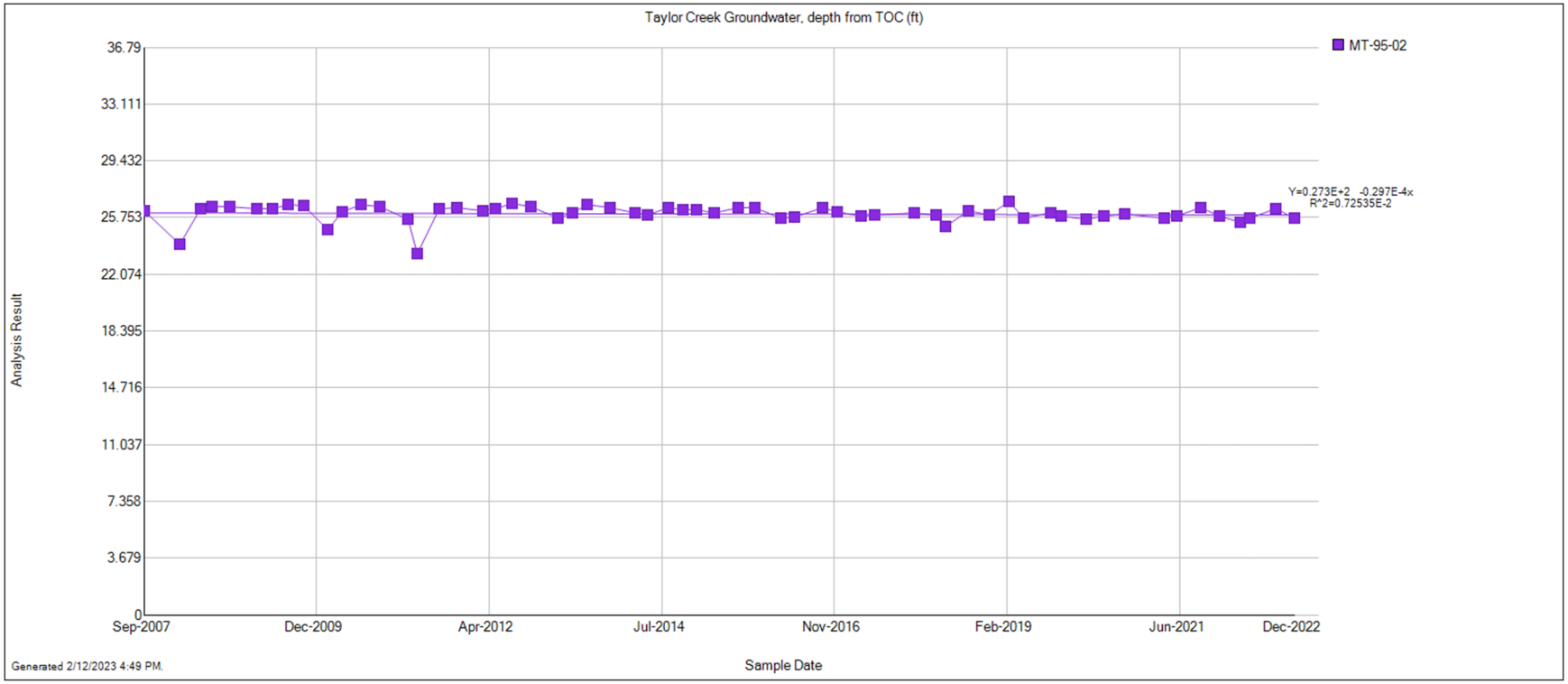

Good Spring Creek South Taylor Pit Sodium, dissolved (mg/L)
A-7
A-8
Analysis Result
78.3
69.6
60.9
52.2
43.5
34.8
26.1
17.4
8.7
0
Jun-2008
Aug-2010
Oct-2012
Dec-2014
Feb-2017
Apr-2019
Jul-2021
Dec-2022
Y=-0.477E+2 + 0.231E-2x
R^2=0.21954E+0
Y=0.249E+2 -0.182E-3x
R^2=0.22574E-2
Generated 2/12/2023 4:43 PM.
Sample Date

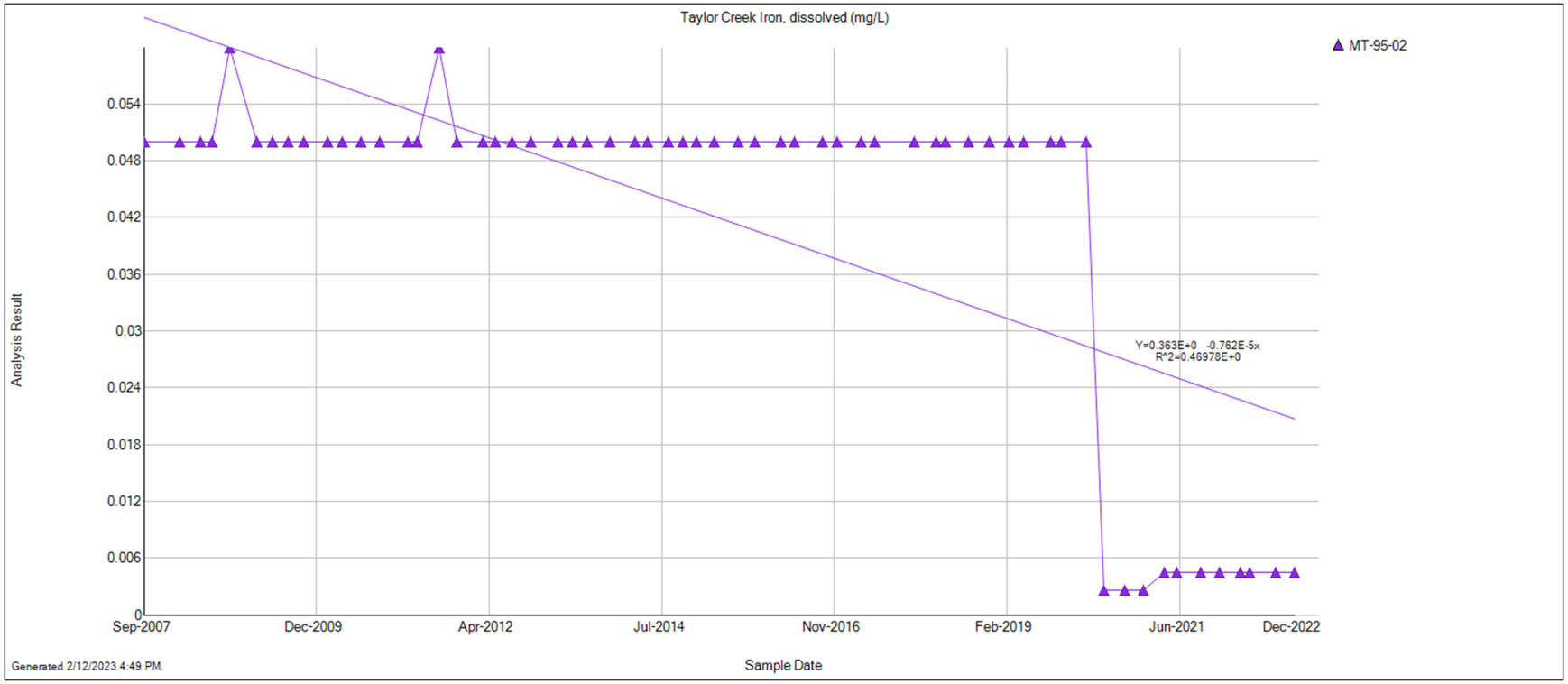

Good Spring Creek South Taylor Pit Sulfate, dissolved (mg/L)
A-7
A-8
Analysis Result
2100
1890
1680
1470
1260
1050
840
630
420
210
0
Jun-2008
Aug-2010
Oct-2012
Dec-2014
Feb-2017
Apr-2019
Jul-2021
Dec-2022
Y=0.901E+3 -0.113E-1x
R^2=0.22261E-1
Y=-0.136E+3 + 0.116E-1x
R^2=0.71184E-2
Generated 2/12/2023 4:43 PM.
Sample Date

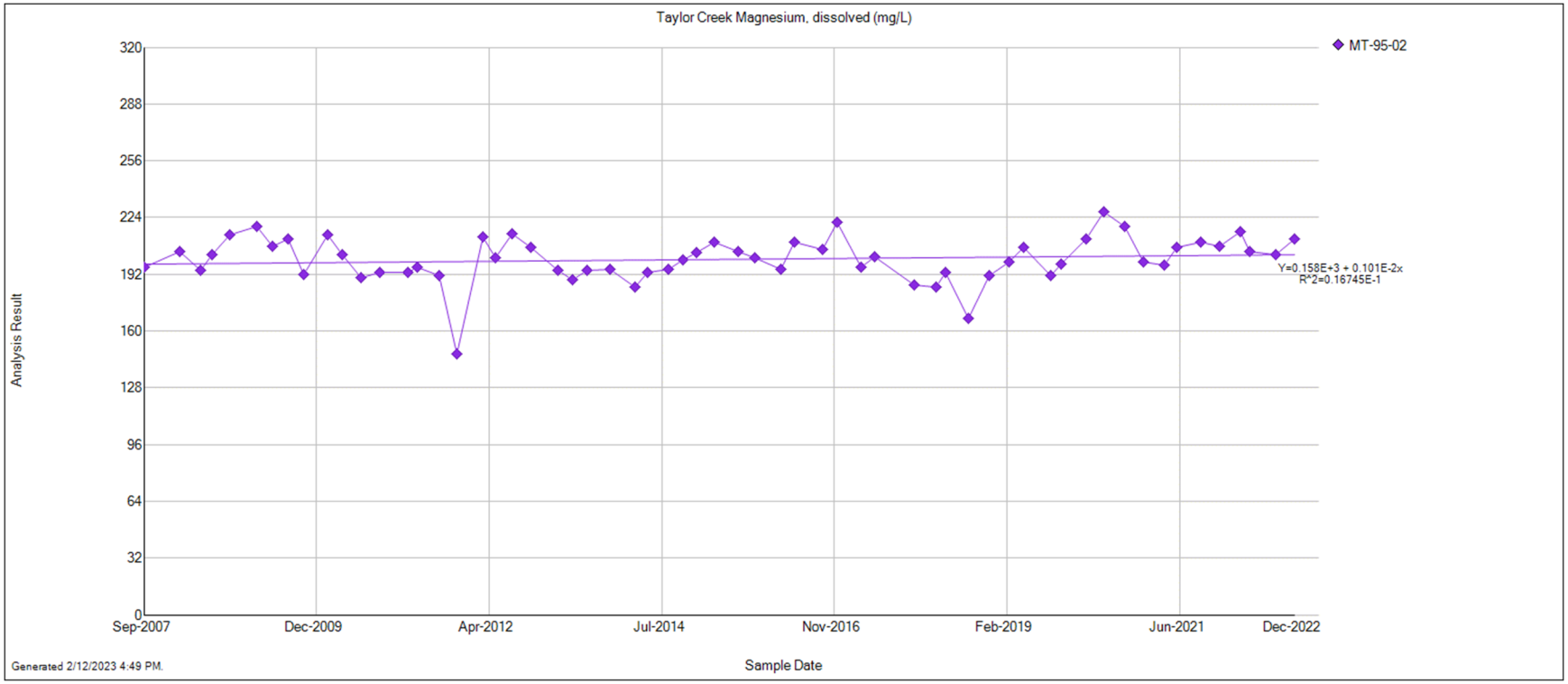

Good Spring Creek South Taylor Pit Total Dissolved Solids (mg/L)
A-7
A-8
Analysis Result
3100
2790
2480
2170
1860
1550
1240
930
620
310
0
Jun-2008
Aug-2010
Oct-2012
Dec-2014
Feb-2017
Apr-2019
Jul-2021
Dec-2022
Y=0.165E+4 -0.119E-1x
R^2=0.84587E-2
Y=0.158E+3 + 0.189E-1x
R^2=0.67356E-2
Generated 2/12/2023 4:43 PM.
Sample Date

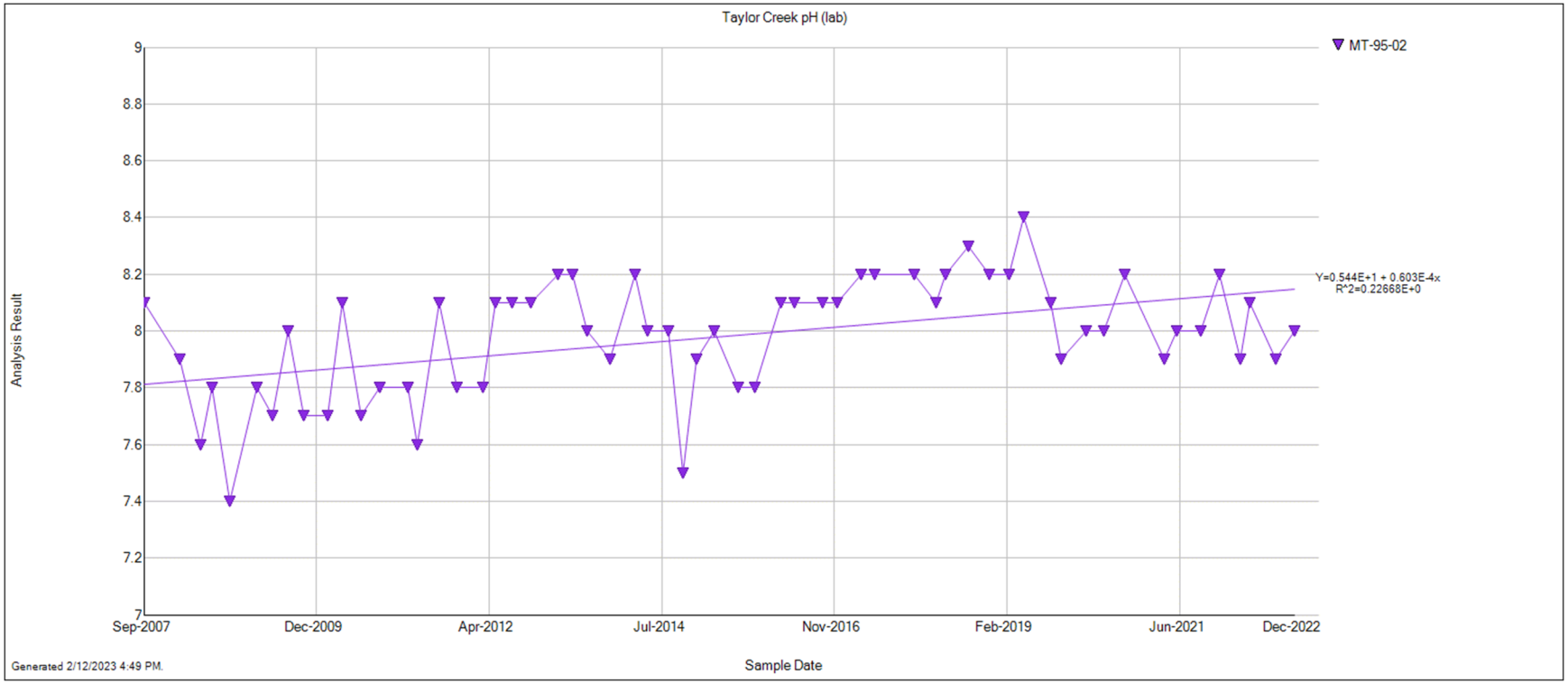

Taylor Creek Calcium, dissolved (mg/L)
MT-95-02
Y=0.221E+3 -0.334E-3x
R^2=0.10645E-2
330
297
264
231
198
165
132
99
66
33
0
Analysis Result
Sep-2007
Dec-2009
Apr-2012
Jul-2014
Nov-2016
Feb-2019
Jun-2021
Dec-2022
Sample Date
Generated 2/12/2023 4:49 PM.

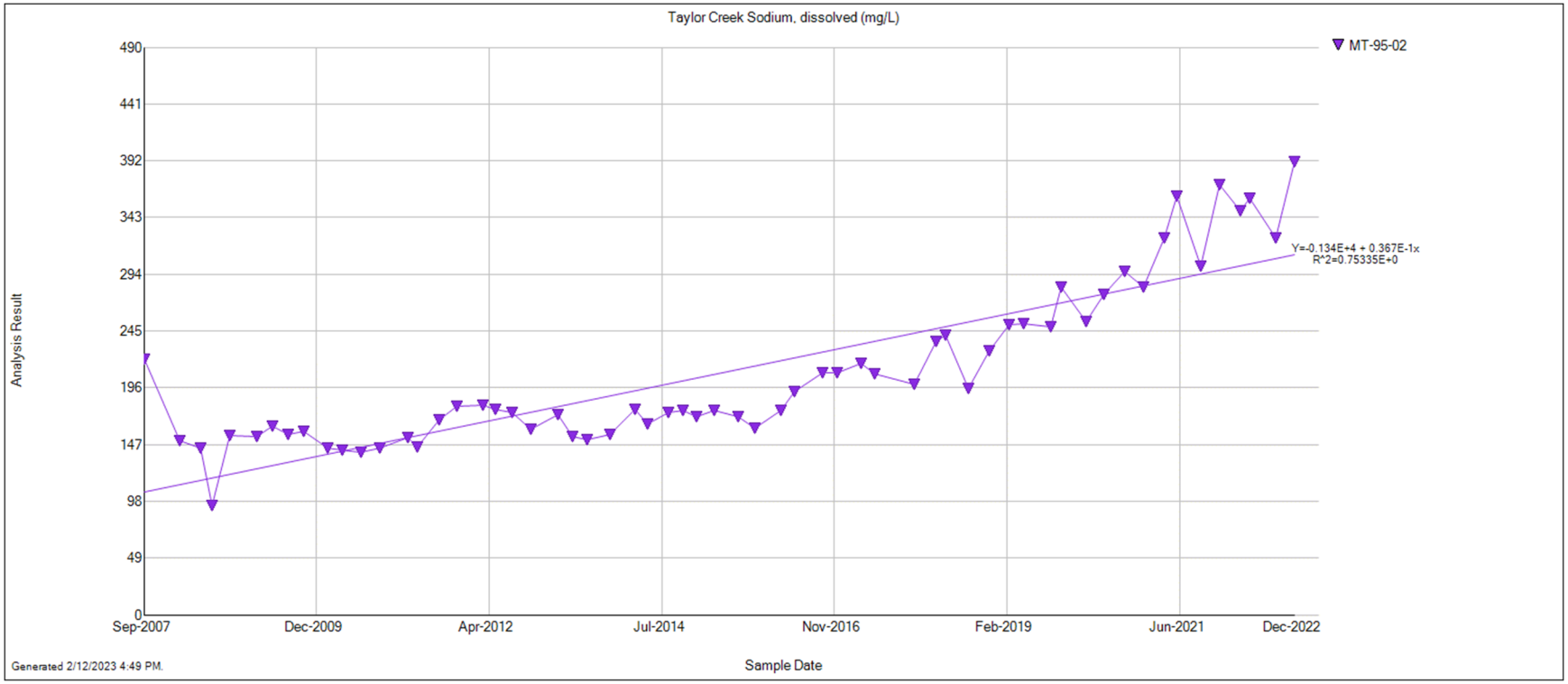

Taylor Creek Specific Conductance @ 25C (lab) (umhos/cm)
MT-95-02
Y=-0.247E+4 + 0.126E+0x
R^2=0.43037E+0
Analysis Result
4700
4230
3760
3290
2820
2350
1880
1410
940
470
0
Sep-2007
Dec-2009
Apr-2012
Jul-2014
Nov-2016
Feb-2019
Jun-2021
Dec-2022
Sample Date
Generated 2/12/2023 4:49 PM.

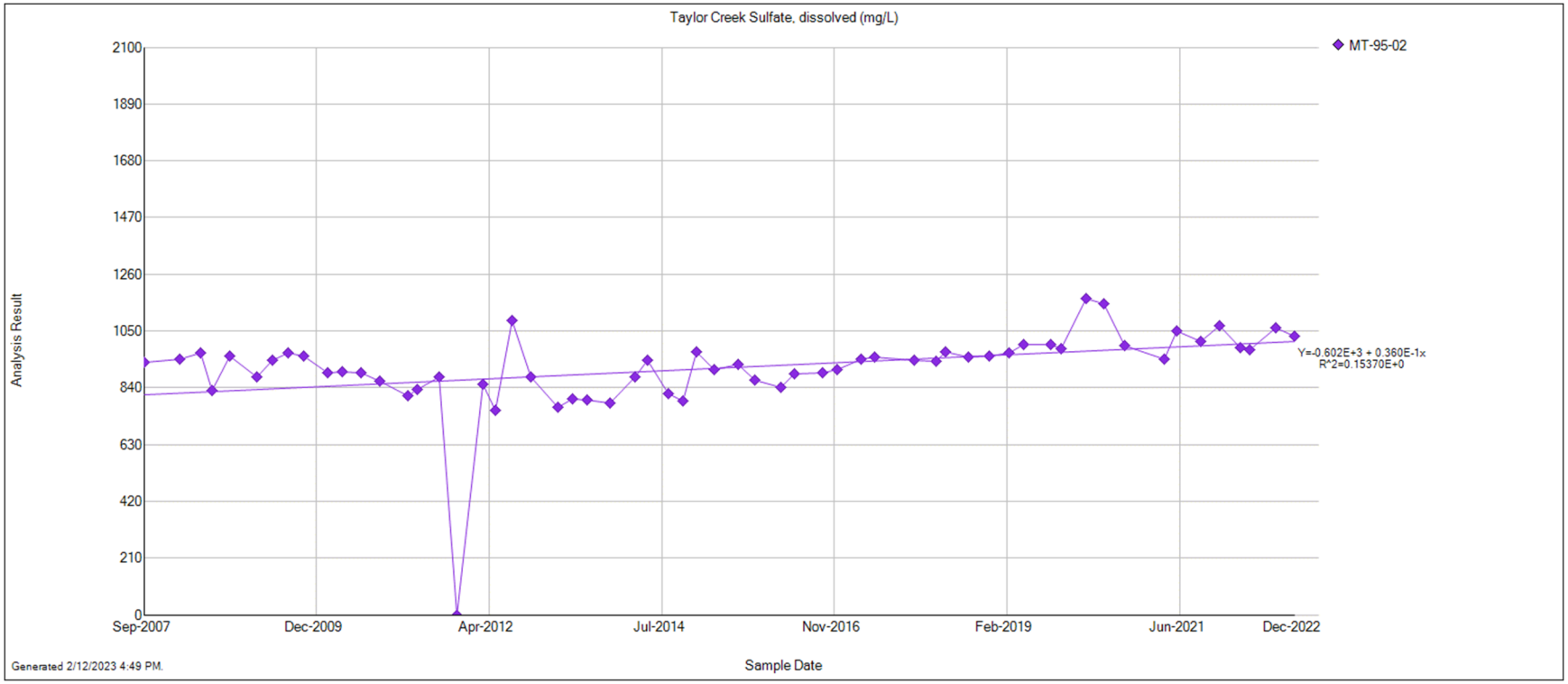

Taylor Creek Groundwater, depth from TOC (ft)
MT-95-02
Y=0.273E+2 -0.297E-4x
R^2=0.72535E-2
36.79
33.111
29.432
25.753
22.074
18.395
14.716
11.037
7.358
3.679
0
Analysis Result
Sep-2007
Dec-2009
Apr-2012
Jul-2014
Nov-2016
Feb-2019
Jun-2021
Dec-2022
Sample Date
Generated 2/12/2023 4:49 PM.

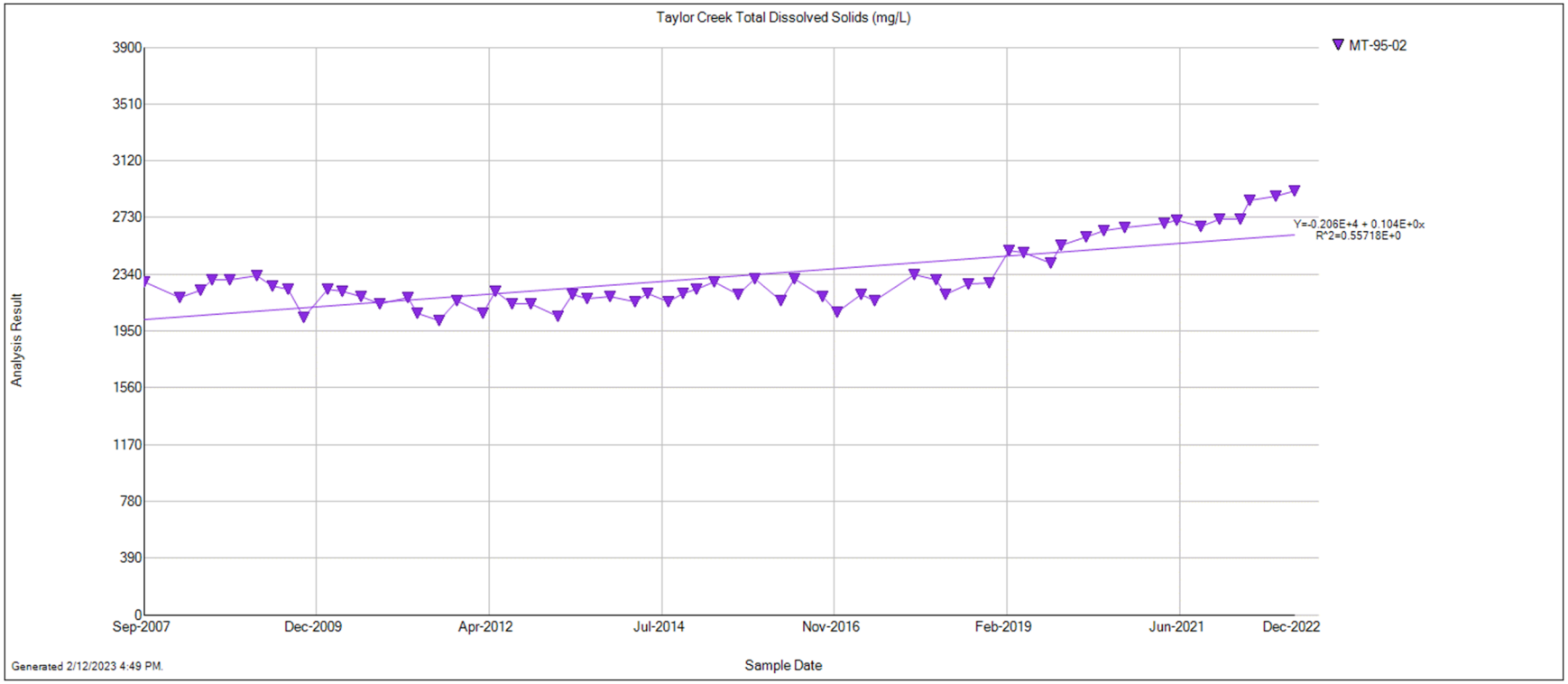

Taylor Creek Iron, dissolved (mg/L)
MT-95-02
Analysis Result
0.054
0.048
0.042
0.036
0.03
0.024
0.018
0.012
0.006
0
Y=0.363E+0 -0.762E-5x
R^2=0.46978E+0
Sep-2007
Dec-2009
Apr-2012
Jul-2014
Nov-2016
Feb-2019
Jun-2021
Dec-2022
Generated 2/12/2023 4:49 PM.
Sample Date

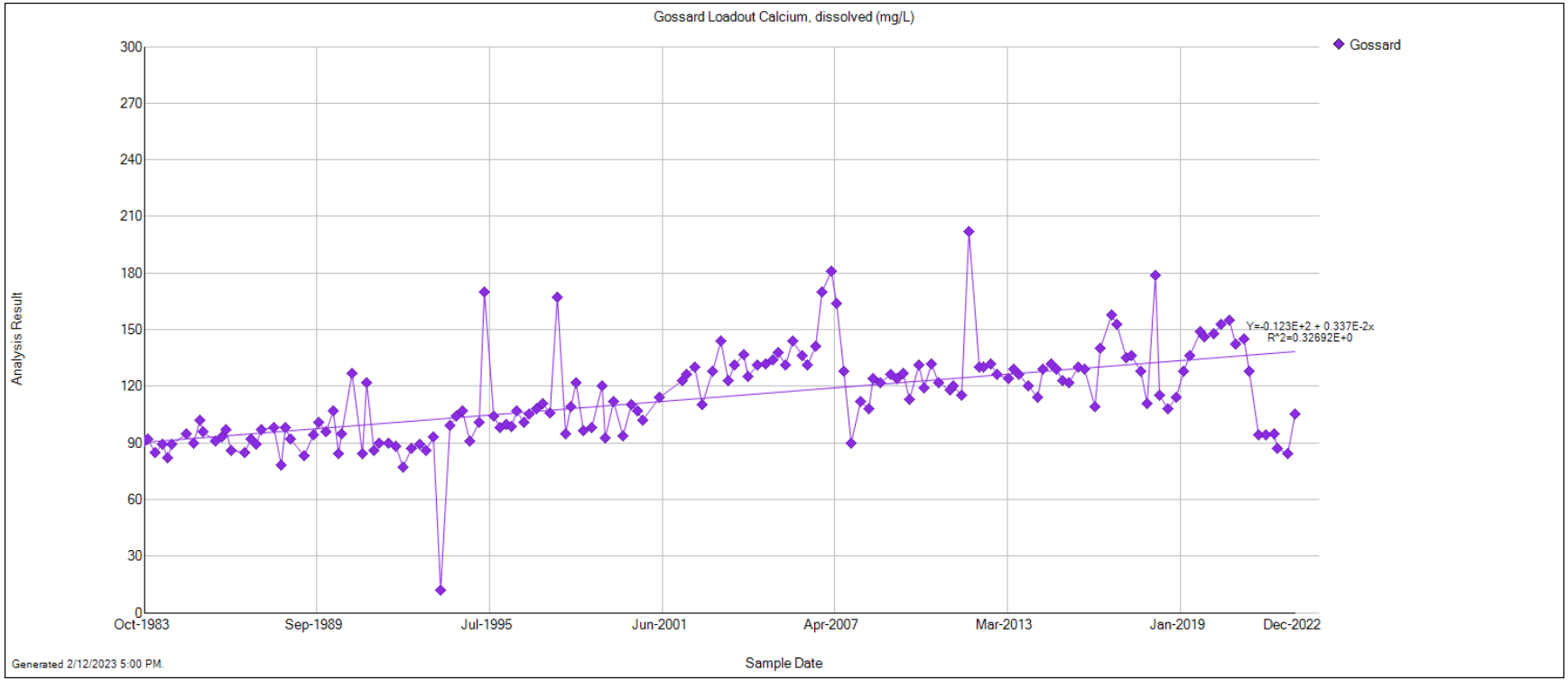

Taylor Creek Magnesium, dissolved (mg/L)
MT-95-02
Y=0.158E+3 + 0.101E-2x
R^2=0.16745E-1
Analysis Result
320
288
256
224
192
160
128
96
64
32
0
Sep-2007
Dec-2009
Apr-2012
Jul-2014
Nov-2016
Feb-2019
Jun-2021
Dec-2022
Generated 2/12/2023 4:49 PM.
Sample Date

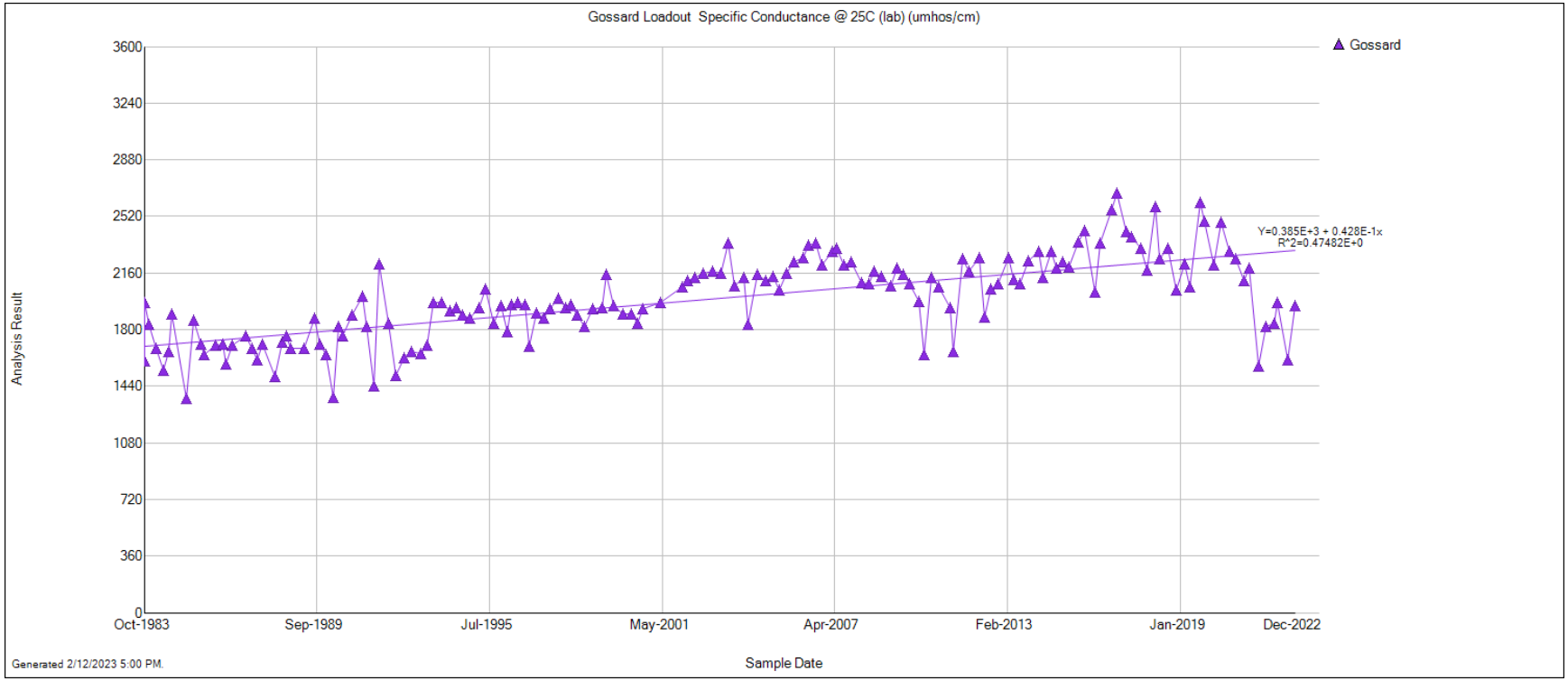

Taylor Creek pH (lab)
MT-95-02
Y=0.544E+1 + 0.603E-4x
R^2=0.22668E+0
Analysis Result
9
8.8
8.6
8.4
8.2
8
7.8
7.6
7.4
7.2
7
Sep-2007
Dec-2009
Apr-2012
Jul-2014
Nov-2016
Feb-2019
Jun-2021
Dec-2022
Sample Date
Generated 2/12/2023 4:49 PM.

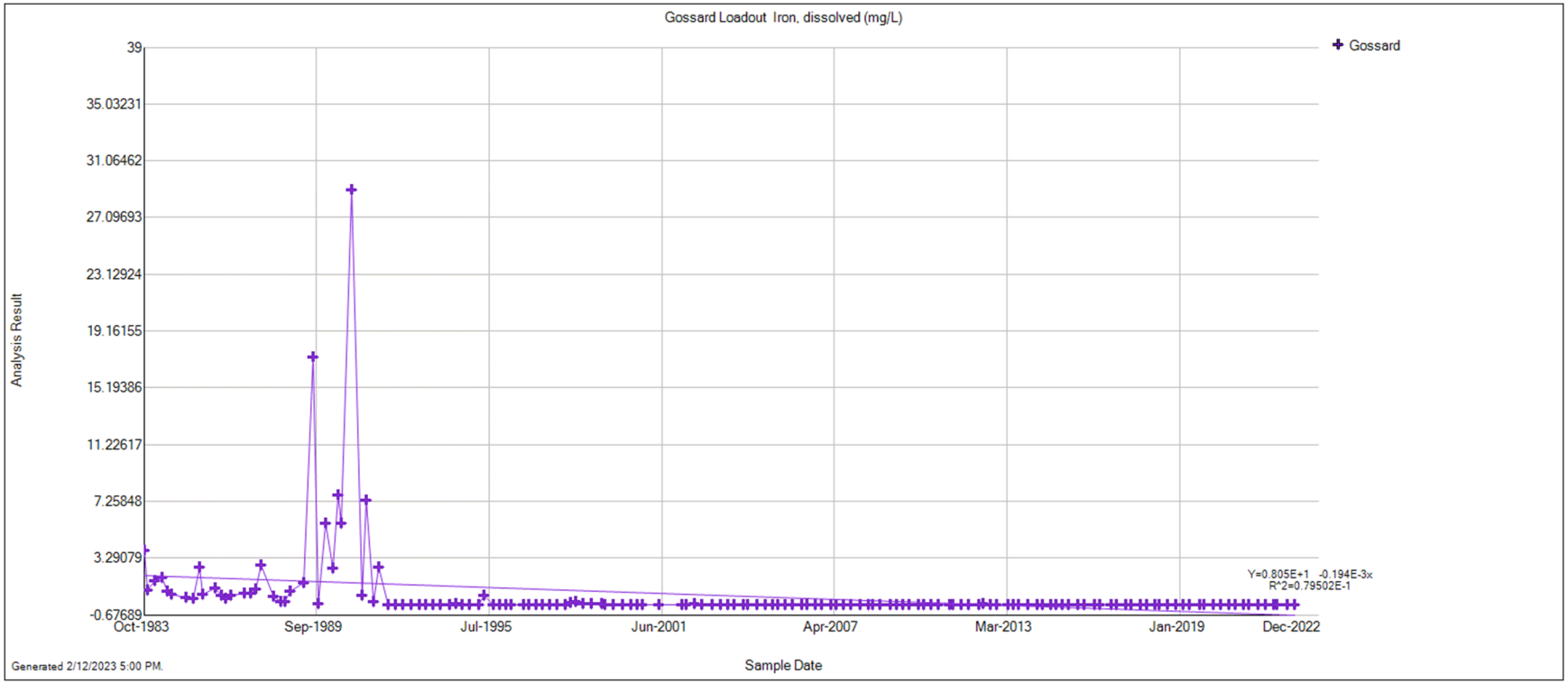

Taylor Creek Sodium, dissolved (mg/L)
MT-95-02
Y=-0.134E+4 + 0.367E-1x
R^2=0.75335E+0
Analysis Result
490
441
392
343
294
245
196
147
98
49
0
Sep-2007
Dec-2009
Apr-2012
Jul-2014
Nov-2016
Feb-2019
Jun-2021
Dec-2022
Sample Date
Generated 2/12/2023 4:49 PM.

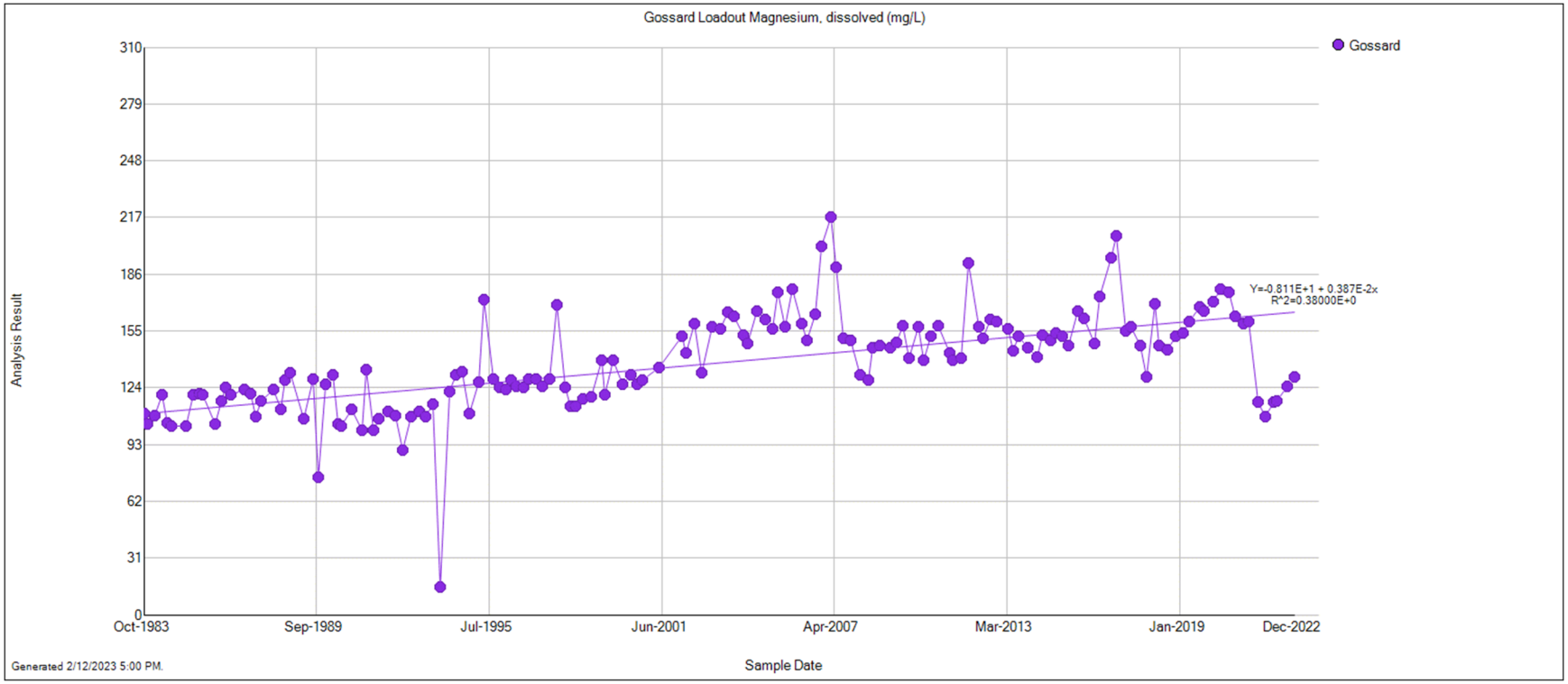

Taylor Creek Sulfate, dissolved (mg/L)
MT-95-02
Analysis Result
2100
1890
1680
1470
1260
1050
840
630
420
210
0
Sep-2007
Dec-2009
Apr-2012
Jul-2014
Nov-2016
Feb-2019
Jun-2021
Dec-2022
Y=-0.602E+3 + 0.360E-1x
R^2=0.15370E+0
Generated 2/12/2023 4:49 PM.
Sample Date

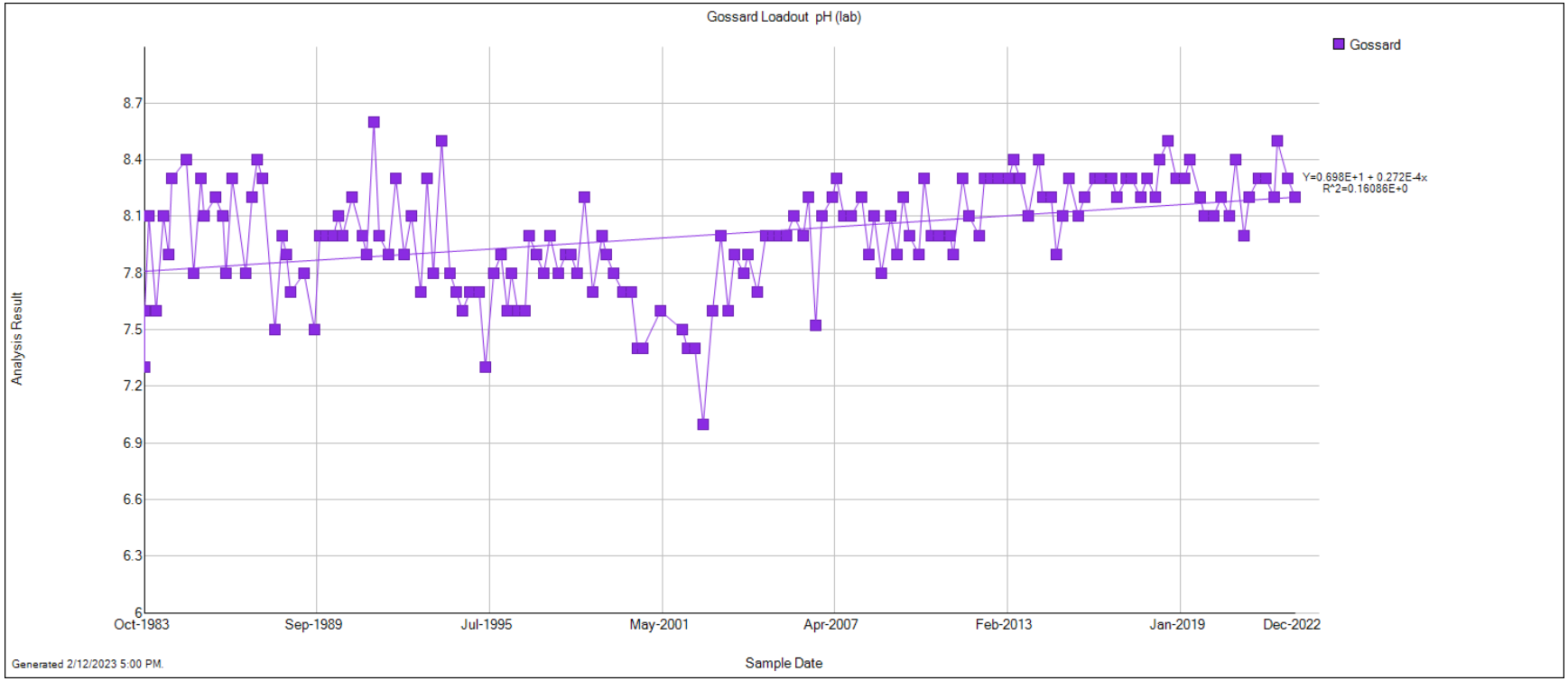

Taylor Creek Total Dissolved Solids (mg/L)
MT-95-02
Y=-0.206E+4 + 0.104E+0x
R^2=0.55718E+0
Analysis Result
3900
3510
3120
2730
2340
1950
1560
1170
780
390
0
Sep-2007
Dec-2009
Apr-2012
Jul-2014
Nov-2016
Feb-2019
Jun-2021
Dec-2022
Sample Date
Generated 2/12/2023 4:49 PM.

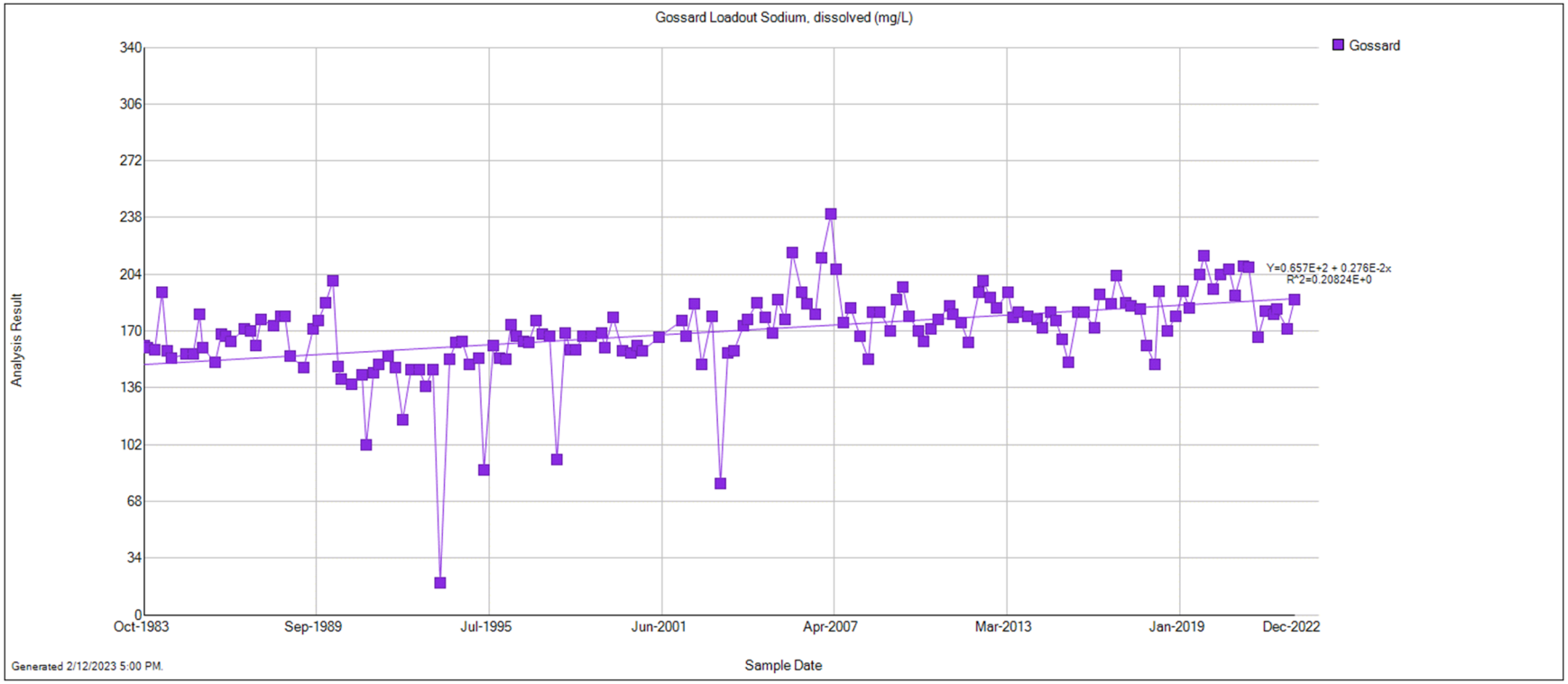

Gossard Loadout Calcium, dissolved (mg/L)
Gossard
Y=-0.123E+2 + 0.337E-2x
R^2=0.32692E+0
Analysis Result
300
270
240
210
180
150
120
90
60
30
0
Oct-1983
Sep-1989
Jul-1995
Jun-2001
Apr-2007
Mar-2013
Jan-2019
Dec-2022
Generated 2/12/2023 5:00 PM.
Sample Date

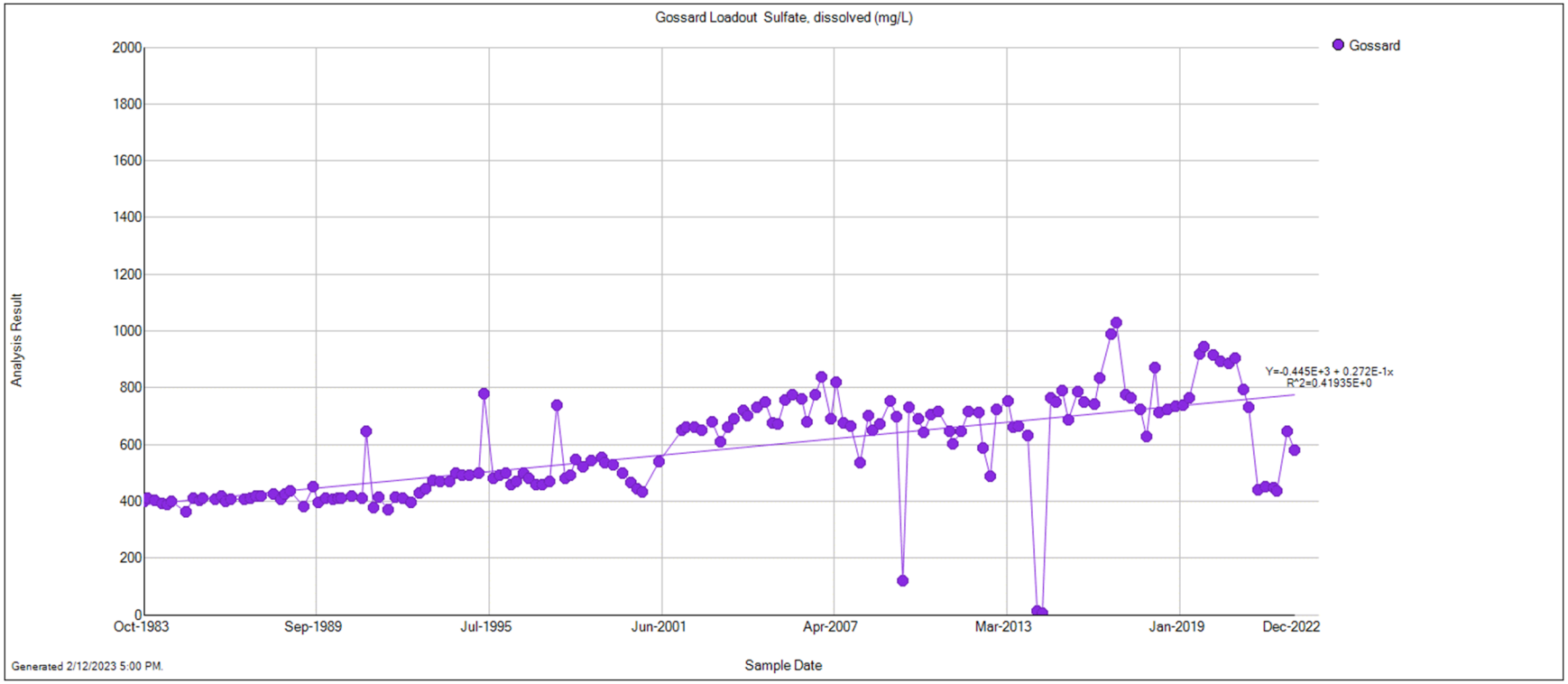

Gossard Loadout Specific Conductance @ 25C (lab) (umhos/cm)
Gossard
Y=0.385E+3 + 0.428E-1x
R^2=0.47482E+0
Analysis Result
3600
3240
2880
2520
2160
1800
1440
1080
720
360
0
Oct-1983
Sep-1989
Jul-1995
May-2001
Apr-2007
Feb-2013
Jan-2019
Dec-2022
Generated 2/12/2023 5:00 PM.
Sample Date

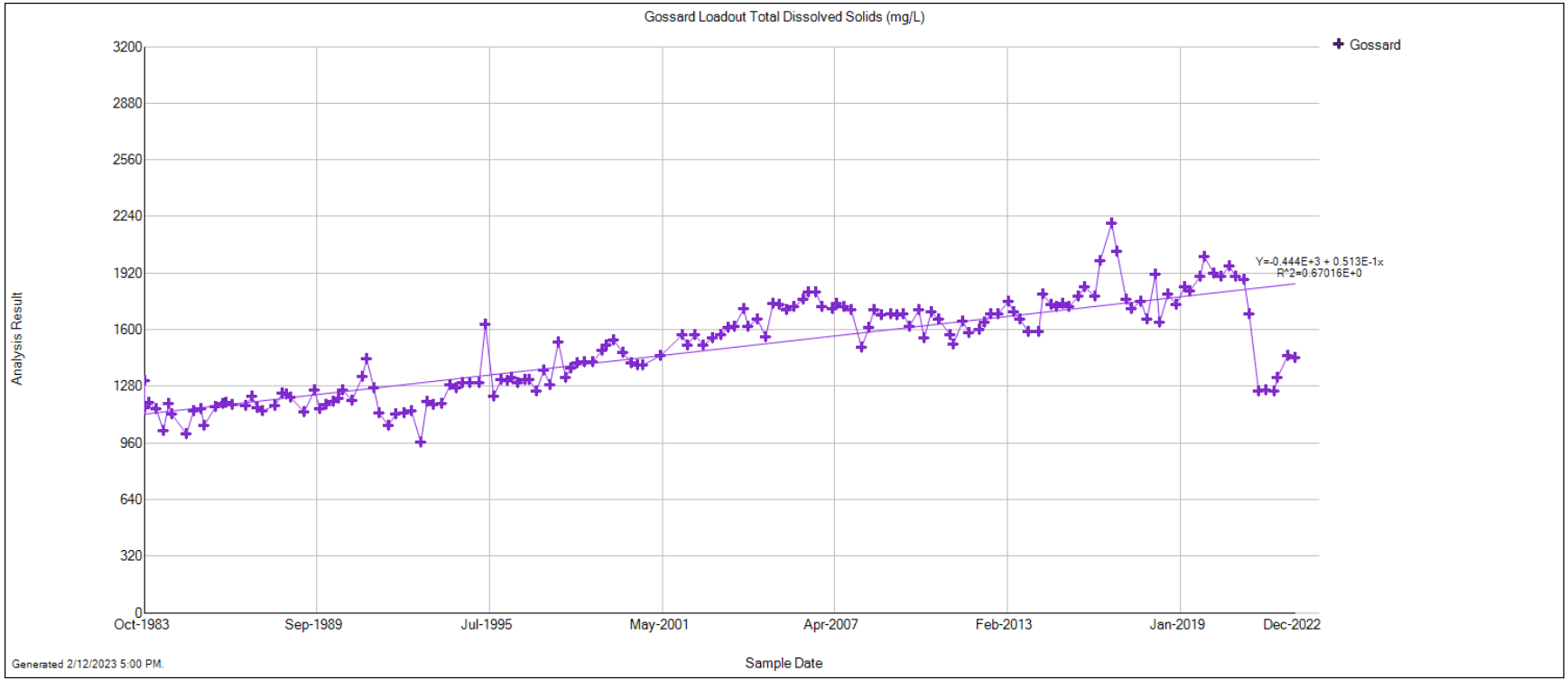

Gossard Loadout Iron, dissolved (mg/L)
Gossard
39
35.03231
31.06462
27.09693
23.12924
19.16155
15.19386
11.22617
7.25848
3.29079
-0.67689
Analysis Result
Oct-1983
Sep-1989
Jul-1995
Jun-2001
Apr-2007
Mar-2013
Jan-2019
Dec-2022
Sample Date
Y=0.805E+1 -0.194E-3x
R^2=0.79502E-1
Generated 2/12/2023 5:00 PM.

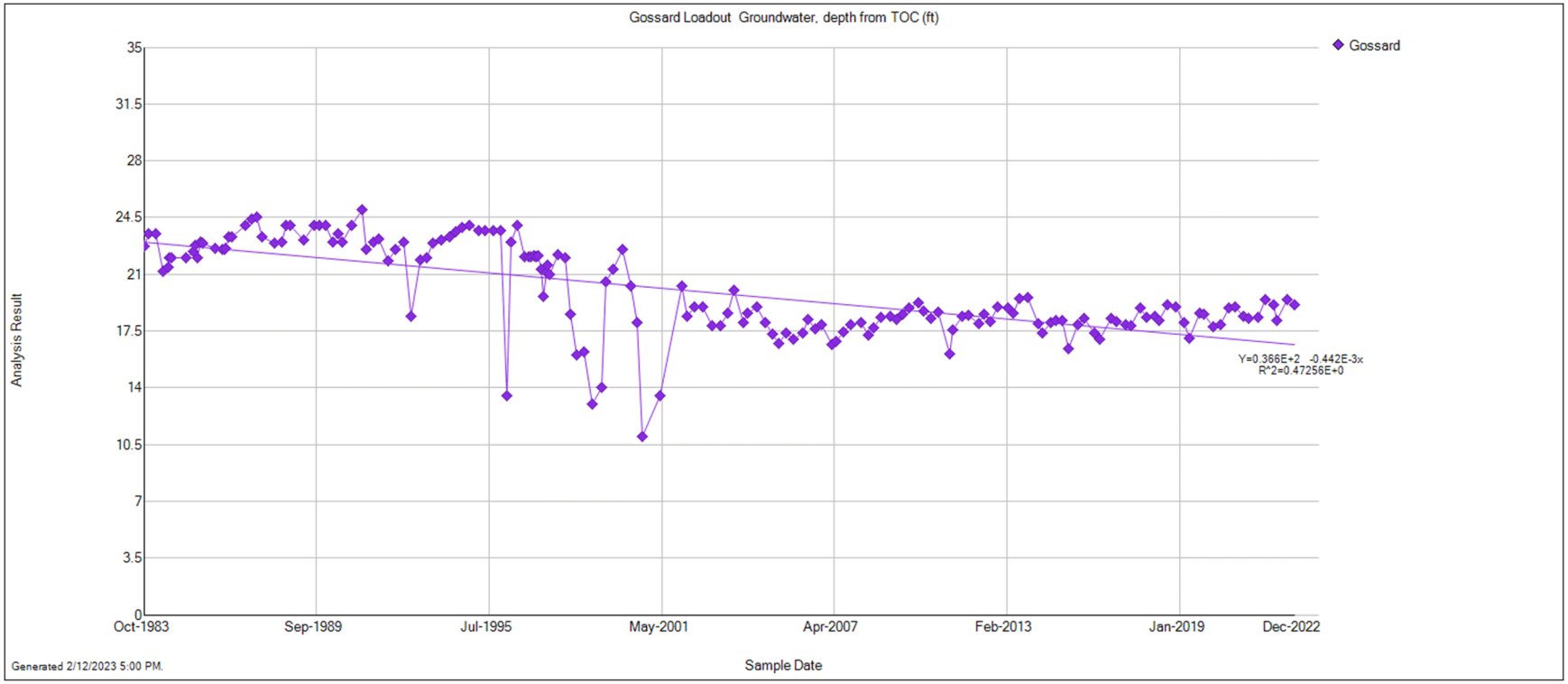

Gossard Loadout Magnesium, dissolved (mg/L)
Gossard
Y=-0.811E+1 + 0.387E-2x
R^2=0.38000E+0
Analysis Result
310
279
248
217
186
155
124
93
62
31
0
Oct-1983
Sep-1989
Jul-1995
Jun-2001
Apr-2007
Mar-2013
Jan-2019
Dec-2022
Sample Date
Generated 2/12/2023 5:00 PM.

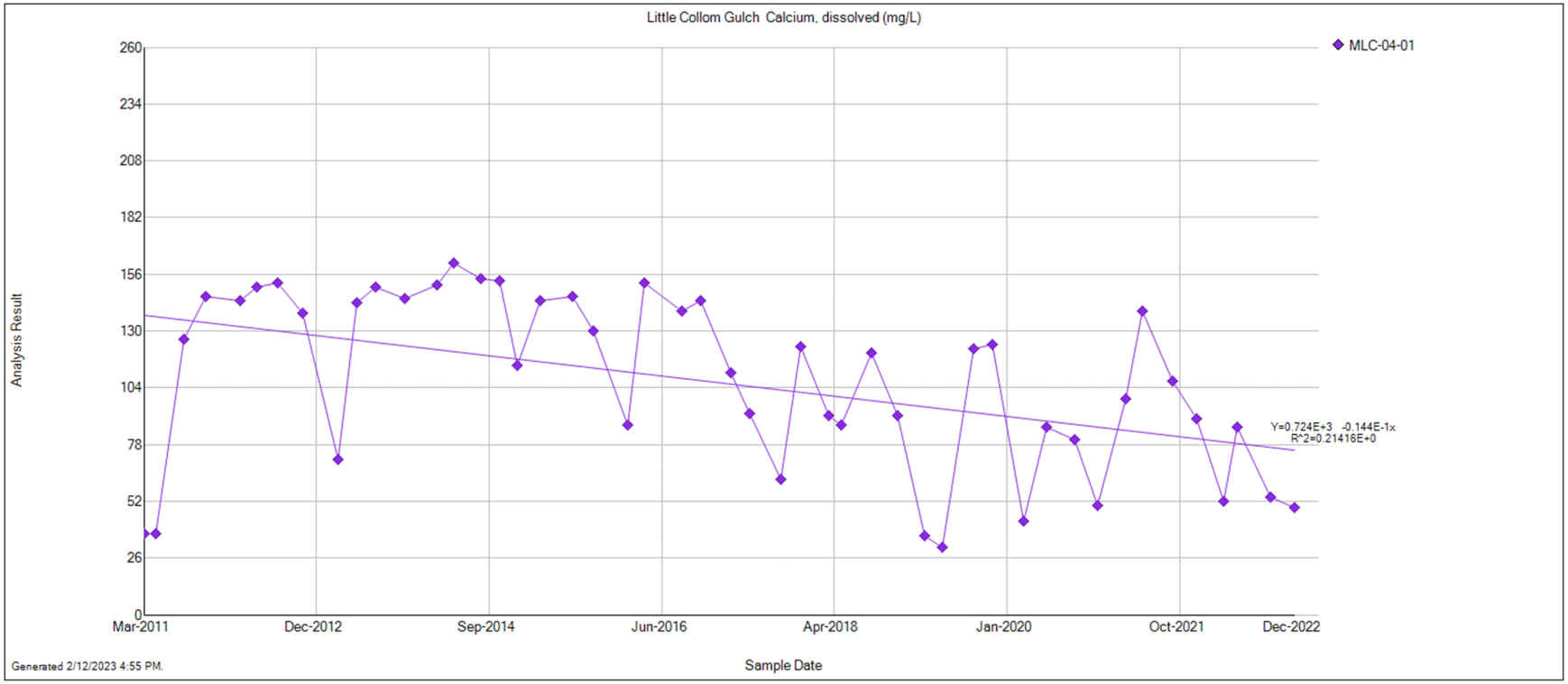

Gossard Loadout pH (lab)
Gossard
Y=0.698E+1 + 0.272E-4x
R^2=0.16086E+0
Analysis Result
8.7
8.4
8.1
7.8
7.5
7.2
6.9
6.6
6.3
6
Oct-1983
Sep-1989
Jul-1995
May-2001
Apr-2007
Feb-2013
Jan-2019
Dec-2022
Generated 2/12/2023 5:00 PM.
Sample Date

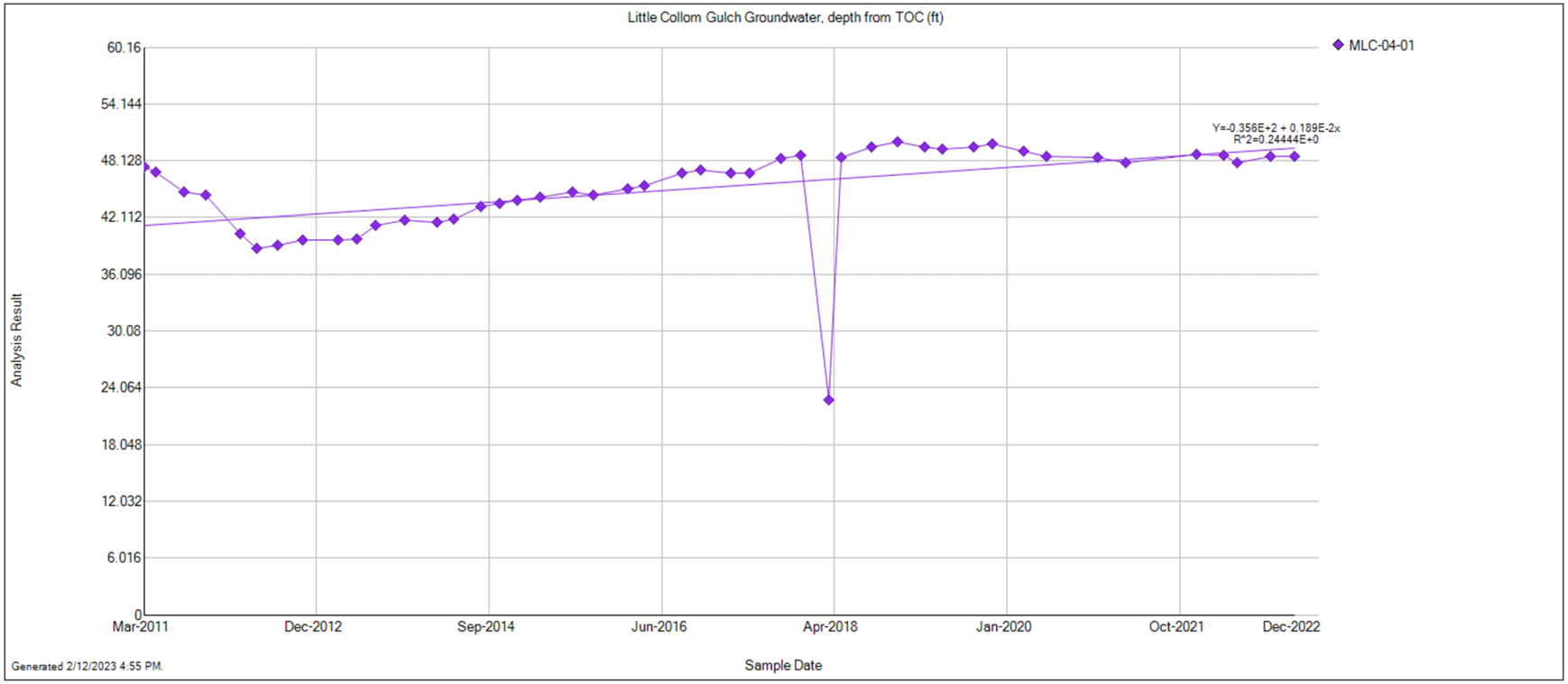

Gossard Loadout Sodium, dissolved (mg/L)
Gossard
Y=0.657E+2 + 0.276E-2x
R^2=0.20824E+0
Analysis Result
340
306
272
238
204
170
136
102
68
34
0
Oct-1983
Sep-1989
Jul-1995
Jun-2001
Apr-2007
Mar-2013
Jan-2019
Dec-2022
Generated 2/12/2023 5:00 PM.
Sample Date

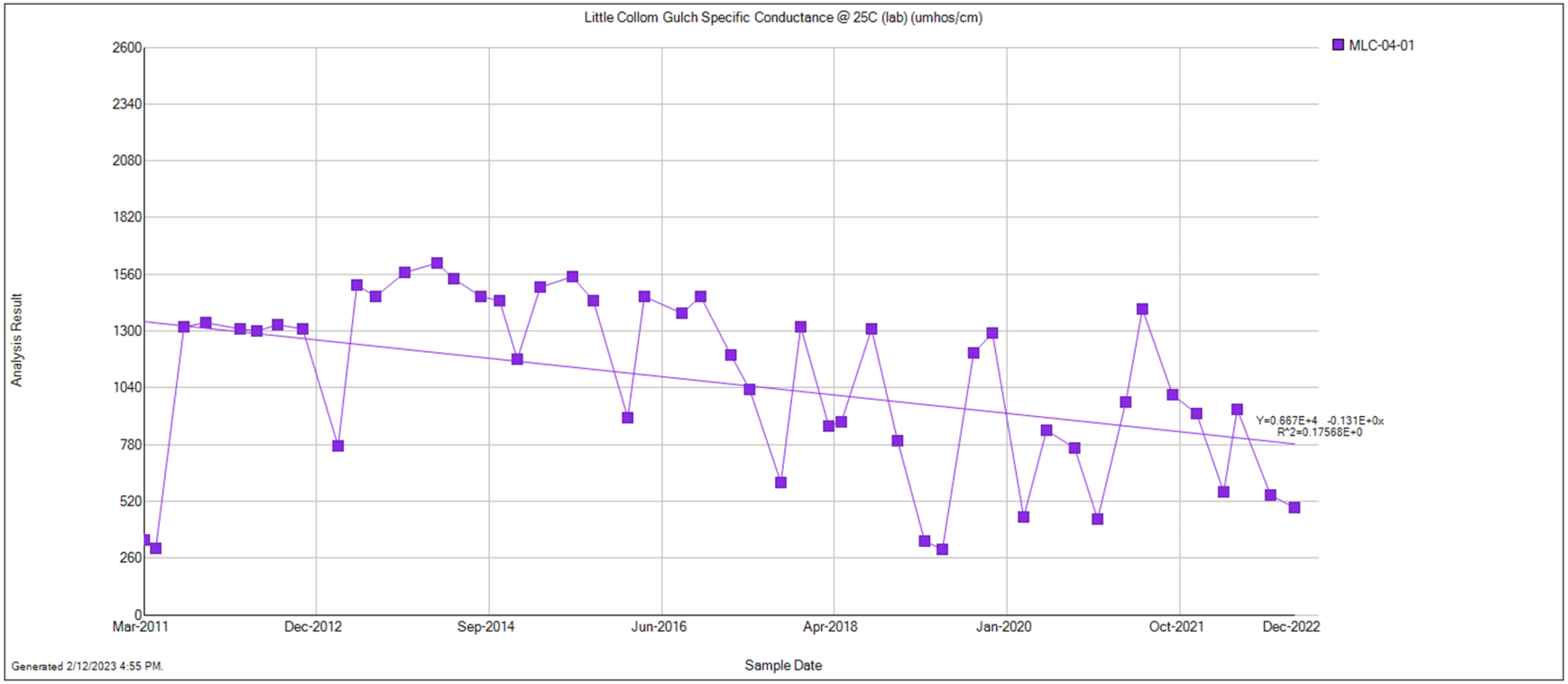

Gossard Loadout Sulfate, dissolved (mg/L)
Gossard
Analysis Result
2000
1800
1600
1400
1200
1000
800
600
400
200
0
Oct-1983
Sep-1989
Jul-1995
Jun-2001
Apr-2007
Mar-2013
Jan-2019
Dec-2022
Y=-0.445E+3 + 0.272E-1x
R^2=0.41935E+0
Generated 2/12/2023 5:00 PM.
Sample Date

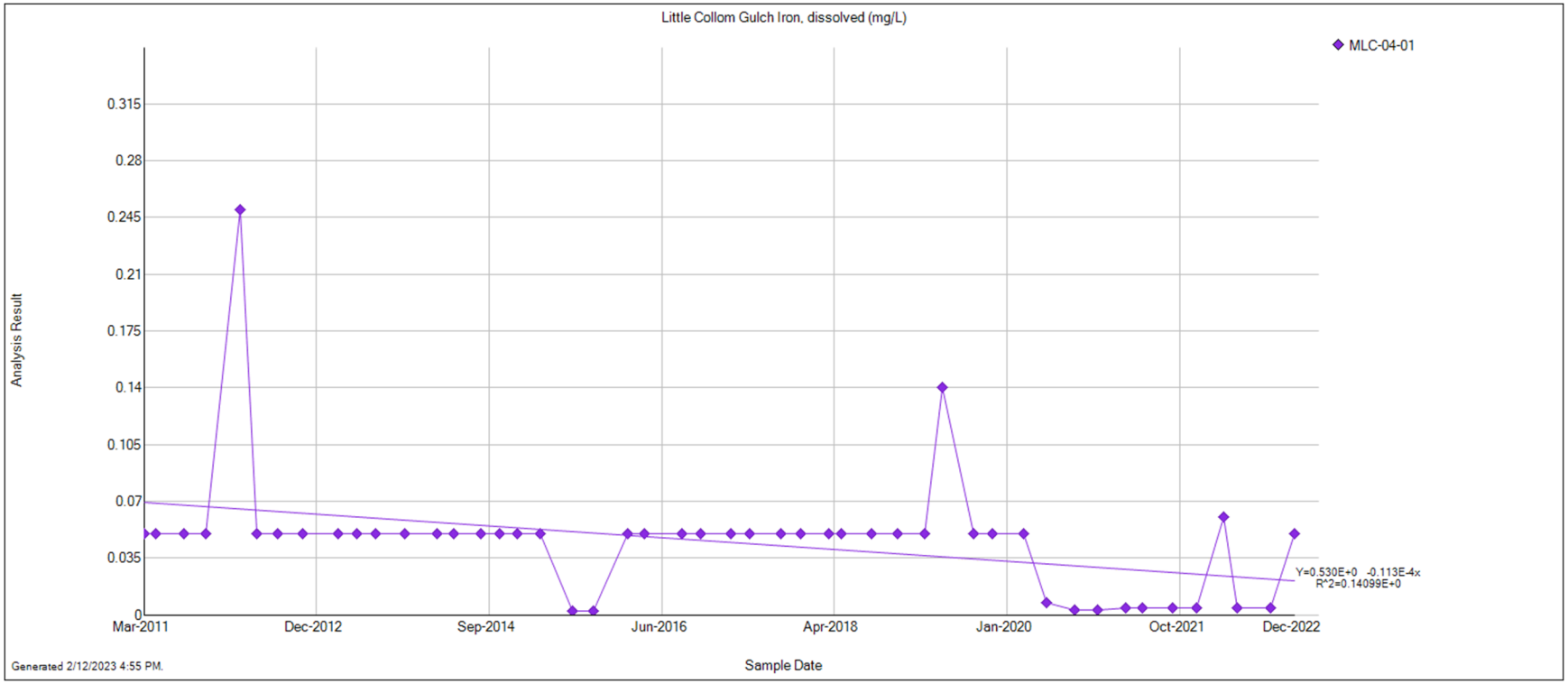

Gossard Loadout Total Dissolved Solids (mg/L)
Gossard
Y=-0.444E+3 + 0.513E-1x
R^2=0.67016E+0
Analysis Result
3200
2880
2560
2240
1920
1600
1280
960
640
320
0
Oct-1983
Sep-1989
Jul-1995
May-2001
Apr-2007
Feb-2013
Jan-2019
Dec-2022
Generated 2/12/2023 5:00 PM.
Sample Date

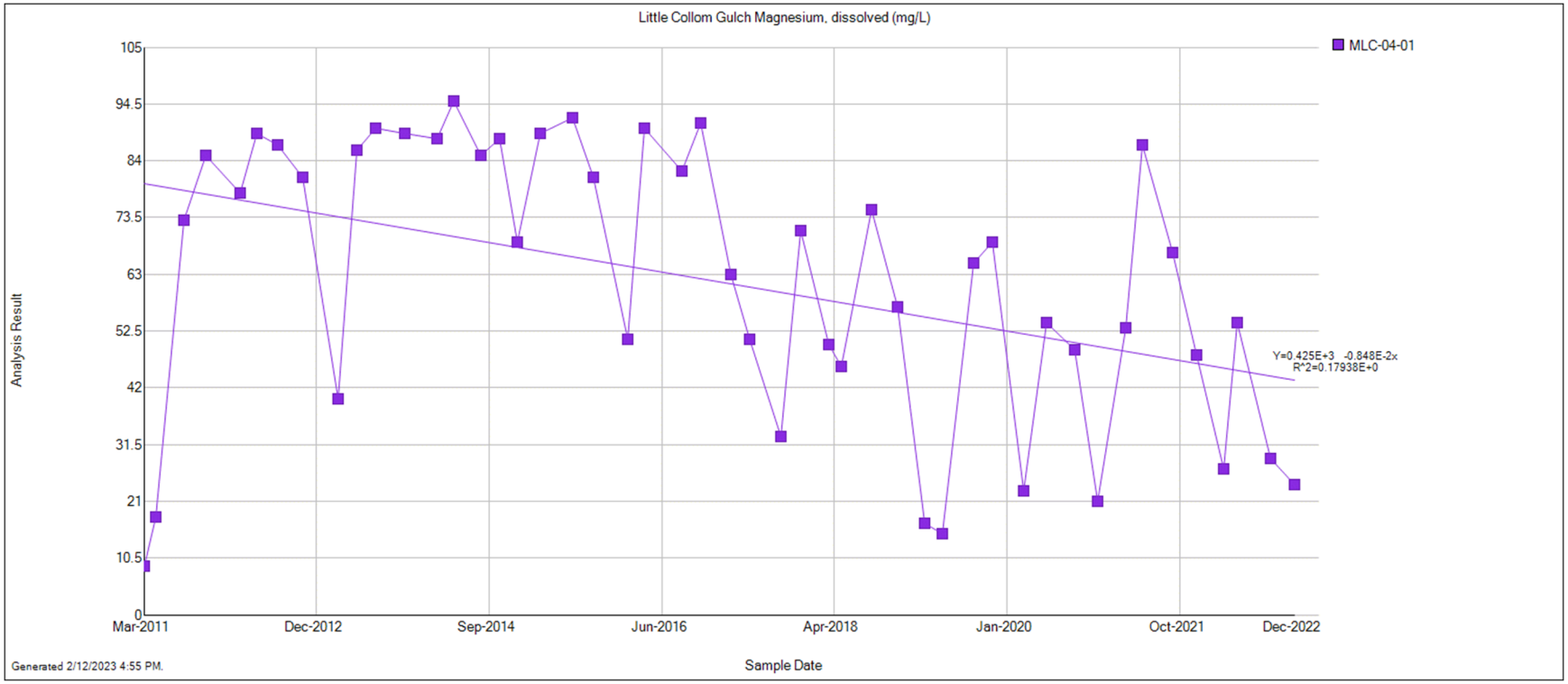

Gossard Loadout Groundwater, depth from TOC (ft)
Gossard
35
31.5
28
24.5
21
17.5
14
10.5
7
3.5
0
Analysis Result
Oct-1983
Sep-1989
Jul-1995
May-2001
Apr-2007
Feb-2013
Jan-2019
Dec-2022
Sample Date
Y=0.366E+2 -0.442E-3x
R^2=0.47256E+0
Generated 2/12/2023 5:00 PM.

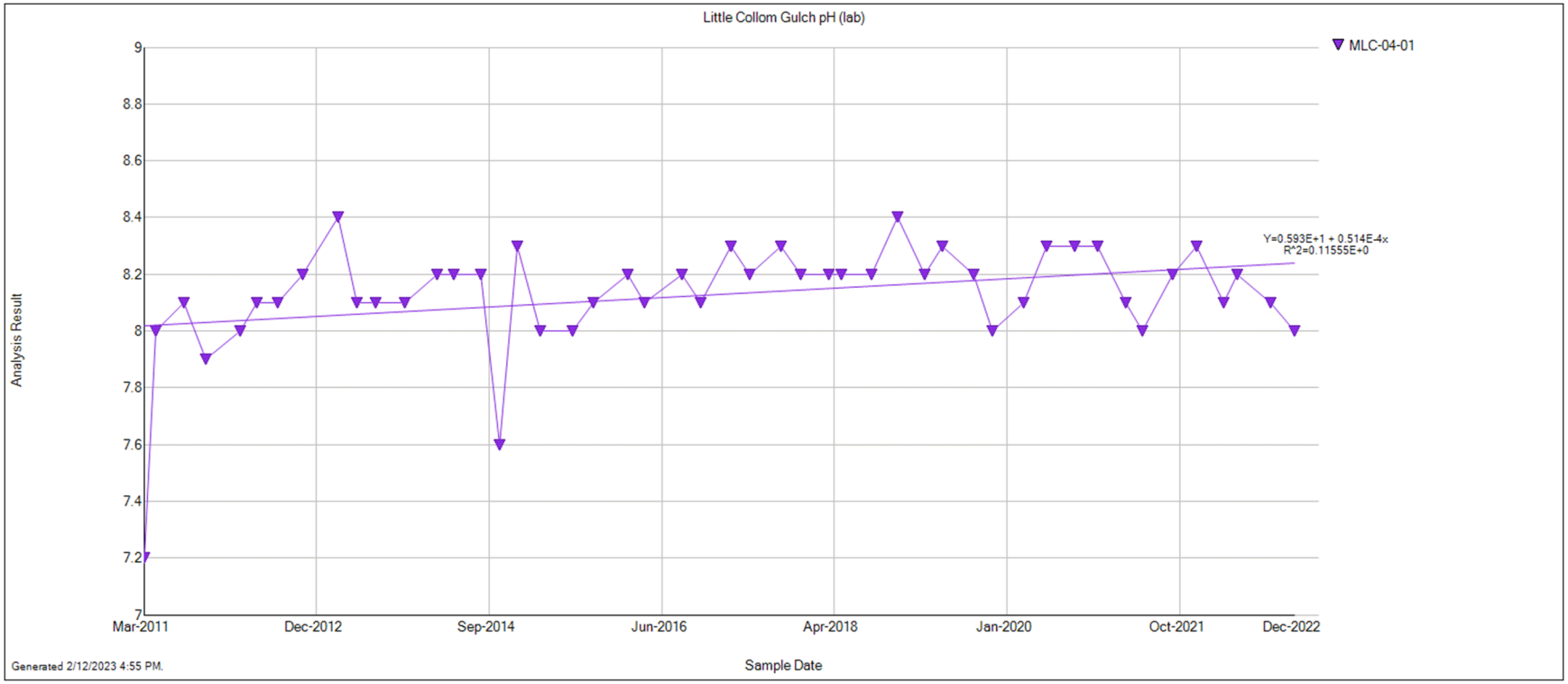

Little Collom Gulch Calcium, dissolved (mg/L)
MLC-04-01
Analysis Result
260
234
208
182
156
130
104
78
52
26
0
Mar-2011
Dec-2012
Sep-2014
Jun-2016
Apr-2018
Jan-2020
Oct-2021
Dec-2022
Y=0.724E+3 -0.144E-1x
R^2=0.21416E+0
Generated 2/12/2023 4:55 PM.
Sample Date

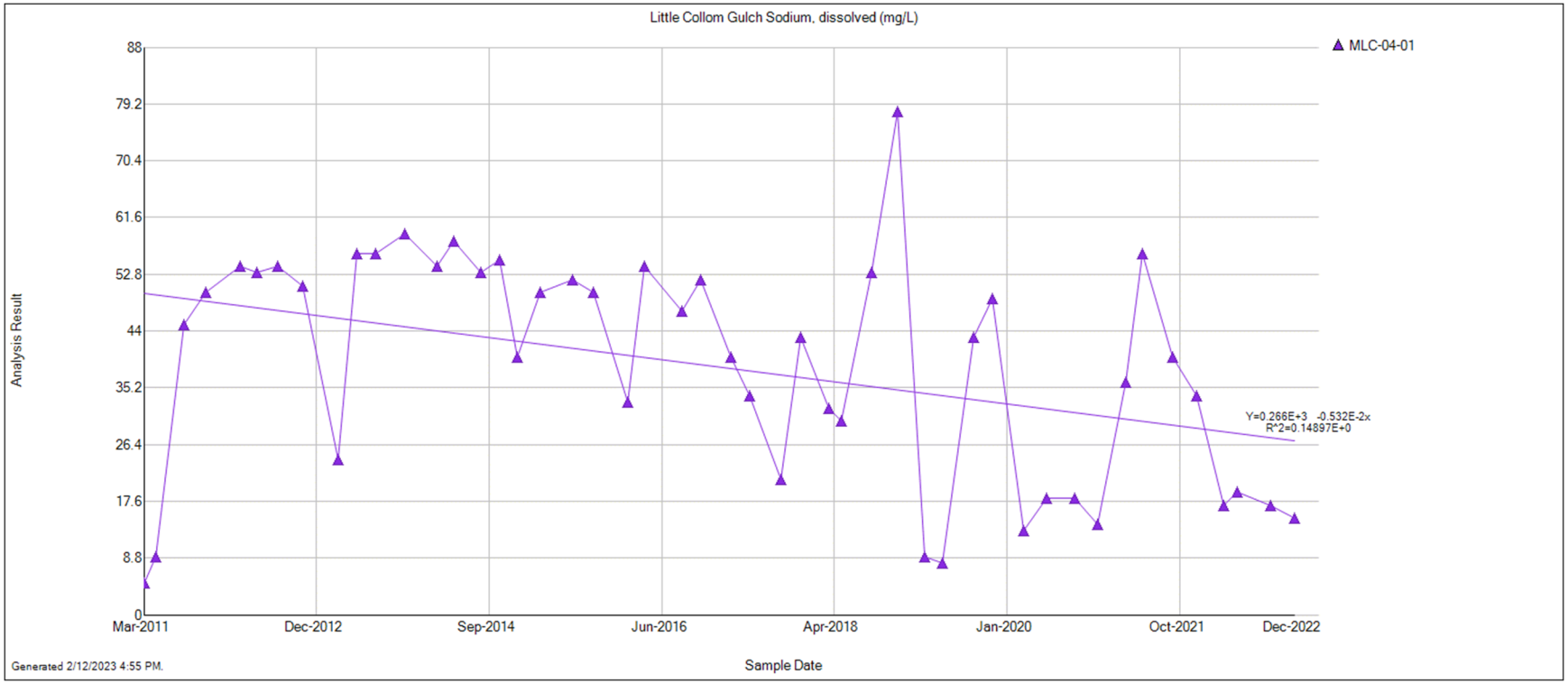

Little Collom Gulch Groundwater, depth from TOC (ft)
MLC-04-01
Y=-0.356E+2 + 0.189E-2x
R^2=0.24444E+0
Analysis Result
60.16
54.144
48.128
42.112
36.096
30.08
24.064
18.048
12.032
6.016
0
Mar-2011
Dec-2012
Sep-2014
Jun-2016
Apr-2018
Jan-2020
Oct-2021
Dec-2022
Generated 2/12/2023 4:55 PM.
Sample Date

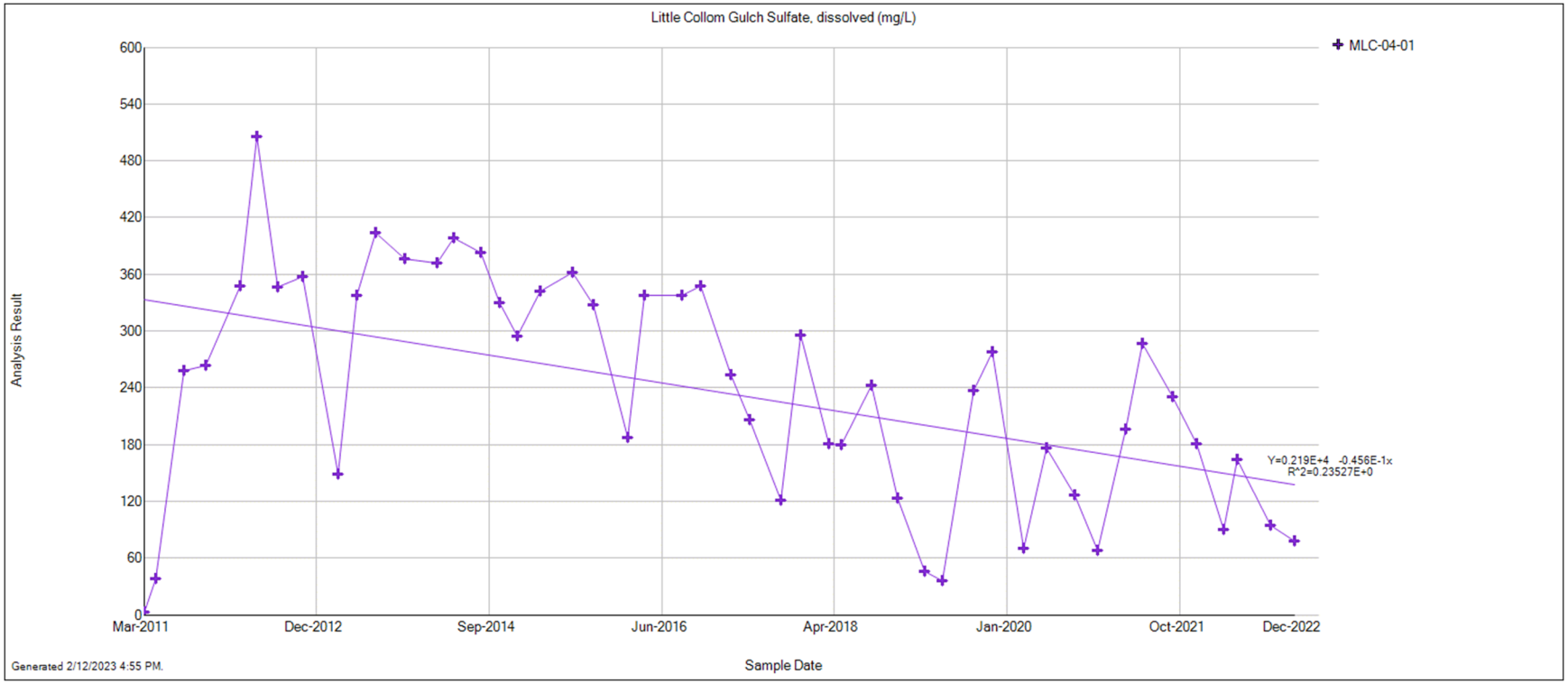

Little Collom Gulch Specific Conductance @ 25C (lab) (umhos/cm)
MLC-04-01
Analysis Result
2600
2340
2080
1820
1560
1300
1040
780
520
260
0
Mar-2011
Dec-2012
Sep-2014
Jun-2016
Apr-2018
Jan-2020
Oct-2021
Dec-2022
Y=0.667E+4 -0.131E+0x
R^2=0.17568E+0
Generated 2/12/2023 4:55 PM.
Sample Date

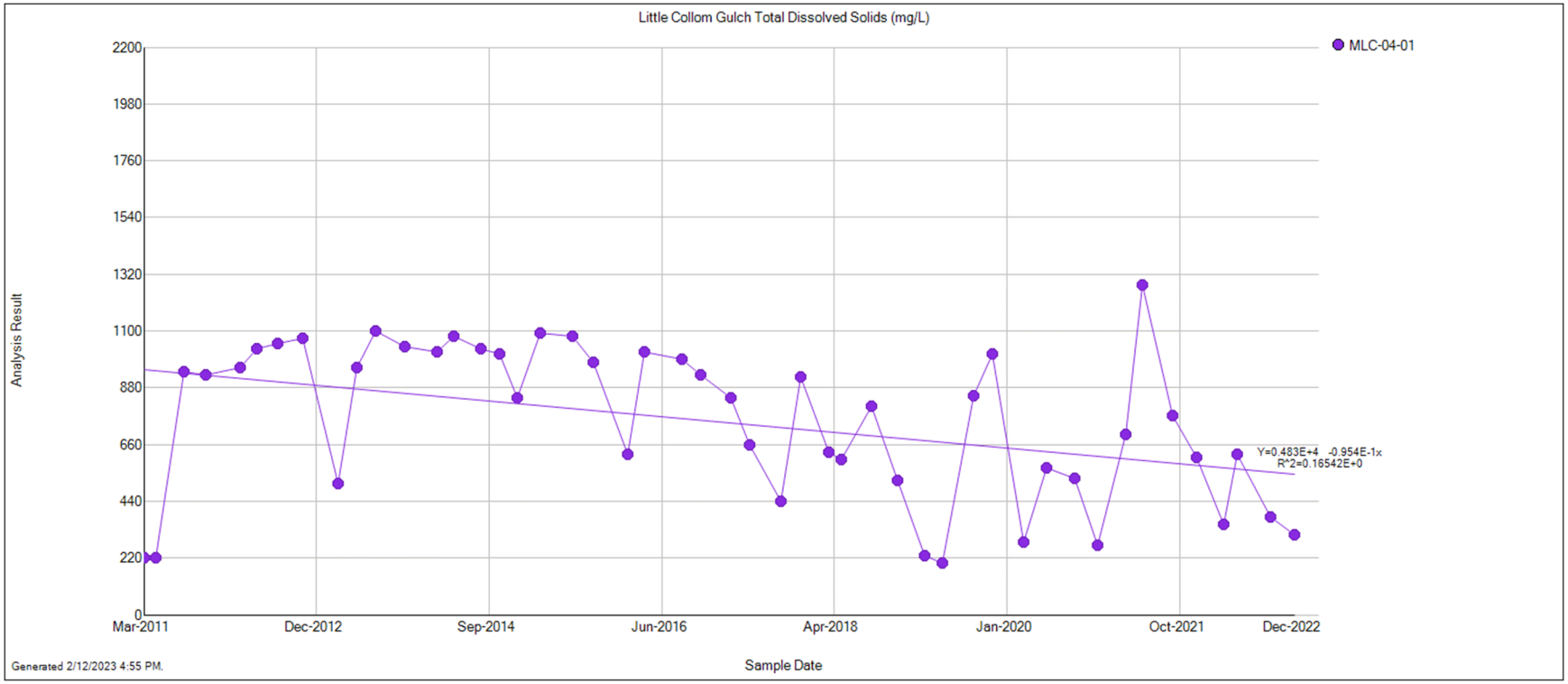

Little Collom Gulch Iron, dissolved (mg/L)
MLC-04-01
Analysis Result
0.315
0.28
0.245
0.21
0.175
0.14
0.105
0.07
0.035
0
Mar-2011
Dec-2012
Sep-2014
Jun-2016
Apr-2018
Jan-2020
Oct-2021
Dec-2022
Y=0.530E+0 -0.113E-4x
R^2=0.14099E+0
Generated 2/12/2023 4:55 PM.
Sample Date

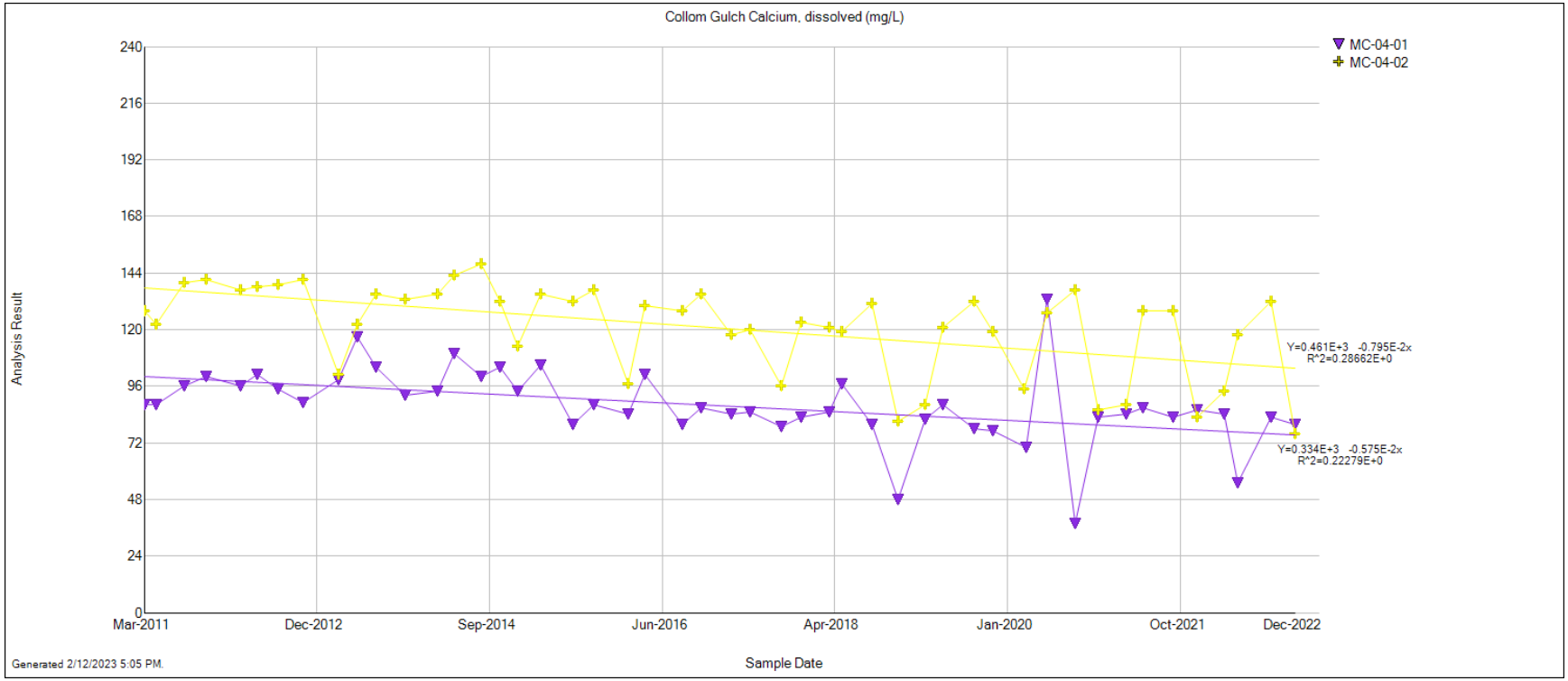

Little Collom Gulch Magnesium, dissolved (mg/L)
MLC-04-01
Analysis Result
105
94.5
84
73.5
63
52.5
42
31.5
21
10.5
0
Mar-2011
Dec-2012
Sep-2014
Jun-2016
Apr-2018
Jan-2020
Oct-2021
Dec-2022
Y=0.425E+3 -0.848E-2x
R^2=0.17938E+0
Generated 2/12/2023 4:55 PM.
Sample Date

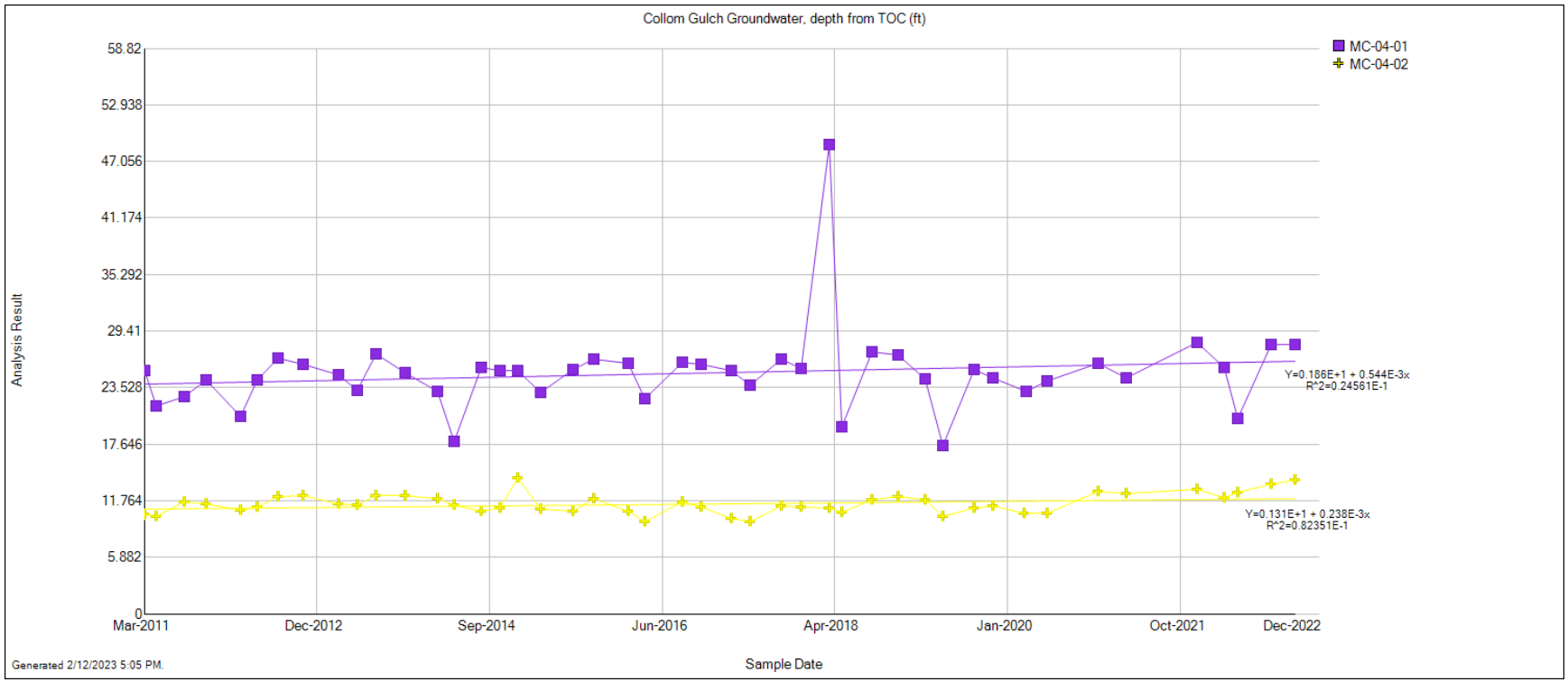

Little Collom Gulch pH (lab)
MLC-04-01
Y=0.593E+1 + 0.514E-4x
R^2=0.11555E+0
Analysis Result
9
8.8
8.6
8.4
8.2
8
7.8
7.6
7.4
7.2
7
Mar-2011
Dec-2012
Sep-2014
Jun-2016
Apr-2018
Jan-2020
Oct-2021
Dec-2022
Sample Date
Generated 2/12/2023 4:55 PM.

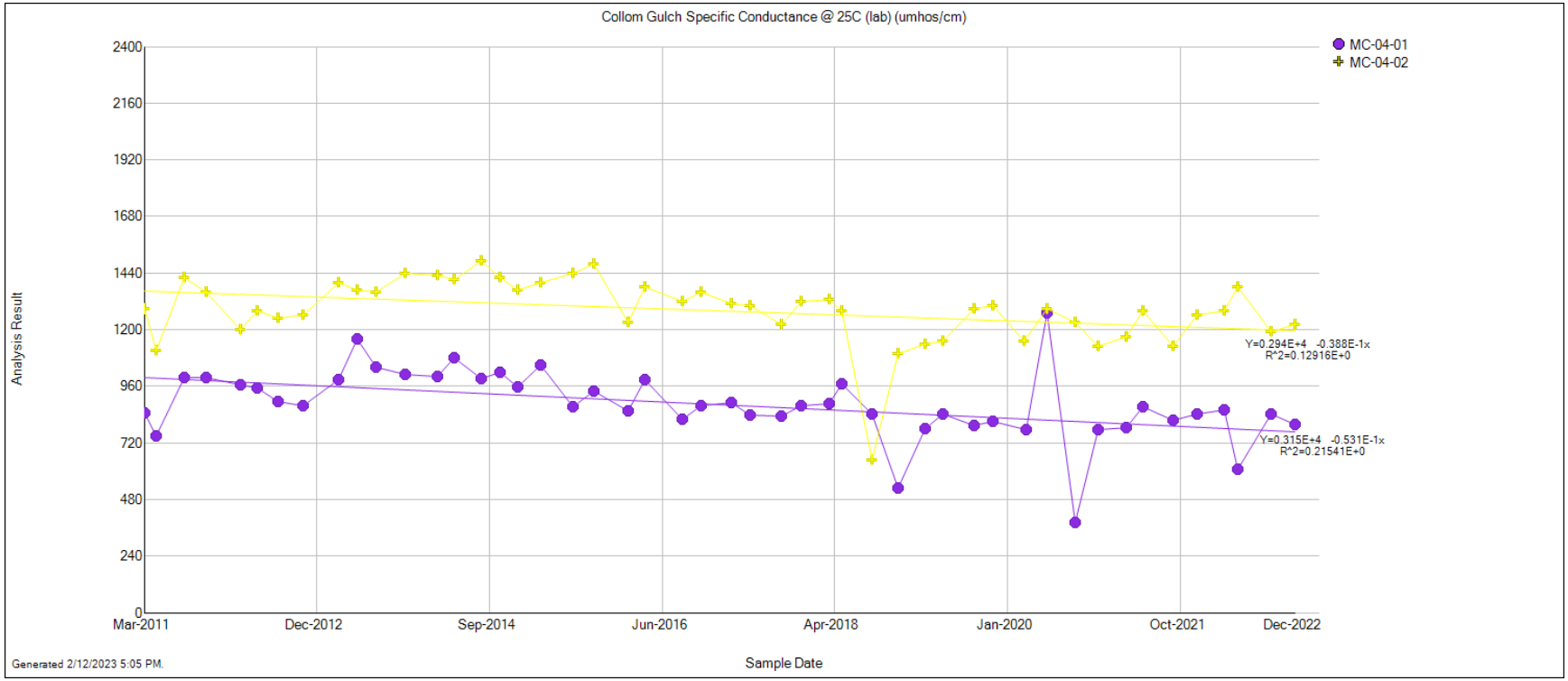

Little Collom Gulch Sodium, dissolved (mg/L)
MLC-04-01
Analysis Result
88
79.2
70.4
61.6
52.8
44
35.2
26.4
17.6
8.8
0
Mar-2011
Dec-2012
Sep-2014
Jun-2016
Apr-2018
Jan-2020
Oct-2021
Dec-2022
Y=0.266E+3 -0.532E-2x
R^2=0.14897E+0
Generated 2/12/2023 4:55 PM.
Sample Date

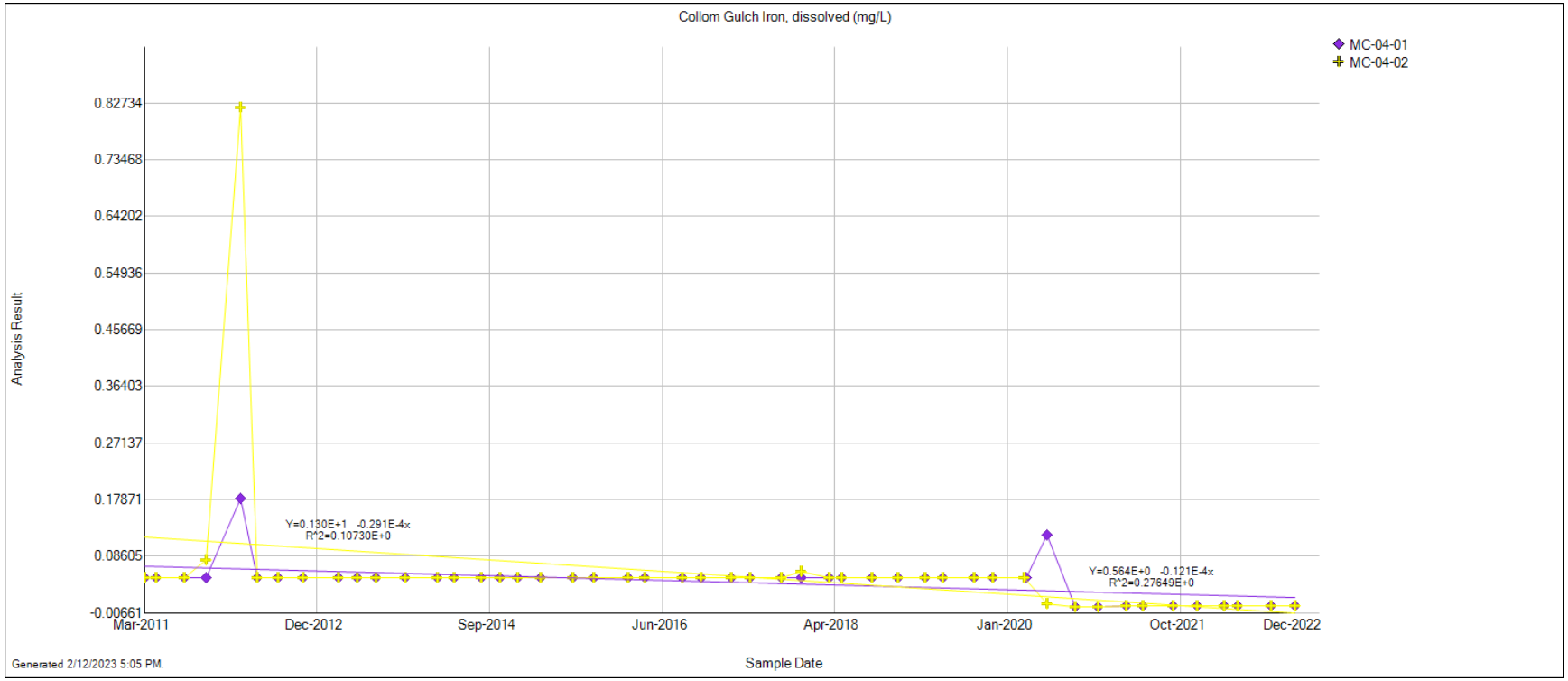

Little Collom Gulch Sulfate, dissolved (mg/L)
MLC-04-01
Analysis Result
600
540
480
420
360
300
240
180
120
60
0
Mar-2011
Dec-2012
Sep-2014
Jun-2016
Apr-2018
Jan-2020
Oct-2021
Dec-2022
Y=0.219E+4 -0.456E-1x
R^2=0.23527E+0
Generated 2/12/2023 4:55 PM.
Sample Date

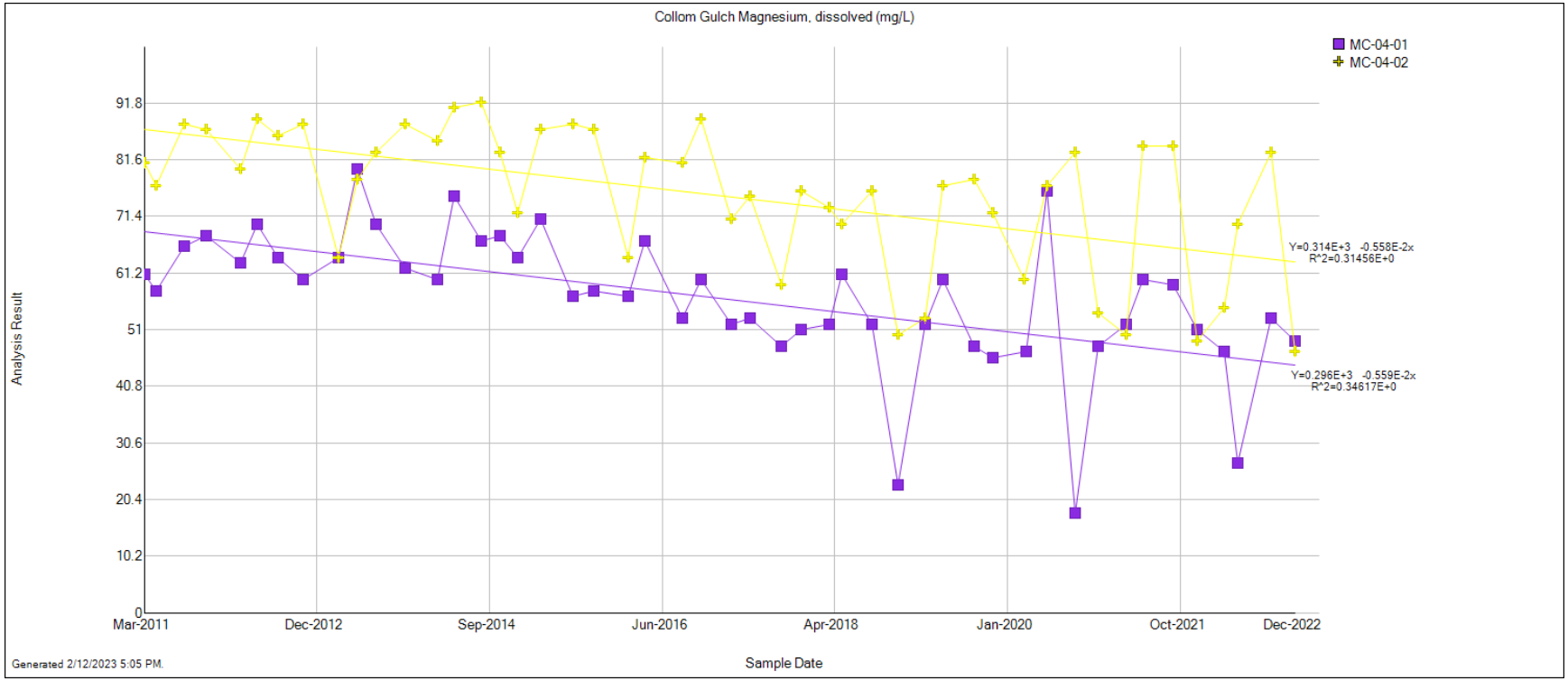

Little Collom Gulch Total Dissolved Solids (mg/L)
MLC-04-01
Analysis Result
2200
1980
1760
1540
1320
1100
880
660
440
220
0
Mar-2011
Dec-2012
Sep-2014
Jun-2016
Apr-2018
Jan-2020
Oct-2021
Dec-2022
Y=0.483E+4 -0.954E-1x
R^2=0.16542E+0
Generated 2/12/2023 4:55 PM.
Sample Date

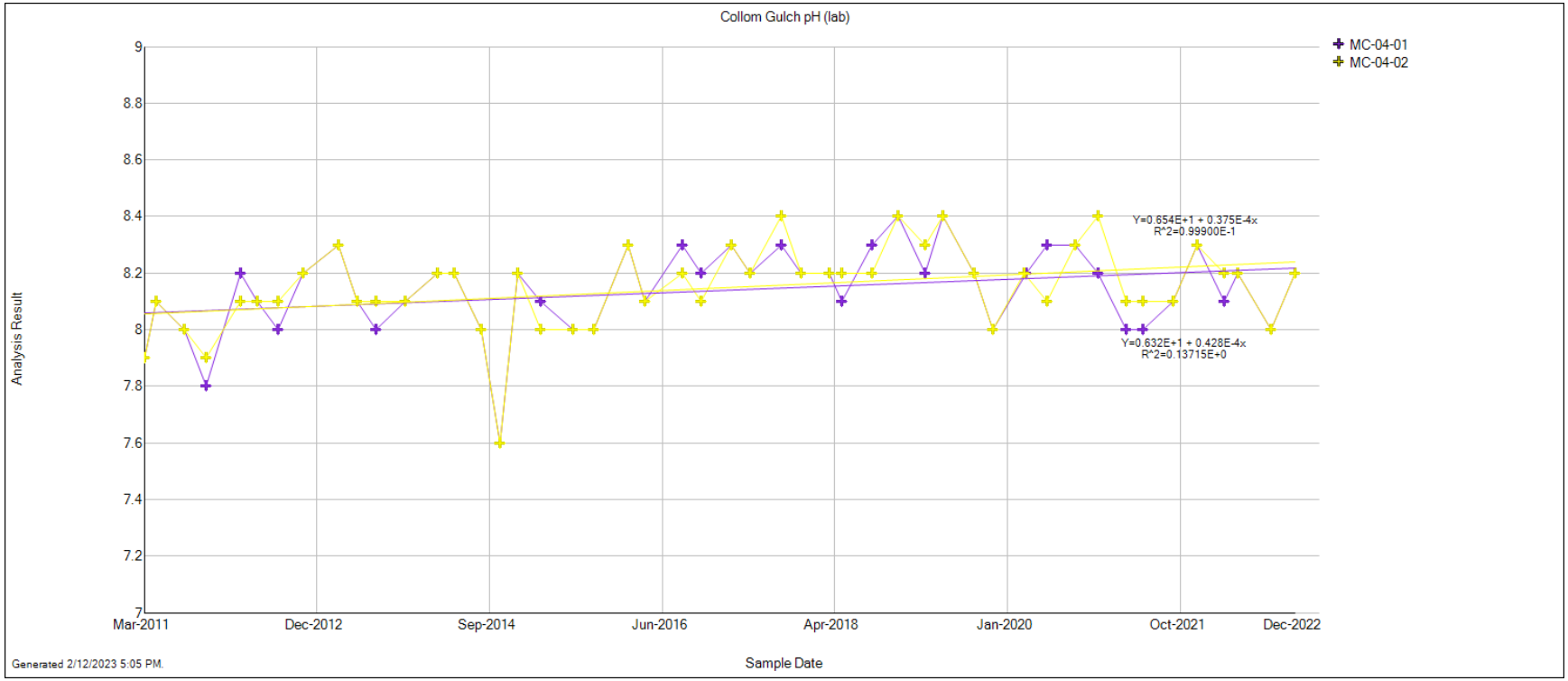

Collom Gulch Calcium, dissolved (mg/L)
MC-04-01
MC-04-02
Y=0.461E+3 -0.795E-2x
R^2=0.28662E+0
Y=0.334E+3 -0.575E-2x
R^2=0.22279E+0
Analysis Result
240
216
192
168
144
120
96
72
48
24
0
Mar-2011
Dec-2012
Sep-2014
Jun-2016
Apr-2018
Jan-2020
Oct-2021
Dec-2022
Generated 2/12/2023 5:05 PM.
Sample Date

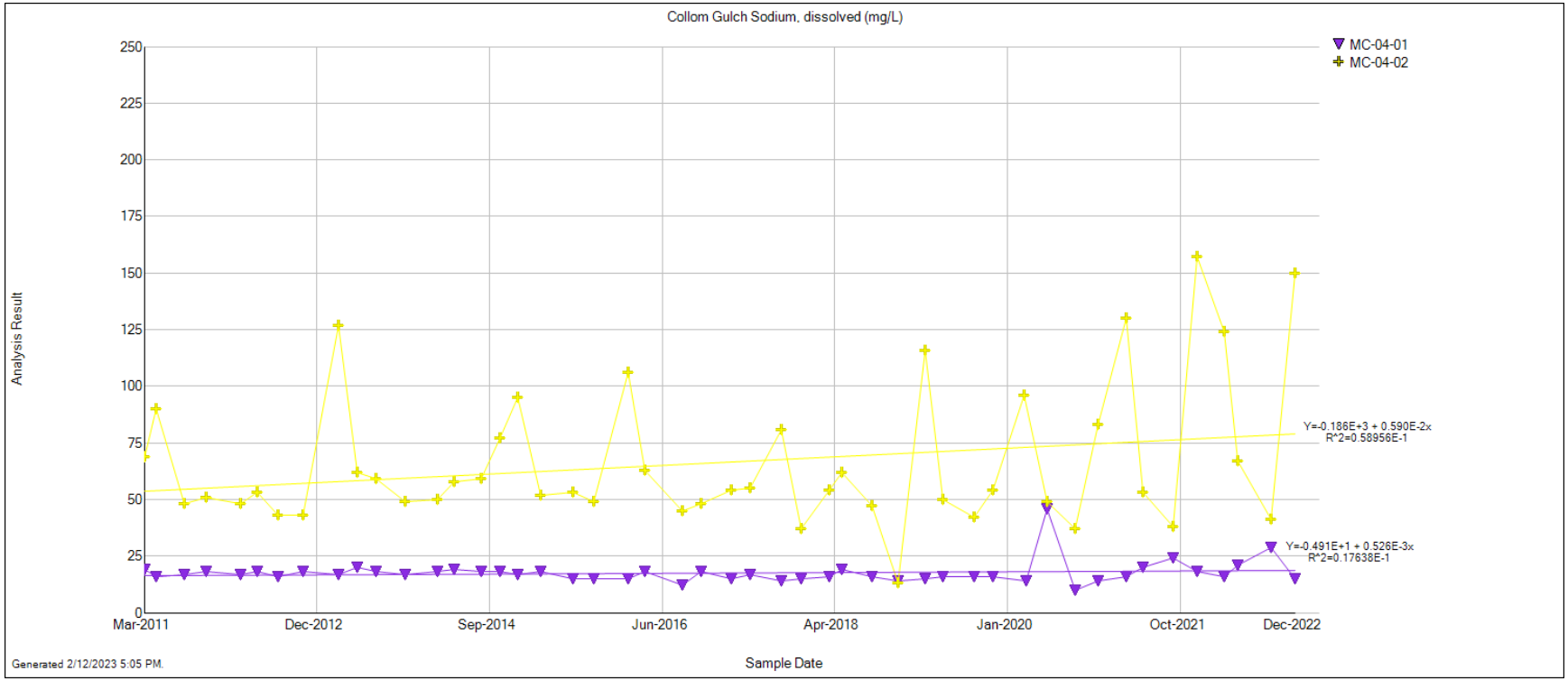

Collom Gulch Groundwater, depth from TOC (ft)
MC-04-01
MC-04-02
Analysis Result
58.82
52.938
47.056
41.174
35.292
29.41
23.528
17.646
11.764
5.882
0
Mar-2011
Dec-2012
Sep-2014
Jun-2016
Apr-2018
Jan-2020
Oct-2021
Dec-2022
Y=0.186E+1 + 0.544E-3x
R^2=0.24561E-1
Y=0.131E+1 + 0.238E-3x
R^2=0.82351E-1
Generated 2/12/2023 5:05 PM.
Sample Date

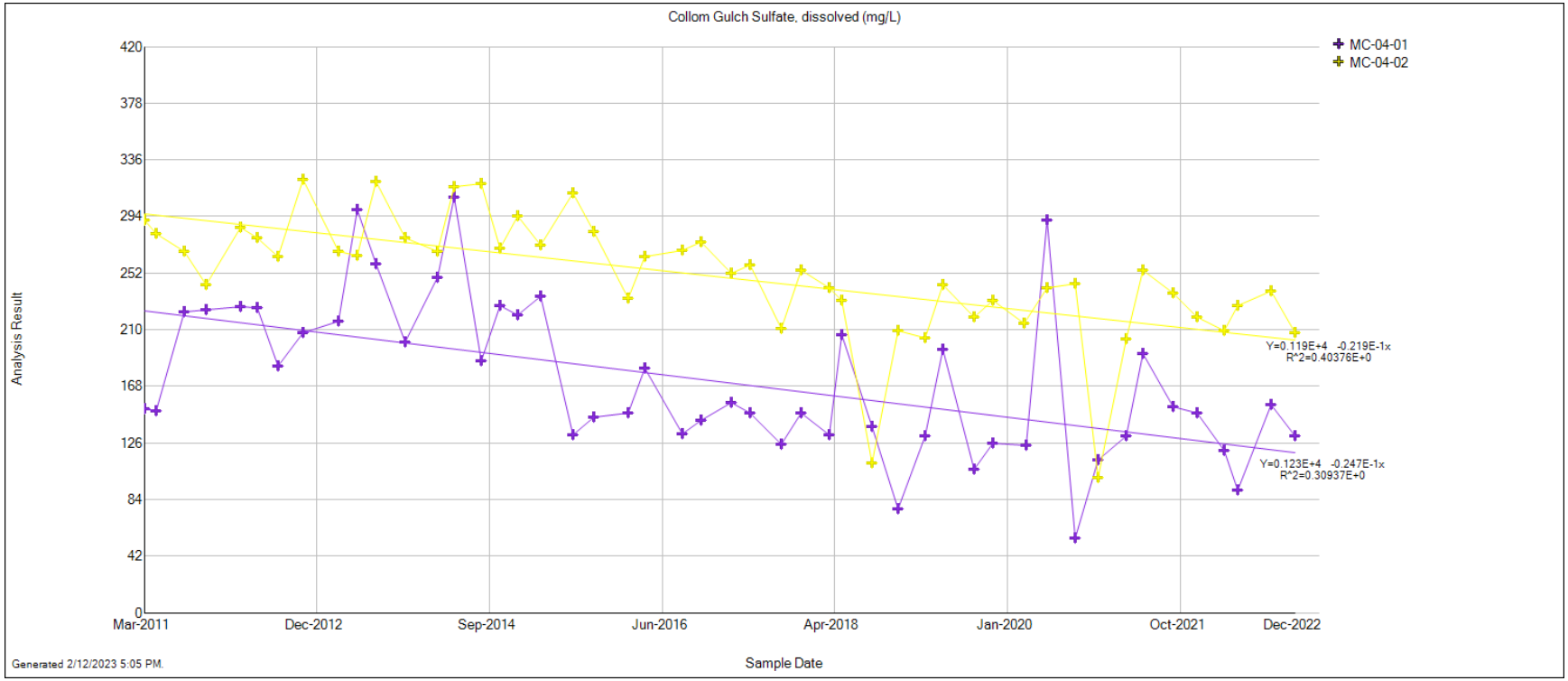

Collom Gulch Specific Conductance @ 25C (lab) (umhos/cm)
MC-04-01
MC-04-02
Analysis Result
2400
2160
1920
1680
1440
1200
960
720
480
240
0
Mar-2011
Dec-2012
Sep-2014
Jun-2016
Apr-2018
Jan-2020
Oct-2021
Dec-2022
Y=0.294E+4 -0.388E-1x
R^2=0.12916E+0
Y=0.315E+4 -0.531E-1x
R^2=0.21541E+0
Generated 2/12/2023 5:05 PM.
Sample Date

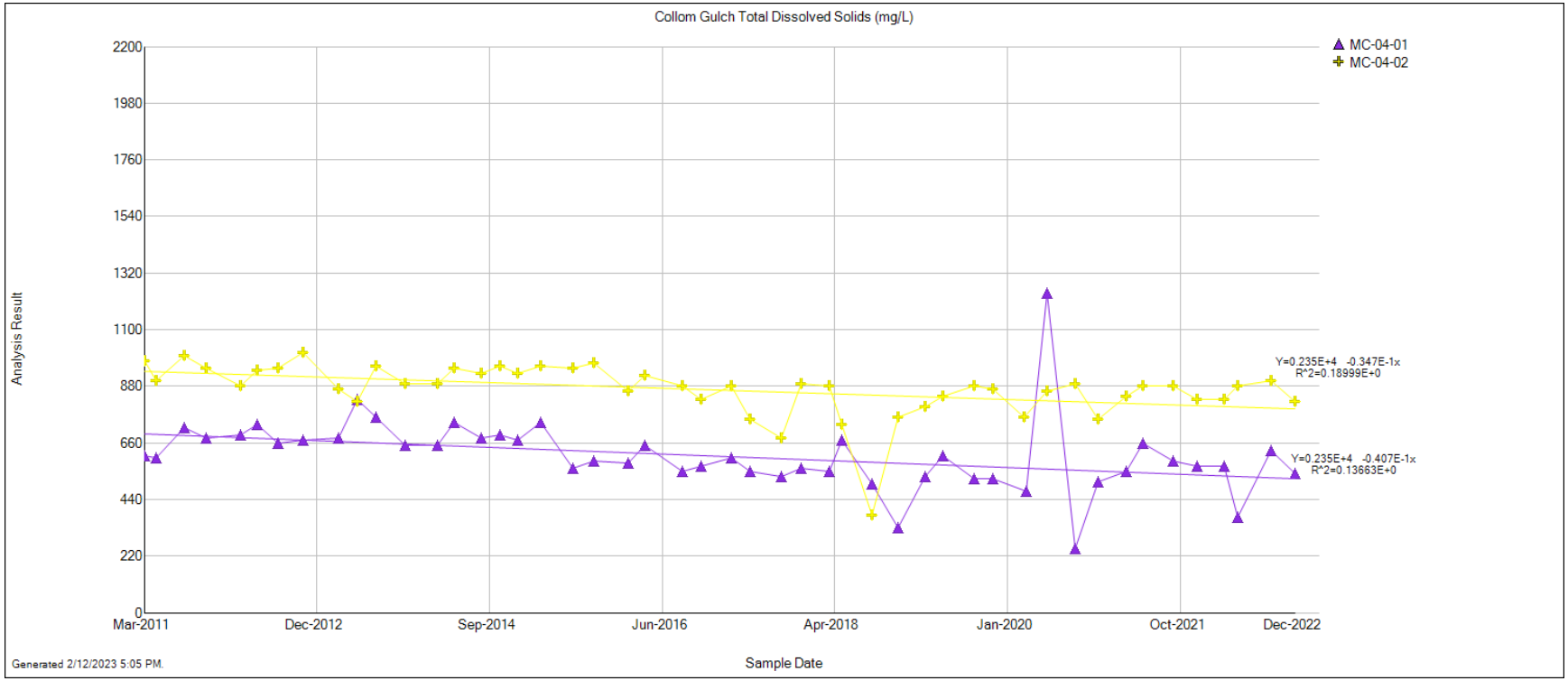

Collom Gulch Iron, dissolved (mg/L)
MC-04-01
MC-04-02
Analysis Result
0.82734
0.73468
0.64202
0.54936
0.45669
0.36403
0.27137
0.17871
0.08605
-0.00661
Y=0.130E+1 -0.291E-4x
R^2=0.10730E+0
Y=0.564E+0 -0.121E-4x
R^2=0.27649E+0
Mar-2011
Dec-2012
Sep-2014
Jun-2016
Apr-2018
Jan-2020
Oct-2021
Dec-2022
Generated 2/12/2023 5:05 PM.
Sample Date

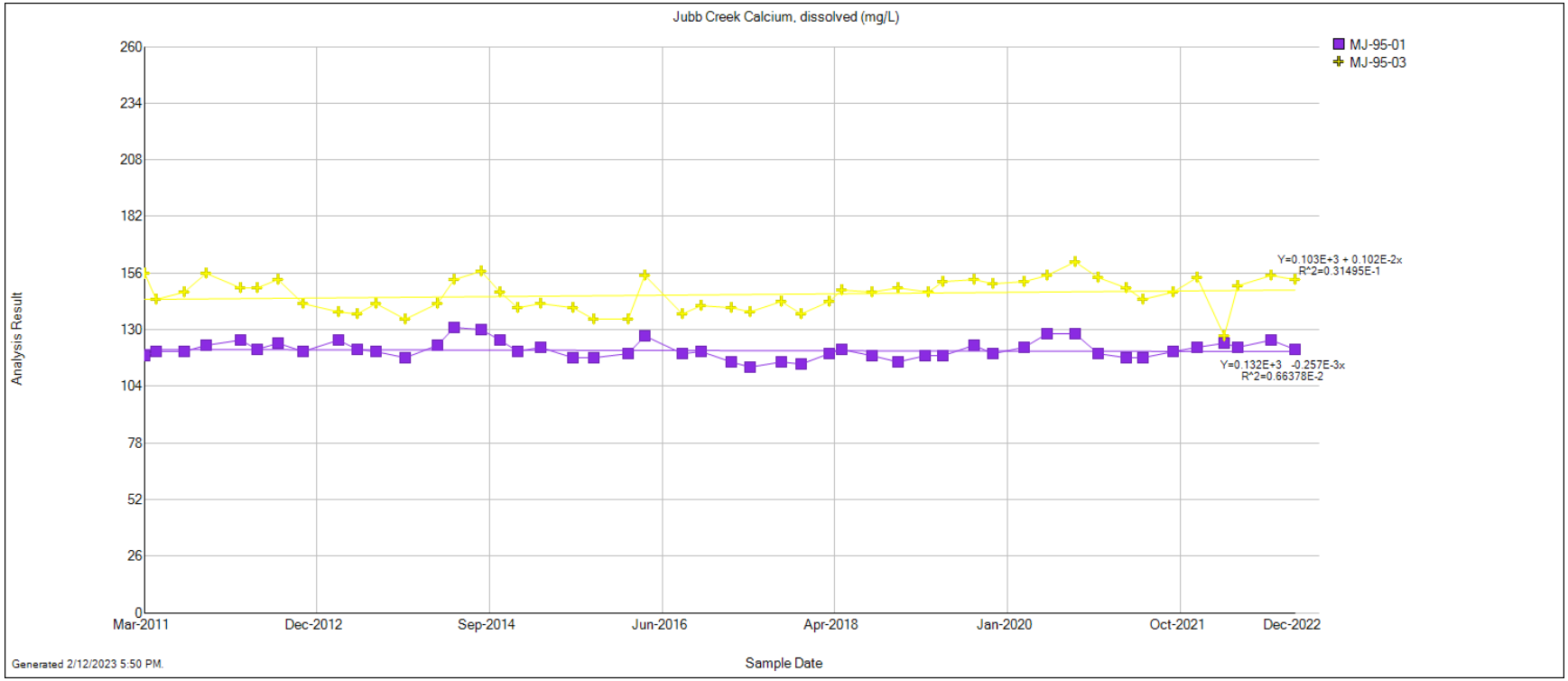

Collom Gulch Magnesium, dissolved (mg/L)
MC-04-01
MC-04-02
Y=0.314E+3 -0.558E-2x
R^2=0.31456E+0
Y=0.296E+3 -0.559E-2x
R^2=0.34617E+0
Analysis Result
91.8
81.6
71.4
61.2
51
40.8
30.6
20.4
10.2
0
Mar-2011
Dec-2012
Sep-2014
Jun-2016
Apr-2018
Jan-2020
Oct-2021
Dec-2022
Generated 2/12/2023 5:05 PM.
Sample Date

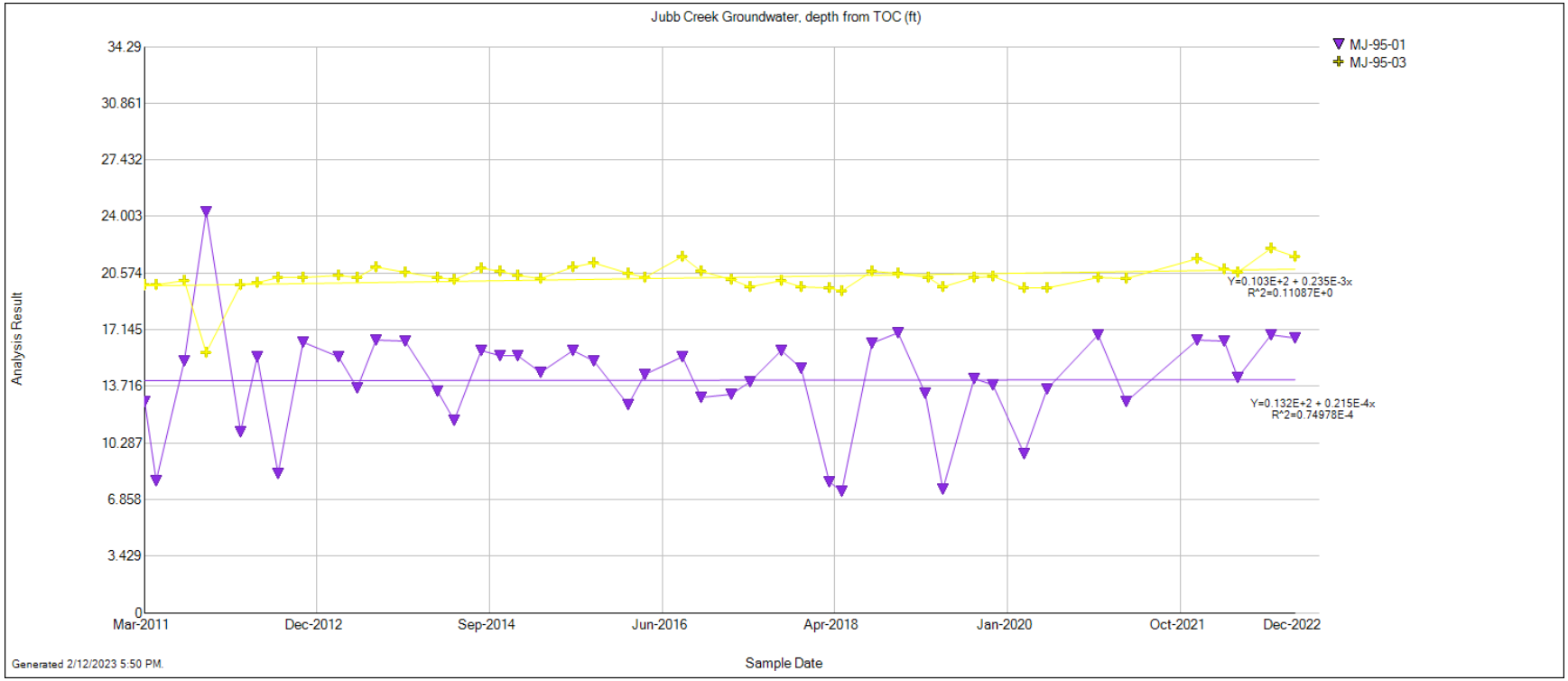

Collom Gulch pH (lab)
MC-04-01
MC-04-02
Y=0.654E+1 + 0.375E-4x
R^2=0.99900E-1
Y=0.632E+1 + 0.428E-4x
R^2=0.13715E+0
Analysis Result
9
8.8
8.6
8.4
8.2
8
7.8
7.6
7.4
7.2
7
Mar-2011
Dec-2012
Sep-2014
Jun-2016
Apr-2018
Jan-2020
Oct-2021
Dec-2022
Generated 2/12/2023 5:05 PM.
Sample Date

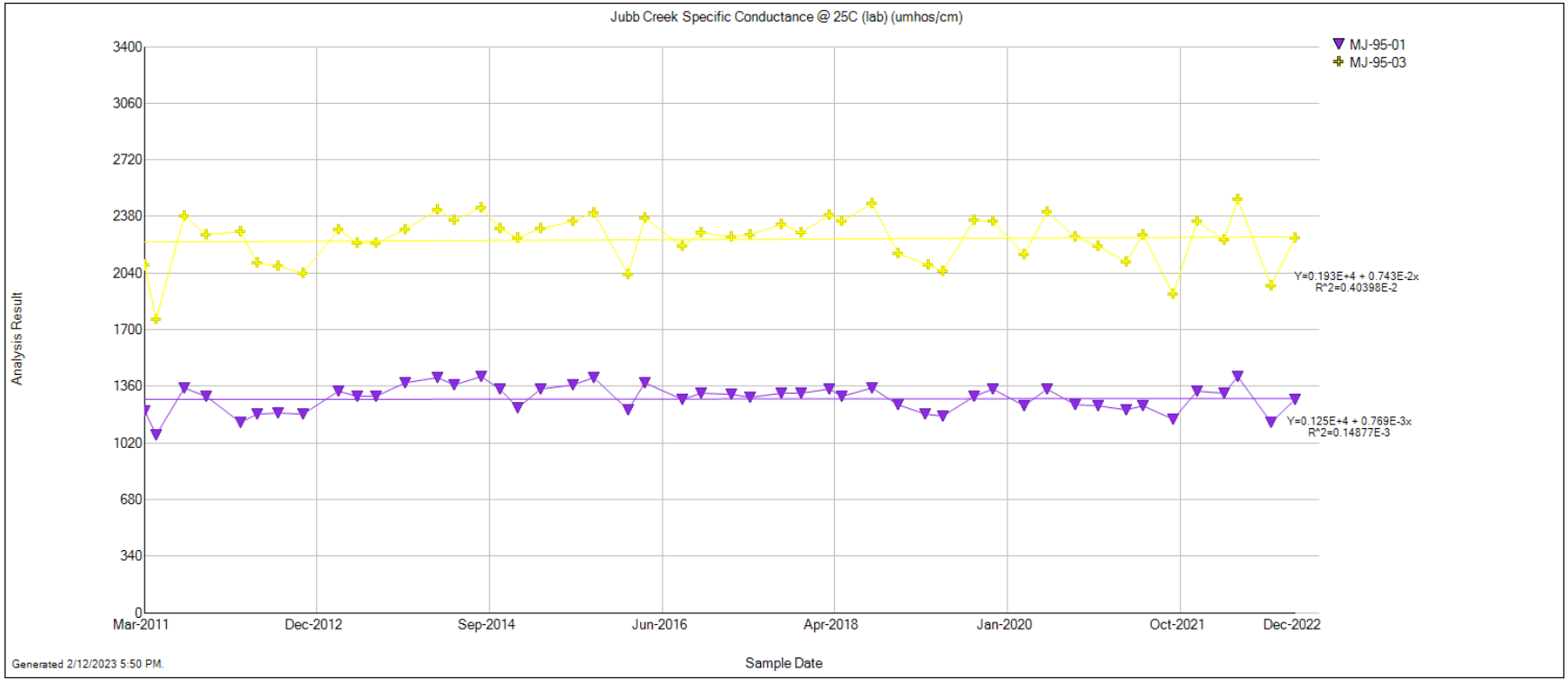

Collom Gulch Sodium, dissolved (mg/L)
MC-04-01
MC-04-02
Y=-0.186E+3 + 0.590E-2x
R^2=0.58956E-1
Y=-0.491E+1 + 0.526E-3x
R^2=0.17638E-1
Analysis Result
250
225
200
175
150
125
100
75
50
25
0
Mar-2011
Dec-2012
Sep-2014
Jun-2016
Apr-2018
Jan-2020
Oct-2021
Dec-2022
Sample Date
Generated 2/12/2023 5:05 PM.

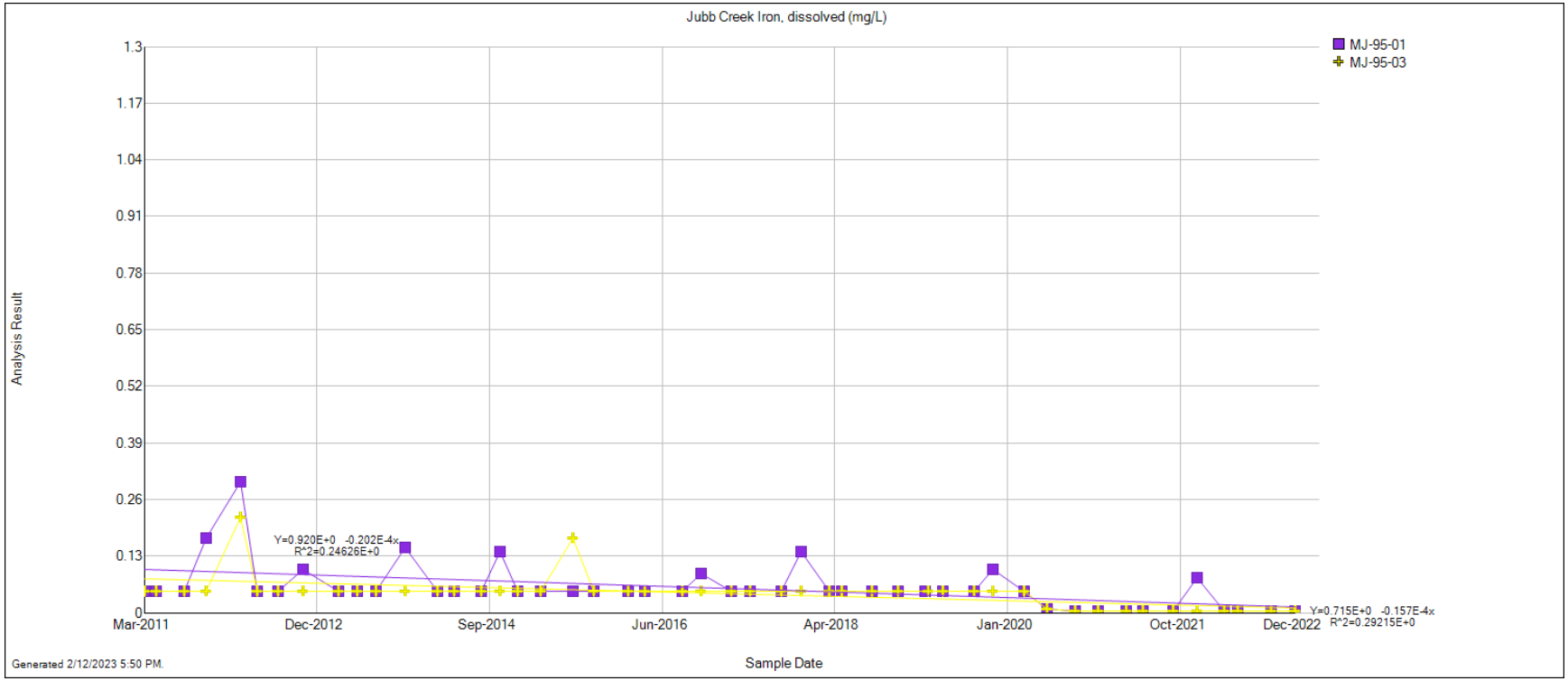

Collom Gulch Sulfate, dissolved (mg/L)
MC-04-01
MC-04-02
Analysis Result
420
378
336
294
252
210
168
126
84
42
0
Mar-2011
Dec-2012
Sep-2014
Jun-2016
Apr-2018
Jan-2020
Oct-2021
Dec-2022
Y=0.119E+4 -0.219E-1x
R^2=0.40376E+0
Y=0.123E+4 -0.247E-1x
R^2=0.30937E+0
Generated 2/12/2023 5:05 PM.
Sample Date

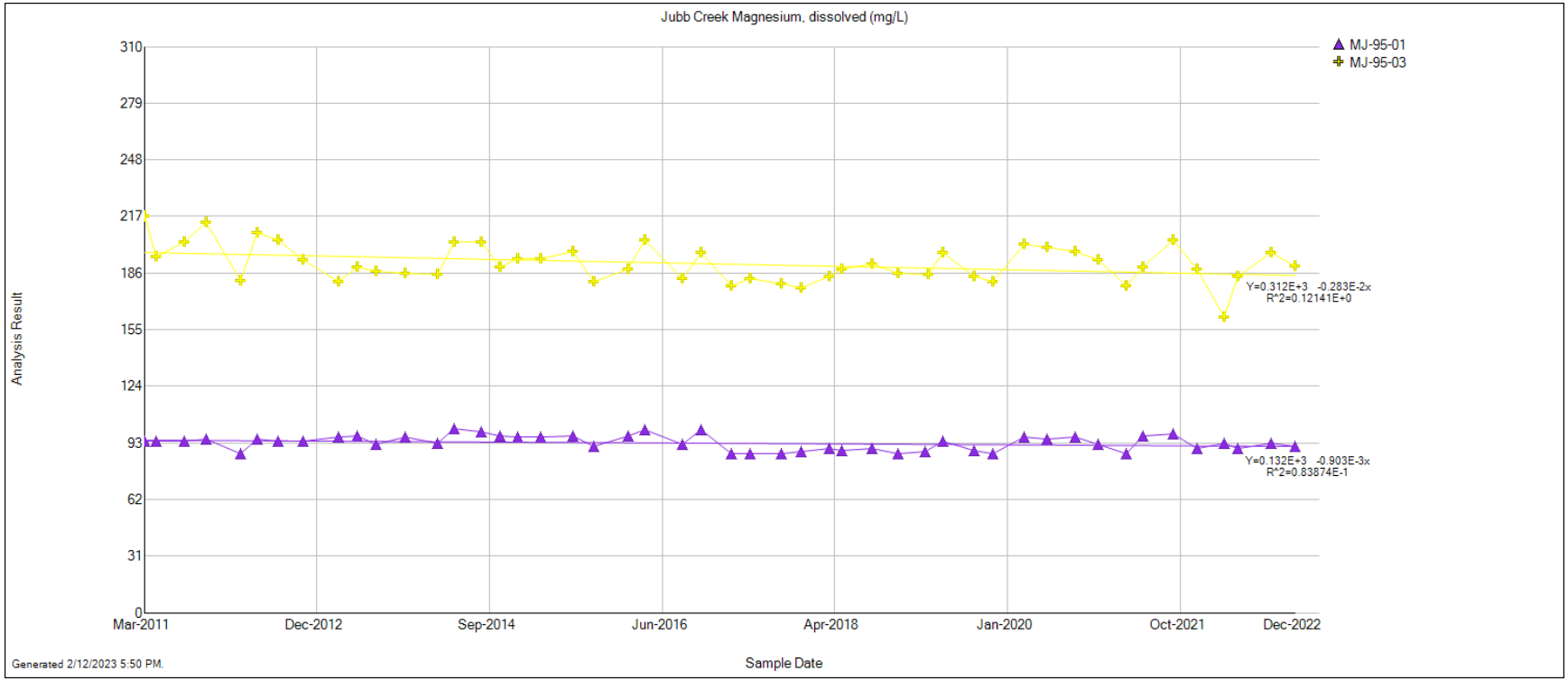

Collom Gulch Total Dissolved Solids (mg/L)
MC-04-01
MC-04-02
Y=0.235E+4 -0.347E-1x
R^2=0.18999E+0
Y=0.235E+4 -0.407E-1x
R^2=0.13663E+0
Analysis Result
2200
1980
1760
1540
1320
1100
880
660
440
220
0
Mar-2011
Dec-2012
Sep-2014
Jun-2016
Apr-2018
Jan-2020
Oct-2021
Dec-2022
Generated 2/12/2023 5:05 PM.
Sample Date

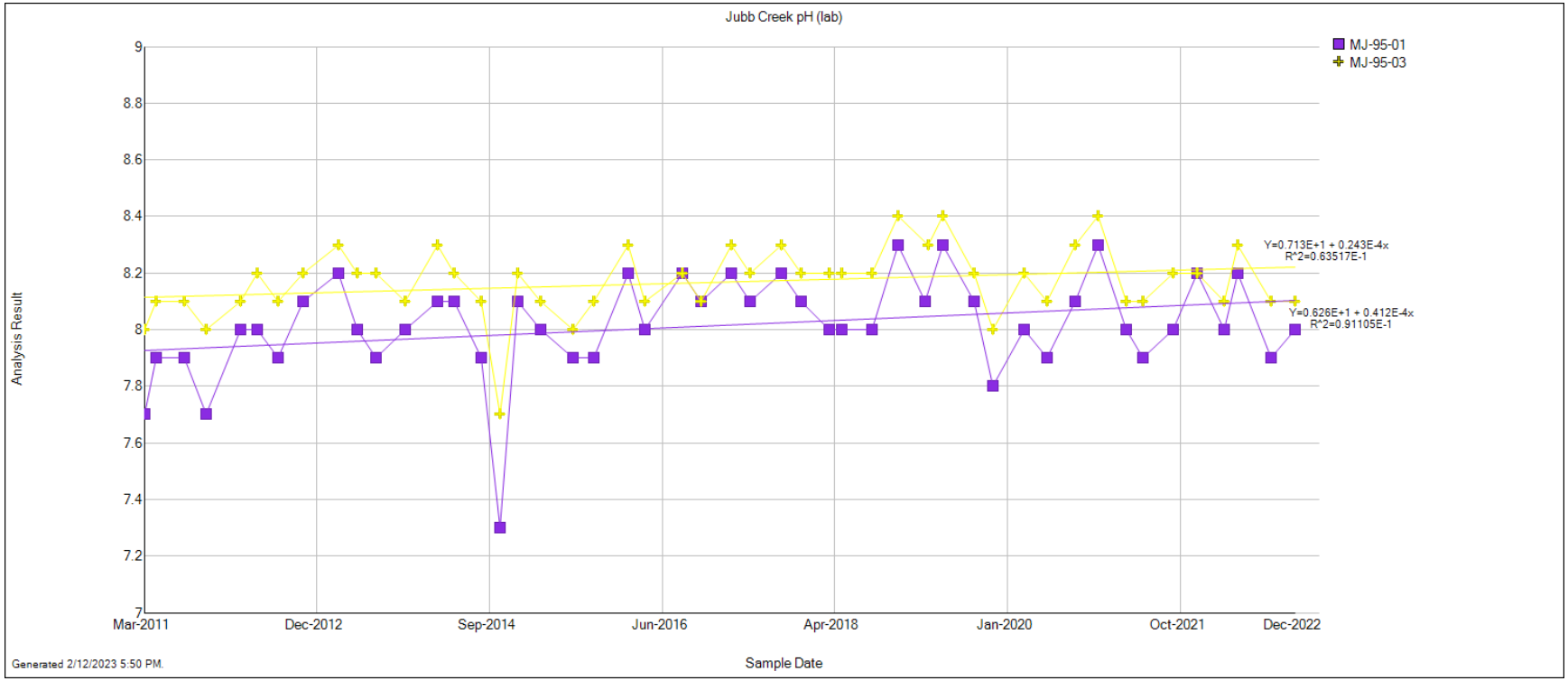

Jubb Creek Calcium, dissolved (mg/L)
MJ-95-01
MJ-95-03
Y=0.103E+3 + 0.102E-2x
R^2=0.31495E-1
Y=0.132E+3 -0.257E-3x
R^2=0.66378E-2
Analysis Result
260
234
208
182
156
130
104
78
52
26
0
Mar-2011
Dec-2012
Sep-2014
Jun-2016
Apr-2018
Jan-2020
Oct-2021
Dec-2022
Generated 2/12/2023 5:50 PM.
Sample Date

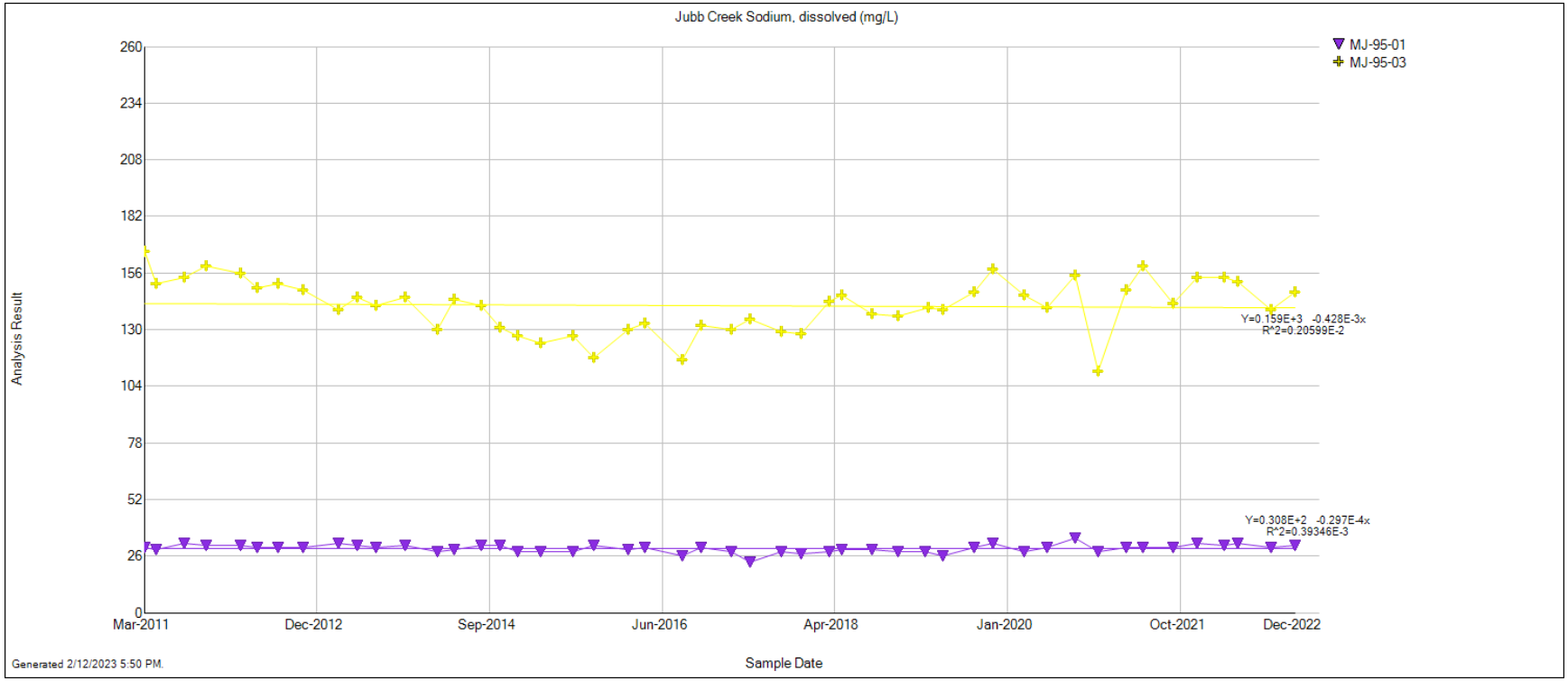

Jubb Creek Groundwater, depth from TOC (ft)
MJ-95-01
MJ-95-03
34.29
30.861
27.432
24.003
20.574
17.145
13.716
10.287
6.858
3.429
0
Analysis Result
Mar-2011
Dec-2012
Sep-2014
Jun-2016
Apr-2018
Jan-2020
Oct-2021
Dec-2022
Sample Date
Y=0.103E+2 + 0.235E-3x
R^2=0.11087E+0
Y=0.132E+2 + 0.215E-4x
R^2=0.74978E-4
Generated 2/12/2023 5:50 PM.

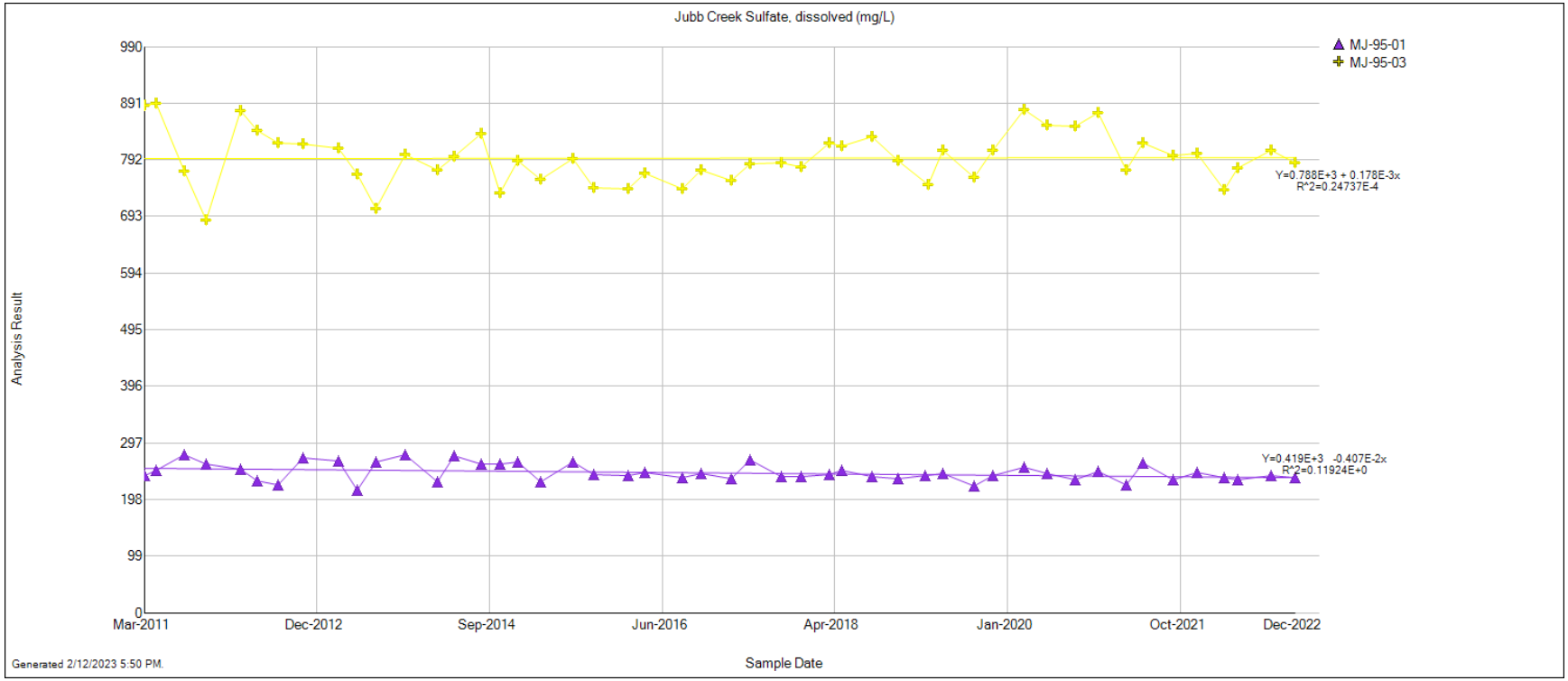

Jubb Creek Specific Conductance @ 25C (lab) (umhos/cm)
MJ-95-01
MJ-95-03
Y=0.193E+4 + 0.743E-2x
R^2=0.40398E-2
Y=0.125E+4 + 0.769E-3x
R^2=0.14877E-3
Analysis Result
3400
3060
2720
2380
2040
1700
1360
1020
680
340
0
Mar-2011
Dec-2012
Sep-2014
Jun-2016
Apr-2018
Jan-2020
Oct-2021
Dec-2022
Generated 2/12/2023 5:50 PM.
Sample Date

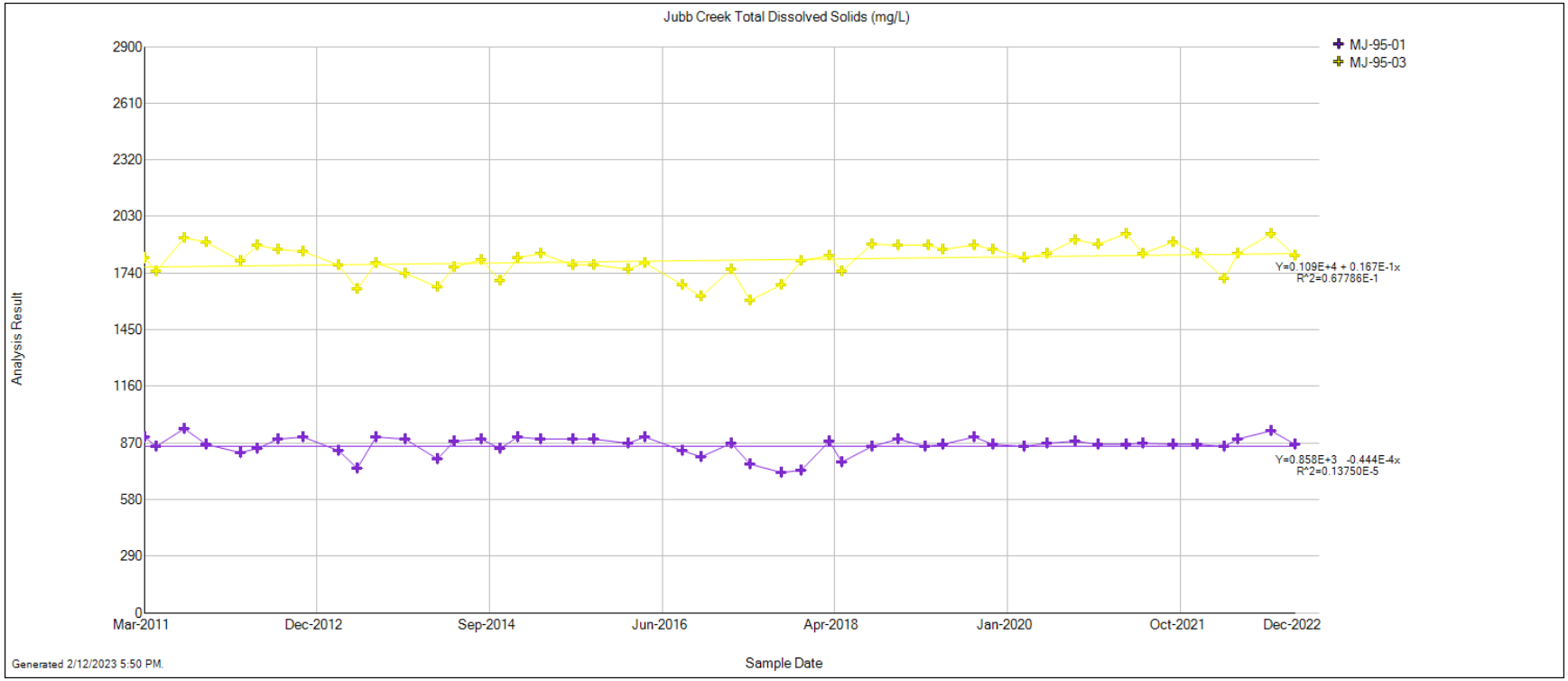

Jubb Creek Iron, dissolved (mg/L)
MJ-95-01
MJ-95-03
Analysis Result
1.3
1.17
1.04
0.91
0.78
0.65
0.52
0.39
0.26
0.13
0
Mar-2011
Dec-2012
Sep-2014
Jun-2016
Apr-2018
Jan-2020
Oct-2021
Dec-2022
Y=0.920E+0 -0.202E-4x
R^2=0.24626E+0
Y=0.715E+0 -0.157E-4x
R^2=0.29215E+0
Generated 2/12/2023 5:50 PM.
Sample Date

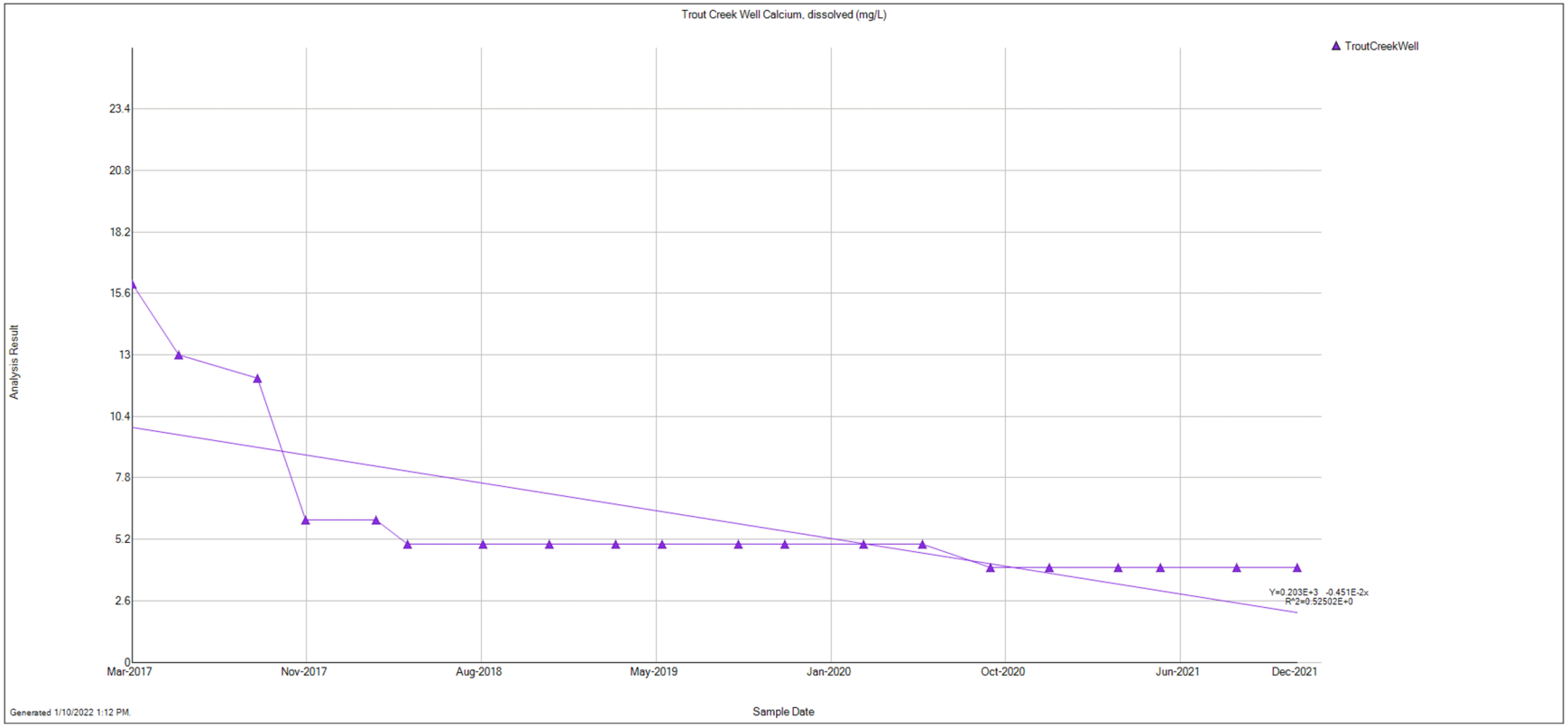

Jubb Creek Magnesium, dissolved (mg/L)
MJ-95-01
MJ-95-03
Y=0.312E+3 -0.283E-2x
R^2=0.12141E+0
Y=0.132E+3 -0.903E-3x
R^2=0.83874E-1
Analysis Result
310
279
248
217
186
155
124
93
62
31
0
Mar-2011
Dec-2012
Sep-2014
Jun-2016
Apr-2018
Jan-2020
Oct-2021
Dec-2022
Generated 2/12/2023 5:50 PM.
Sample Date

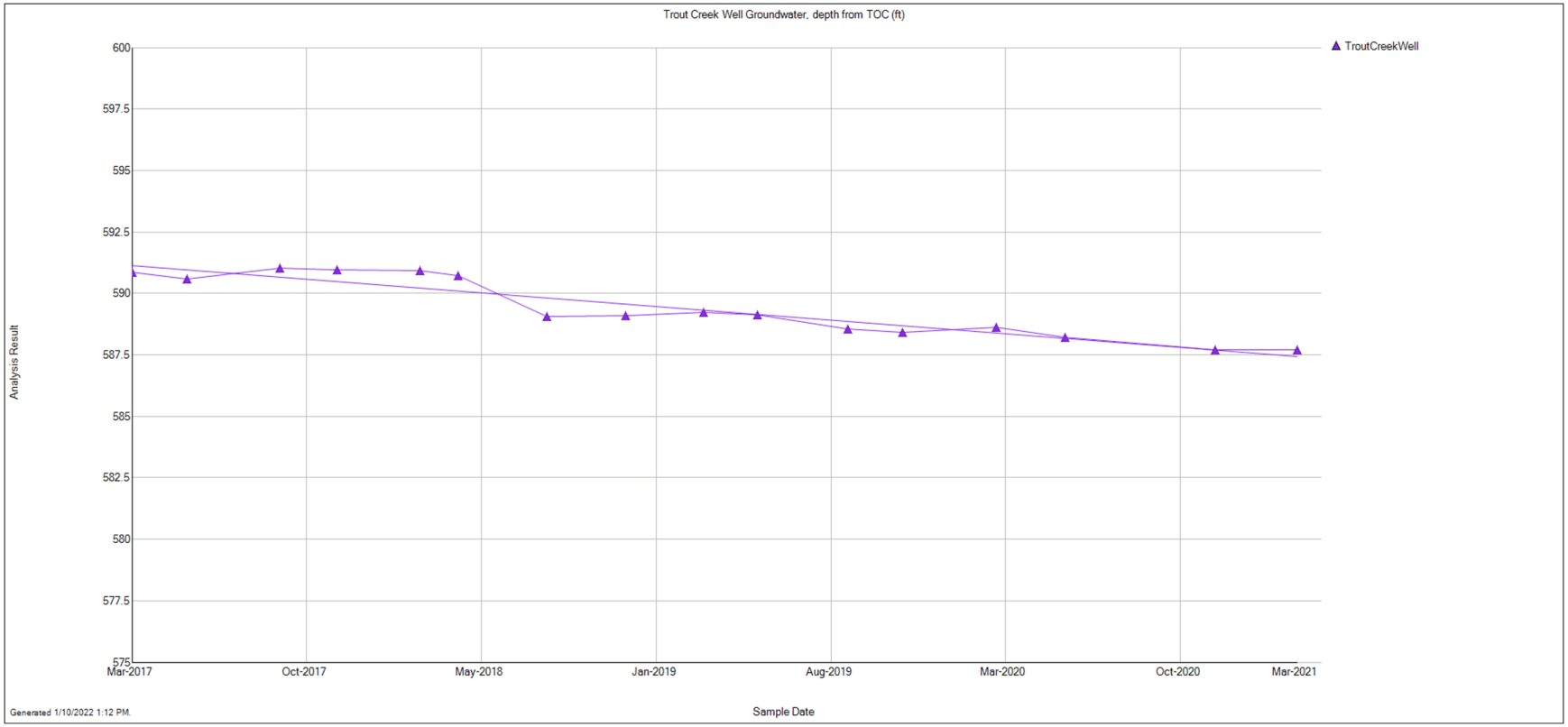

Jubb Creek pH (lab)
MJ-95-01
MJ-95-03
Y=0.713E+1 + 0.243E-4x
R^2=0.63517E-1
Y=0.626E+1 + 0.412E-4x
R^2=0.91105E-1
Analysis Result
9
8.8
8.6
8.4
8.2
8
7.8
7.6
7.4
7.2
7
Mar-2011
Dec-2012
Sep-2014
Jun-2016
Apr-2018
Jan-2020
Oct-2021
Dec-2022
Generated 2/12/2023 5:50 PM.
Sample Date

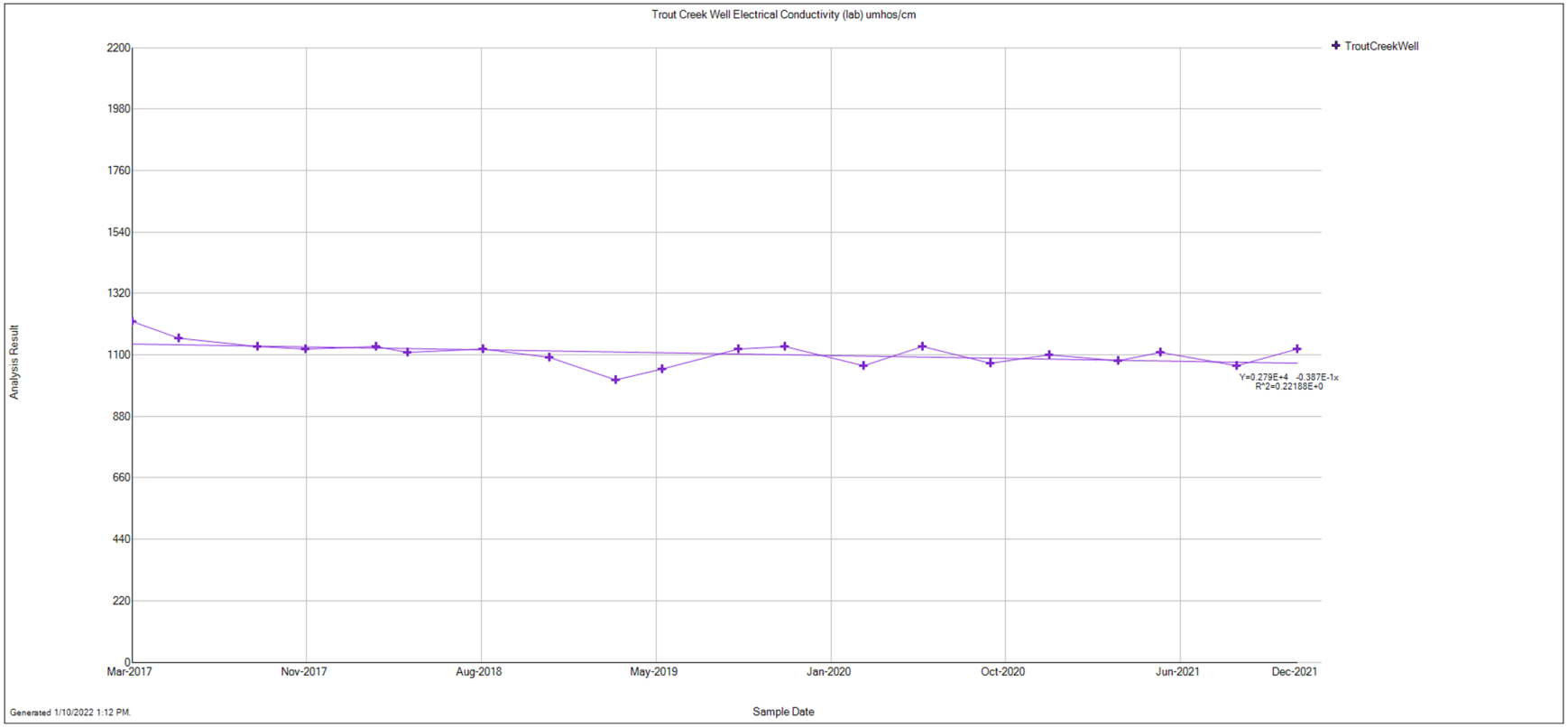

Jubb Creek Sodium, dissolved (mg/L)
MJ-95-01
MJ-95-03
Analysis Result
260
234
208
182
156
130
104
78
52
26
0
Mar-2011
Dec-2012
Sep-2014
Jun-2016
Apr-2018
Jan-2020
Oct-2021
Dec-2022
Y=0.159E+3 -0.428E-3x
R^2=0.20599E-2
Y=0.308E+2 -0.297E-4x
R^2=0.39346E-3
Generated 2/12/2023 5:50 PM.
Sample Date

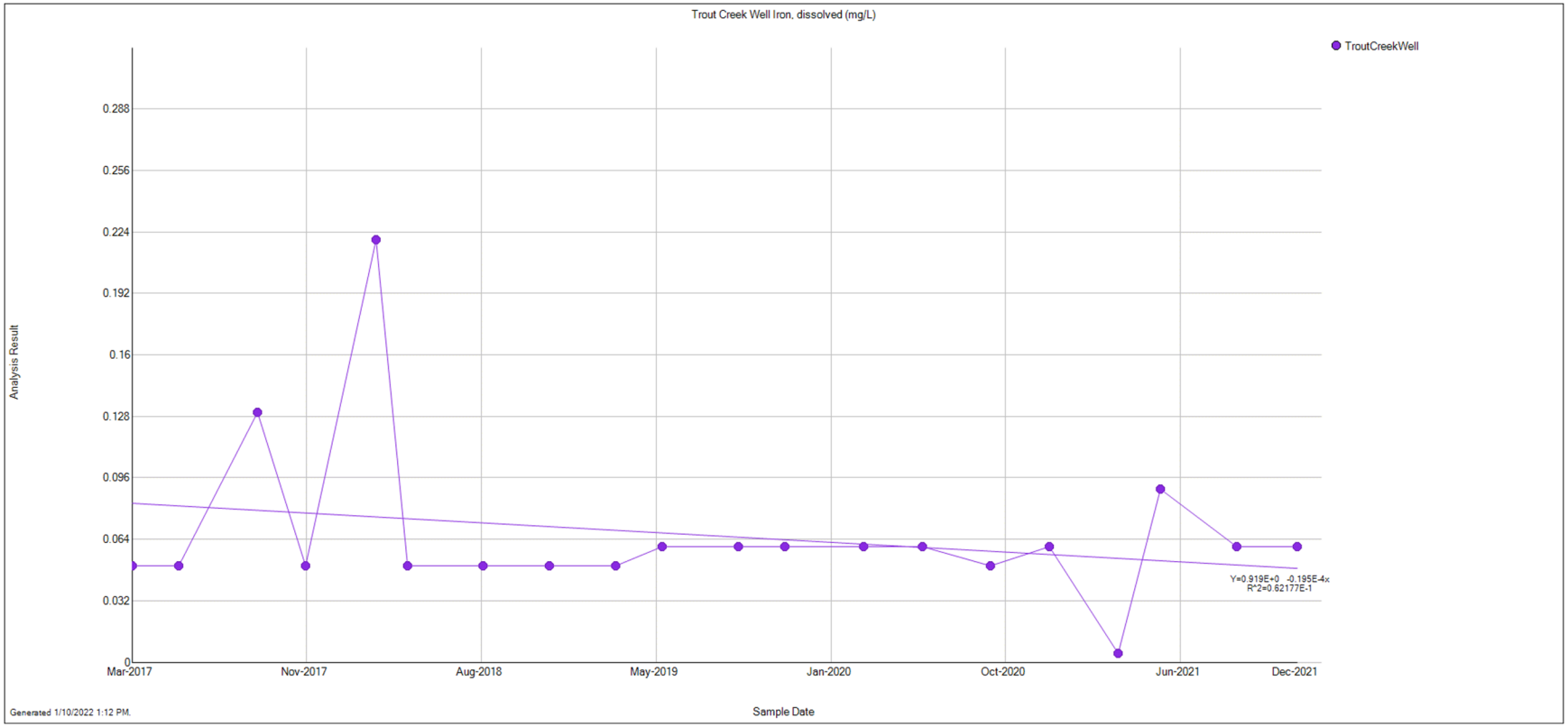

Jubb Creek Sulfate, dissolved (mg/L)
MJ-95-01
MJ-95-03
Y=0.788E+3 + 0.178E-3x
R^2=0.24737E-4
Y=0.419E+3 -0.407E-2x
R^2=0.11924E+0
Analysis Result
990
891
792
693
594
495
396
297
198
99
0
Mar-2011
Dec-2012
Sep-2014
Jun-2016
Apr-2018
Jan-2020
Oct-2021
Dec-2022
Generated 2/12/2023 5:50 PM.
Sample Date

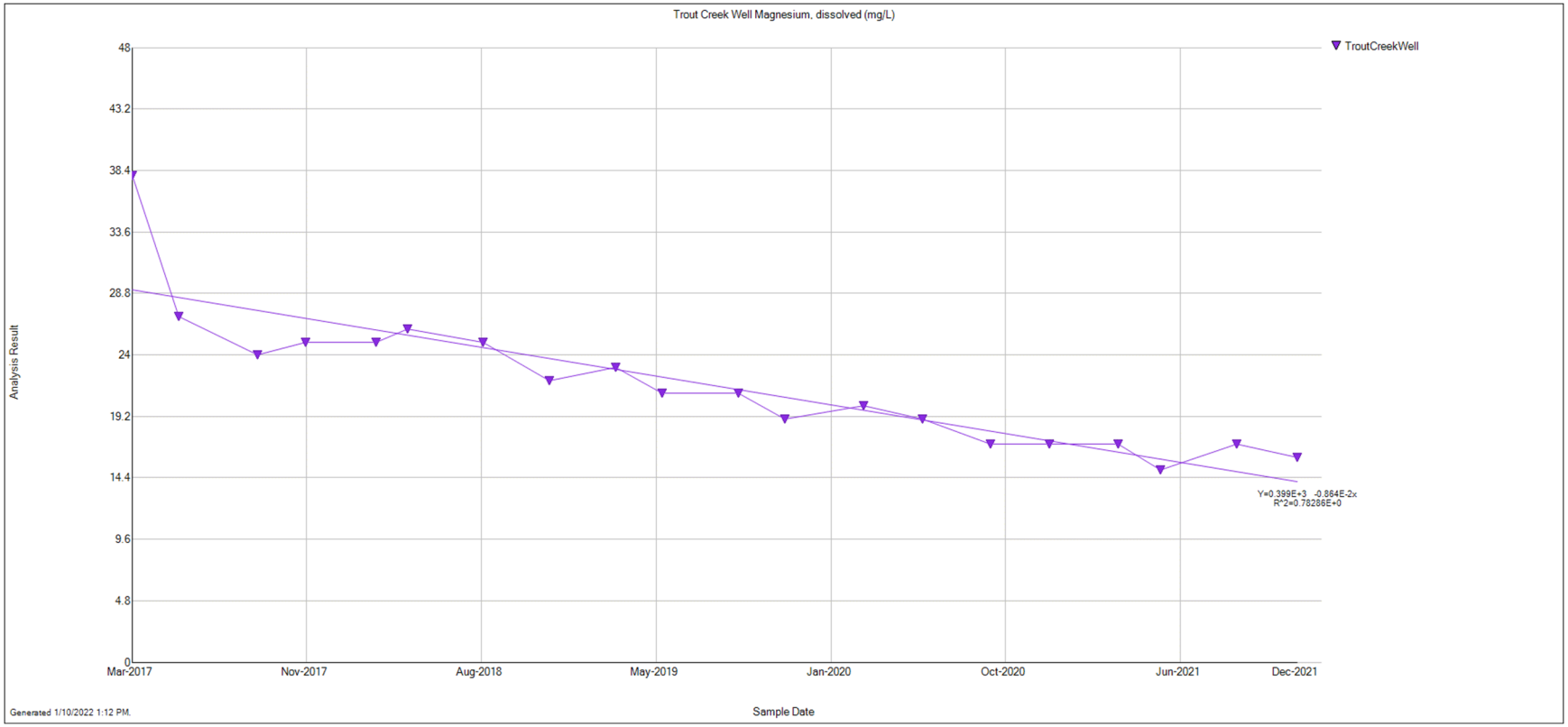

Jubb Creek Total Dissolved Solids (mg/L)
MJ-95-01
MJ-95-03
Y=0.109E+4 + 0.167E-1x
R^2=0.67786E-1
Y=0.858E+3 -0.444E-4x
R^2=0.13750E-5
Analysis Result
2900
2610
2320
2030
1740
1450
1160
870
580
290
0
Mar-2011
Dec-2012
Sep-2014
Jun-2016
Apr-2018
Jan-2020
Oct-2021
Dec-2022
Generated 2/12/2023 5:50 PM.
Sample Date

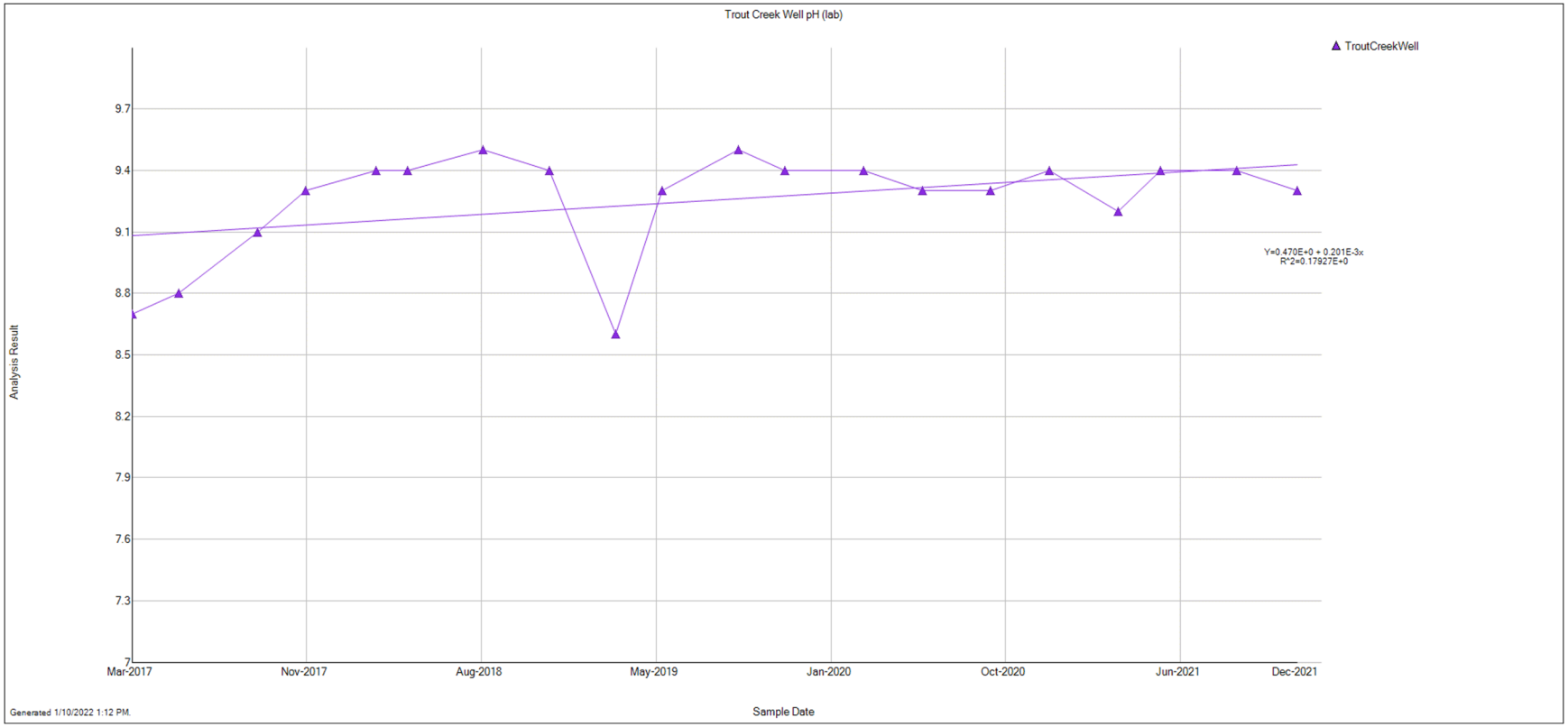

Trout Creek Well Calcium, dissolved (mg/L)
TroutCreekWell
Analysis Result
23.4
20.8
18.2
15.6
13
10.4
7.8
5.2
2.6
0
Mar-2017
Nov-2017
Aug-2018
May-2019
Jan-2020
Oct-2020
Jun-2021
Dec-2021
Y=0.203E+3 -0.451E-2x
R^2=0.52502E+0
Generated 1/10/2022 1:12 PM.
Sample Date

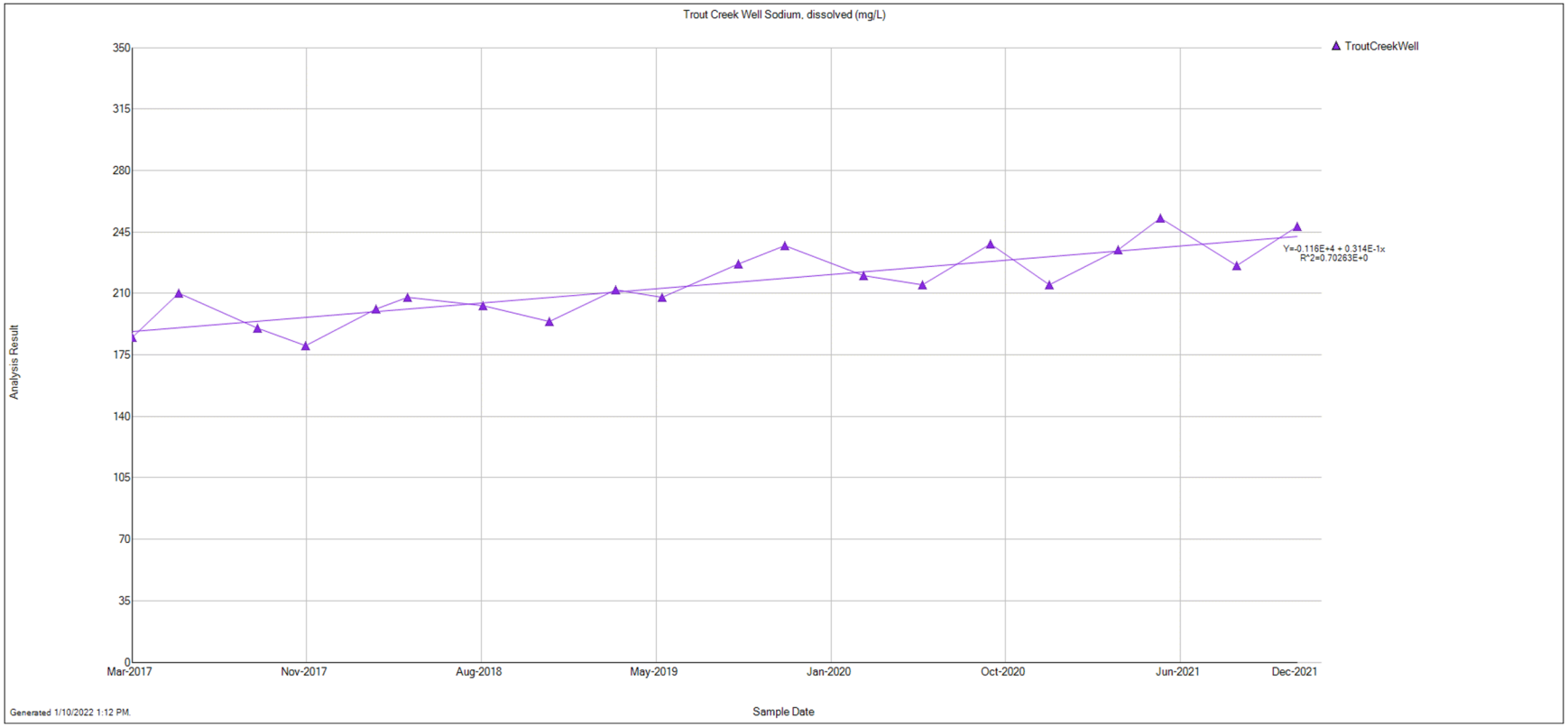

Trout Creek Well Groundwater, depth from TOC (ft)
TroutCreekWell
600
597.5
595
592.5
590
587.5
585
582.5
580
577.5
575
Analysis Result
Mar-2017
Oct-2017
May-2018
Jan-2019
Aug-2019
Mar-2020
Oct-2020
Mar-2021
Sample Date
Generated 1/10/2022 1:12 PM.

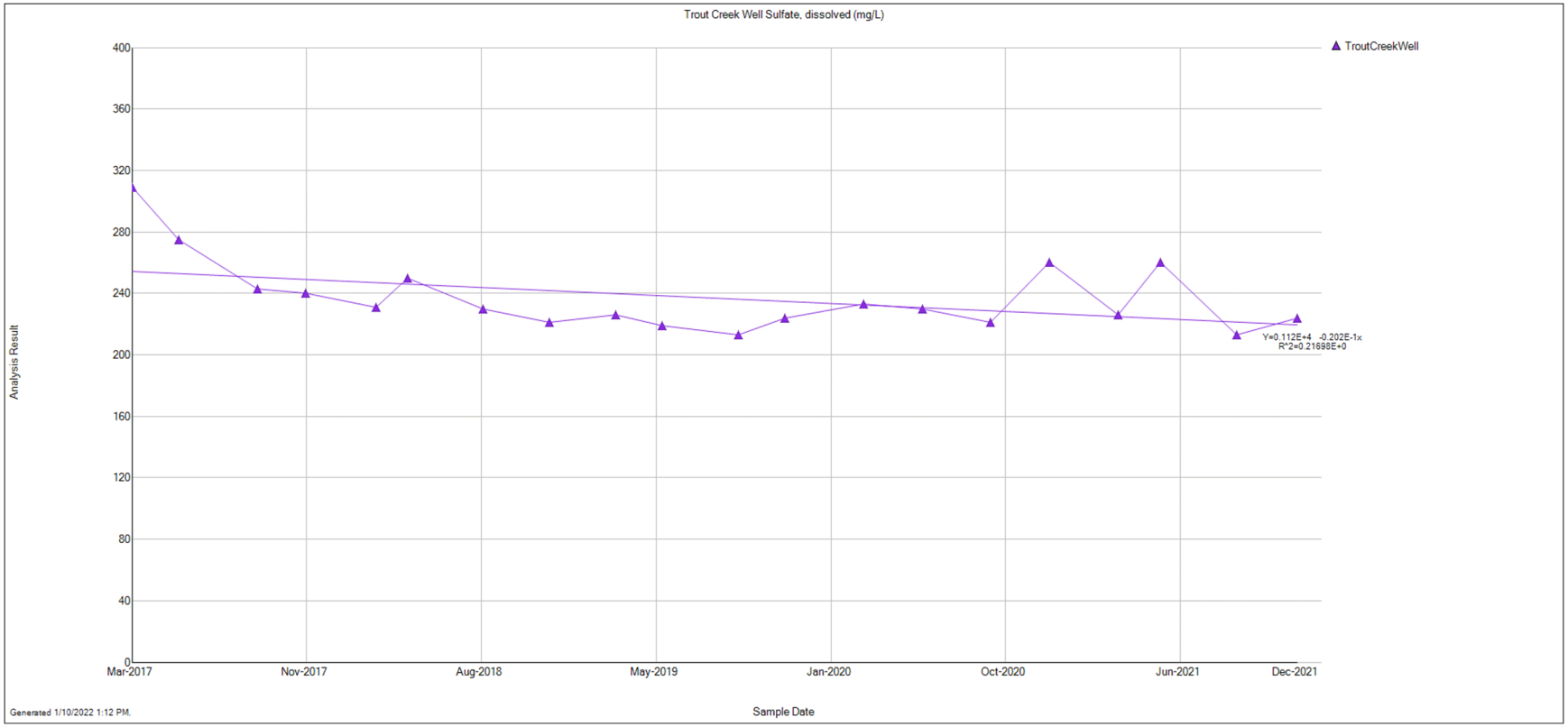

Trout Creek Well Electrical Conductivity (lab) umhos/cm
TroutCreekWell
Analysis Result
2200
1980
1760
1540
1320
1100
880
660
440
220
0
Mar-2017
Nov-2017
Aug-2018
May-2019
Jan-2020
Oct-2020
Jun-2021
Dec-2021
Y=0.279E+4 -0.387E-1x
R^2=0.22188E+0
Generated 1/10/2022 1:12 PM.
Sample Date

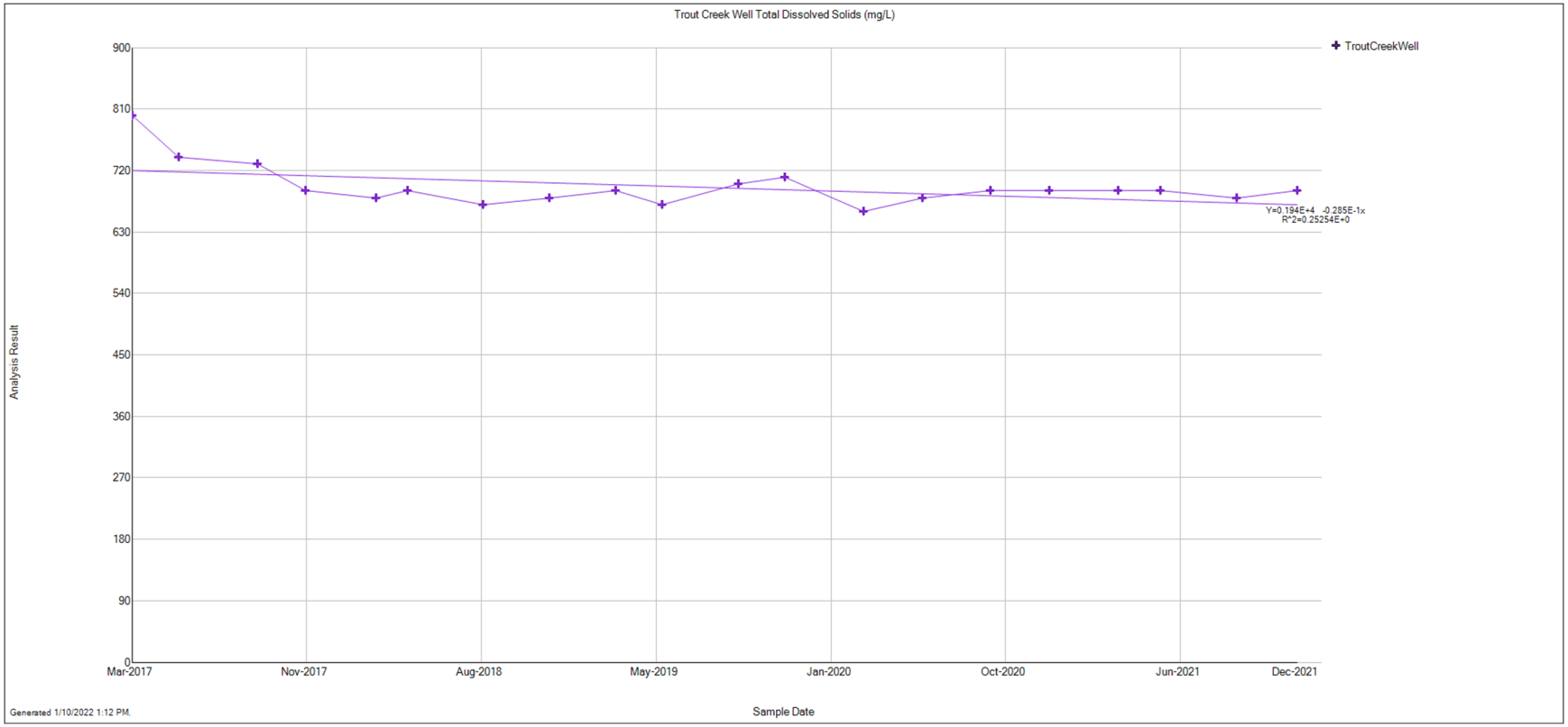

Trout Creek Well Iron, dissolved (mg/L)
TroutCreekWell
Analysis Result
0.288
0.256
0.224
0.192
0.16
0.128
0.096
0.064
0.032
0
Mar-2017
Nov-2017
Aug-2018
May-2019
Jan-2020
Oct-2020
Jun-2021
Dec-2021
Y=0.919E+0 -0.195E-4x
R^2=0.62177E-1
Generated 1/10/2022 1:12 PM.
Sample Date


Trout Creek Well Magnesium, dissolved (mg/L)
TroutCreekWell
Analysis Result
48
43.2
38.4
33.6
28.8
24
19.2
14.4
9.6
4.8
0
Mar-2017
Nov-2017
Aug-2018
May-2019
Jan-2020
Oct-2020
Jun-2021
Dec-2021
Y=0.399E+3 -0.864E-2x
R^2=0.78286E+0
Generated 1/10/2022 1:12 PM.
Sample Date


Trout Creek Well pH (lab)
TroutCreekWell
Analysis Result
9.7
9.4
9.1
8.8
8.5
8.2
7.9
7.6
7.3
7
Mar-2017
Nov-2017
Aug-2018
May-2019
Jan-2020
Oct-2020
Jun-2021
Dec-2021
Y=0.470E+0 + 0.201E-3x
R^2=0.17927E+0
Generated 1/10/2022 1:12 PM.
Sample Date


Trout Creek Well Sodium, dissolved (mg/L)
TroutCreekWell
Y=-0.116E+4 + 0.314E-1x
R^2=0.70263E+0
Analysis Result
350
315
280
245
210
175
140
105
70
35
0
Mar-2017
Nov-2017
Aug-2018
May-2019
Jan-2020
Oct-2020
Jun-2021
Dec-2021
Generated 1/10/2022 1:12 PM.
Sample Date


Trout Creek Well Sulfate, dissolved (mg/L)
TroutCreekWell
Analysis Result
400
360
320
280
240
200
160
120
80
40
0
Mar-2017
Nov-2017
Aug-2018
May-2019
Jan-2020
Oct-2020
Jun-2021
Dec-2021
Y=0.112E+4 -0.202E-1x
R^2=0.21698E+0
Generated 1/10/2022 1:12 PM.
Sample Date


Trout Creek Well Total Dissolved Solids (mg/L)
TroutCreekWell
Y=0.194E+4 -0.285E-1x
R^2=0.25254E+0
Analysis Result
900
810
720
630
540
450
360
270
180
90
0
Mar-2017
Nov-2017
Aug-2018
May-2019
Jan-2020
Oct-2020
Jun-2021
Dec-2021
Generated 1/10/2022 1:12 PM.
Sample Date

SECTION 2 – CDRMS ARR FORM AND SUPPORT DOCUMENTS

RULE REQUIREMENT

Rule 2.04.13(1) (a-f)

2.04.13(1) by April 1, or other such date as agreed on, each permittee shall file an annual reclamation report covering the previous calendar year for all areas under bond. The report shall include, but not be limited to, text, discussion and maps which address:

- the name and address of the permittee and permit number
- location and number of acres disturbed during that year
- location and number of acres backfilled and graded during that year
- location and number of acres topsoiled during that year
- the species, location and number of acres of vegetation planted during that year, including any augmented seeding or cultural practices
- location, number of acres and date of planting for all previously re-vegetated areas

PERMITTEE

Colowyo Coal Company L.P.
5731 State Highway 13
Meeker, CO 81647

DISTURBED ACRES

During 2022, 91.9 acres of additional disturbance occurred onsite. Please see Exhibit 2 for the locations of areas disturbed during 2022.

At the end of 2022, the total disturbance was 5,185.5 acres. Of this, 2,142.7 acres are in long-term facilities, and the active mining area comprised of 1,075.7 acres.

BACKFILLAND GRADED ACRES

During 2022, 28.2 acres were backfilled and graded. To date, 1,962.0 acres have been backfilled and graded. Please see Exhibit 2 for the locations of all areas that have been backfilled and graded to date.

TOPSOIL REPLACEMENT & SEEDING ACRES

During 2022, 0.0 acres were topsoiled, and 2.9 acres (reclamation units C07-C-016) were permanently seeded. Please see Exhibit 2 for all locations that have been topsoiled and seeded to date at Colowyo, Figure 2-2 for more detailed description of each reclamation area at Colowyo, and Figure 2-3 for the seed mixture planted in 2022.

The species seeded on Colowyo's reclamation areas follow the approved seed mixtures located in Volume 1.

Figure 2-1 Annual Reclamation Report Form provides a detailed description of the acreages presented above.

Figure 2-1 –Annual Reclamation Report Form

Colorado Division of Reclamation, Mining and Safety

Annual Reclamation Report for Calendar Year – 2022

Colowyo Mine	C-1981-019	Colowyo Coal Company L.P.
Mine Name	Permit Number	Permittee

5731 State Highway 13 Meeker, CO 81641

Address

This report, required by Rule 2.04.13, is due by February 15 of each year, or other date, as agreed upon by the Division. It should include text, discussion, and maps, at a minimum, in addition to any other reclamation monitoring data as required by the approved permit. The location of the acreage reported under each land status category and year of seeding (if applicable) should be clearly identified on a map included with the report.

Land Category	Last Year's Cumulative Total (from last year's ARR)	This Calendar Year			Cumulative Total
		Acres Added (+)	Acres Subtracted (-)		
Acreage in Active Mining Areas[1]	1,008.6*	67.1	0.0	=	1,075.7

Land Category	Last Year's Cumulative Total (from last year's ARR)	This Calendar Year			Cumulative Total
		Acres Added (+)	Acres Subtracted (-)		
Acres Disturbed[2]	5,093.6*	91.9	0	=	5,185.5
Acres Backfilled and Graded	1,938.8*	28.2	0	=	1,962.0
Acres Topsoiled	1,300.9*	603.0**	0.0	=	1,903.9

Acreage in Long-term Facilities[3]	Last Year's Cumulative Total (from last year's ARR)	This Calendar Year			Cumulative Total
		Acres Added (+)	Acres Subtracted (-)		
Non-Permanent Facilities	2,142.6*	0.0	3.6	=	2,139.0
Permanent Facilities (permitted)	3.7	0	0	=	3.7
Totals	2,146.3			=	2,142.7

Acres Seeded (permanent)	Last Year's Cumulative Total (from last year's ARR)	This Calendar Year			Cumulative Total
		Acres Added (+)	Acres Subtracted (-)		
9 Years and Less	979.0	0	293.6	=	685.4
10 Years and Greater	263.1*	955.4	0.0	=	1,218.5
Totals	1,242.1			=	1,903.9

Bond Release	Last Year's Cumulative Total (from last year's ARR)	This Calendar Year			Cumulative Total
		Acres Added (+)	Acres Subtracted (-)		
Phase I Released	1,991.9	0.0	13.3	=	2,005.2
Phase II Released	1,682.7	0.0	0.0	=	1,682.7
Phase III Released	722.5	0.0	0.0	=	722.5

*The cumulative totals presented above on Figure 2-1 for last year's ARR totals will not match what was reported in 2021. The Division and Colowyo during 2022 worked through a process to audit acres reported for disturbed, active mining, backfilled and graded, and non-permanent facilities. Previous reporting of these acreages did not total the overall disturbance acres.

Through this process it was determined that several issues were occurring that did not allow these acreages to be reported accurately. First, Phase III released acres within the permit boundary had been removed from all acreage classifications, and those Phase III released acres within the permit boundary have been added back into each acreage classification for proper reporting. Second, old polygons in Colowyo's AutoCAD files included duplicate polygons. When polygons were totaled in AutoCAD this caused a duplication of some acreages. This issue has been corrected and now polygons in AutoCAD for each acreage classification are standalone. Finally, native areas (not disturbed) within Colowyo's larger disturbance footprint were being included as disturbed. This issue has also been corrected.

Figure 2-2 – Colowyo Reclamation Table

Colowyo Reclamation Table

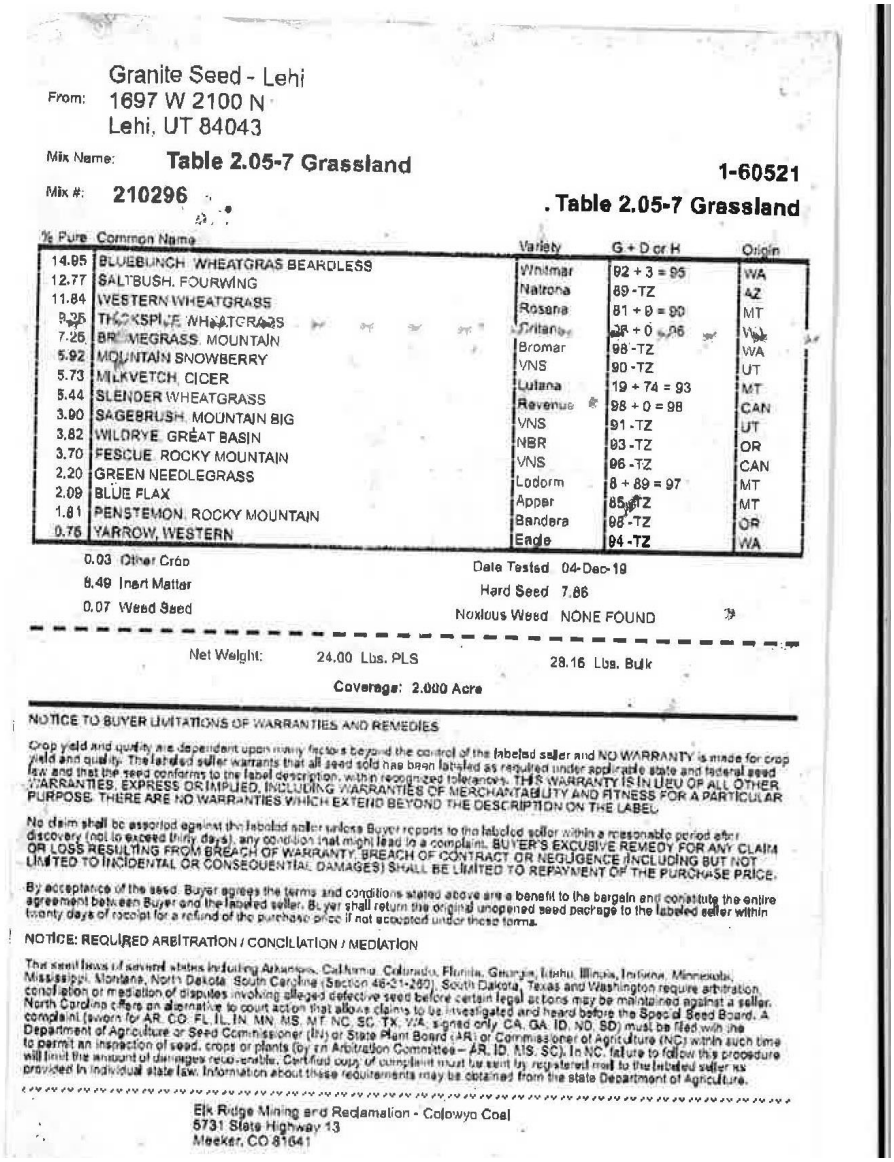
Area	Reclamation Period			Status			Ecosystem Targeted Seeding		Notes:
	Year	Acreage (Seeded)	Revegetated Years	Bond Release Phase 1	Bond Release Phase 2	Bond Release Phase 3	Sagebrush Steppe Acres	Grazingland Acres	
East Pit									
EP010	1988	1.9	35	Apr-98	Aug-01	Aug-12	NA	NA	
EP011	1989	8.1	34	Apr-98	Aug-01	Aug-12	NA	NA	Phase III Released.
EP012	1990	6.2	33	Apr-98	Aug-01	Aug-12	NA	NA	Phase III Released.
EP014	1991	11.8	32	Apr-98	Aug-01	Aug-12	NA	NA	Phase III Released.
EP015	1991	8.1	32	Apr-98	Aug-01	Aug-12	NA	NA	Phase III Released.
EP020	1993	3.9	30	Apr-98	Aug-01	Aug-12	NA	NA	Phase III Released.
EP025	1994	23.9	29	Apr-98	Aug-01	Aug-12	NA	NA	Phase III Released.
EP026	1995	15.9	28	Apr-98	Aug-01	Aug-12	NA	NA	Phase III Released.
EP030	1997	4.1	26	Jun-11	Jun-11	Aug-12	NA	NA	Phase III Released.
EP032	1998	14.1	25	Jun-11	Jun-11	Aug-12	NA	NA	Phase III Released.
EP034	1999	6.9	24	Jun-11	Jun-11	Aug-12	NA	NA	Phase III Released.
EP038	2001	3.5	22	Jun-11	Jun-11	Feb-17	NA	NA	Phase III Released.
EP039	2003	4.3	20	Jun-11	Jun-11	Feb-17	NA	NA	Phase III Released.
EP040	2003	10.5	20	Jun-11	Jun-11	Feb-17	NA	NA	Phase III Released.
EP041	2003	29.5	20	Jun-11	Jun-11	Nov-18	NA	NA	Phase III Released.
EP042	2002	9.7	21	Jun-11	Jun-11	Feb-17	NA	NA	Phase III Released.
EP043	2002	10.2	21	Jun-11	Jun-11	Feb-17	NA	NA	Phase III Released.
EP044	2003	6.0	20	Jun-11	Jun-11	Feb-17	NA	NA	Phase III Released.
EP045	2003	6.1	20	Apr-12	Nov-18	Nov-18	NA	NA	Phase III Released.
EP046	2005	96.7	18	Apr-12	Nov-18	Nov-18	NA	NA	Phase III Released.
EP047	2005	0.0	18	Apr-12	Nov-18	Nov-18	NA	NA	Phase III Released.
EP047	2006	1.9	17	Apr-12	Nov-18	Nov-18	NA	NA	Phase III Released.
EP049	2006	0.8	17	Apr-12	Nov-18	Nov-18	NA	NA	Phase III Released.
EP050	2006	0.0	17	Apr-12	Nov-18	Nov-18	NA	NA	Phase III Released.
EP050	2007	77.5	16	Apr-12	Nov-18	Nov-18	NA	NA	Phase III Released.
EP051	2009	32.0	14	Apr-12	Nov-18		NA	NA	8.0 ac Redisturbed in 2010 Reseeded in 2010
EP052	2010	37.0	13	Apr-12	Nov-18		NA	NA	37.0 Acres Seeded in 2011
EP053	2010	17.4	13	Apr-12	Nov-18		NA	NA	17.4 Acres Seeded 2011
EP054	2010	17.4	13	Apr-12	Nov-18		NA	NA	
EP055	2010	8.8	13	Apr-12	Nov-18		NA	NA	
EP056	2011	34.8	12	Apr-12			0.0	34.8	
EP057	2012	70.7	11	Aug-13	Nov-18		0.0	62.7	
EP058	2014	33.4	9	Jan-16	Oct-19		0.0	33.4	
EP059	2016	48.9	7	Jan-18	Oct-20		0.0	30.9	Reseeded 30.9 acres in the fall of 2020.
EP060	2017	5.5	6	Aug-18	Oct-20		0.9	4.6	Redisturbance Topsoil Pile and Road No Backfill
EP061	2018	14.5	5	Sep-19			14.5	0.0	All Regrade occurred with EP057 and EP059.
EP062	2019	7.0	4	Jun-21			7.0	0.0	Topsoil pile footprint reclaimed. Reseeded 7.0 acres in fall of 2020.
Grand Totals		**719.0**					**22.4**	**166.4**	
West Pit									
WP001	1995	6.2	28	Apr-98	Aug-01	Aug-12	NA	NA	Phase III Released
WP002	1995	32.7	28	Apr-98	Aug-01	Aug-12	NA	NA	Phase III Released
WP003	1995	7.0	28	Jun-11	Jun-11	Nov-18	NA	NA	Phase III Released
WP004	1996	8.9	27	Jun-11	Jun-11	Nov-18	NA	NA	Phase III Released
WP005	1997	6.1	26	Jun-11	Jun-11	Aug-12	NA	NA	Phase III Released
WP006	1998	2.0	25	Jun-11	Jun-11	Aug-12	NA	NA	Phase III Released
WP007	1999	7.9	24	Jun-11	Jun-11	Aug-12	NA	NA	Phase III Released
WP008	2000	10.1	23	Jun-11	Jun-11	Feb-17	NA	NA	Phase III Released
WP009	2001	0.5	22	Jun-11	Jun-11	Feb-17	NA	NA	Phase III Released
WP010	2001	5.2	22	Jun-11			NA	NA	August 2021 - Sprayed Entire Unit with Esplanade Herbicide
WP011	2001	1.7	22	Jun-11	Jun-11	Feb-17	NA	NA	Phase III Released
WP012	2002	0.0	21	Apr-12	Nov-18	Nov-18	NA	NA	Phase III Released
WP013	2006	4.0	17	Apr-12	Nov-18	Nov-18	NA	NA	Phase III Released
WP014	2009	47.3	14	Apr-12	Nov-18		NA	NA	6 Acres Redisturbed in 2010 Reseeded in 2010. Moved 4.4 acres to WP019.
WP015	2010	94.0	13	Apr-12	Nov-18		NA	NA	69.7 acres re-seeded in 2013.
WP016	2011	146.1	12	Apr-12	Nov-18		NA	NA	34.1 Acres Seeded in 2012/17.7 acres regraded 2011/3.7 acres moved to WP023
WP017	2013	12.6	10	Apr-12	Nov-18		0.0	12.6	
WP018	2013	31.2	10	Aug-13	Nov-18		7.1	24.1	
WP019	2013	35.9	10	Jan-16	Nov-18		1.5	34.4	
WP020	2013	95.8	10	Jan-16	Nov-18		86.6	9.2	
WP021	2015	75.4	8	Sep-16	Oct-20		0.0	75.9	
WP022	2016	0.5	7	Aug-18	Oct-20		0.5	0.0	This was surface disturbance only or an access road. No topsoil stripping or regrade occurred.
WP023	2016	105.4	7	Jan-18	Oct-20		0.0	105.4	
WP024	2017	98.2	6	Aug-18	Oct-20		17.3	0.0	
WP025	2017	23.3	6	Apr-12	Oct-20		23.3	0.0	
WP026	2018	54.2	5	Aug-18			0.0	54.2	
WP027	2018	17.8	5	Aug-18			0.0	17.8	
WP028	2018	17.9	5	Sep-19			0.0	17.9	
WP029	2018	38.2	5	Sep-19			0.0	38.2	
WP030	2019	12.1	4	Jun-21			12.1	0.0	Reseeded 12.1 acres in the fall of 2020.
WP031	2019	45.8	4	Jul-20			13.3	32.5	Reseeded 10 Acres in the fall of 2020.
WP032	2015	10.5	8	Sep-16			0.0	10.5	
WP033	2021	3.3	2				0.0	3.3	
WP034	2021	10.0	2				0.0	10.0	
Grand Totals		**1,067.8**					**161.7**	**446.0**	

Figure 2-2 – Colowyo Reclamation Table Continued

Colowyo Reclamation Table

Area	Reclamation Period			Status			Ecosystem Targeted Seeding		Notes:
	Year	Acreage (Seeded)	Revegetated Years	Bond Release Phase 1	Bond Release Phase 2	Bond Release Phase 3	Sagebrush Steppe Acres	Grazingland Acres	
Section 16 Pit									
16002	1993	6.2	30	Jun-11	Jan-18	Jan-18	NA	NA	Phase III Released
16003	1993	25.9	30	Apr-98	Aug-01	Jan-18	NA	NA	Phase III Released
16005	1994	3.9	29	Jun-11	Jan-18	Jan-18	NA	NA	Phase III Released
16006	1994	50.5	29	Apr-98	Aug-01	Jan-18	NA	NA	Phase III Released
16008	1995	41.2	28	Apr-98	Aug-01	Jan-18	NA	NA	Phase III Released
16009	1996	1.3	27	Jun-11	Jan-18	Jan-18	NA	NA	Phase III Released
16010	1996	10.0	27	Jun-11	Jun-11	Jan-18	NA	NA	Phase III Released
16011	1997	6.2	26	Jun-11	Jan-18	Jan-18	NA	NA	Phase III Released
16012	1997	2.0	26	Jun-11	Jan-18	Jan-18	NA	NA	Phase III Released
16013	1997	3.2	26	Jun-11	Jan-18	Jan-18	NA	NA	Phase III Released
16014	1998	7.4	25	Jun-11	Jun-11	Jan-18	NA	NA	Phase III Released
16015	1998	2.0	25	Jun-11	Jan-18	Jan-18	NA	NA	Phase III Released
16016	1999	22.7	24	Jun-11	Jan-18	Jan-18	NA	NA	Phase III Released
Grand Totals		**182.5**							
South Taylor Pit									
ST001	2011	46.1	12	Jan-16			19.1	23.7	Only 44.8 acres Phase I released in 2016-19.1 ac Sagebrush Steep/3.3 acres study area/23.7 ac Grassland
ST002	2012	6.3	11	Aug-13	Oct-19		0.0	6.3	
ST003	2013	1.2	10	Jan-16	Oct-19		0.0	1.2	
ST004	2014	12.2	9	Jan-16			0.0	12.2	Only 4.5 acres Phase I released in 2016
ST005	2016	1.4	7	Aug-18			1.4	0.0	Wildland Fire Area no backfill and grading occurred or topsoil stripping
Grand Totals		**67.2**					**20.5**	**43.4**	67.2 Acres seeded as grazingland.
Gossard Loadout/Facilities Areas									
GF01	2016	3.4	7	Aug-18	Oct-20		3.4	0.0	Lower Admin Building
GF03	2017	17.7	6				17.7	0.0	This was the raw water pipeline.
GF04	2017	10.4	6				0.0	10.4	
Grand Total		**31.5**					**21.1**	**10.4**	31.5 Acres seeded as grazingland.
Collom									
C01	2016	0.3	7	Aug-18			0.3	0.0	This was brushing only.
C02	2016	0.2	7	Aug-18			0.2	0.0	This was brushing only.
C03	2016	0.1	7				0.1	0.0	This was brushing only.
C05	2016	0.1	7	Aug-18			0.1	0.0	This was brushing only.
C06	2018	14.8	5				15.0	0.0	
C07	2022	0.2	1				0.0	0.2	This was surface disturbance only for a fire line. No backfilling or topsoil replacement occurred.
C08	2022	1.0	1				0.0	1.0	This was surface disturbance only for a fire line. No backfilling or topsoil replacement occurred.
C09	2022	0.3	1				0.0	0.3	This was surface disturbance only for a fire line. No backfilling or topsoil replacement occurred.
C10	2022	0.2	1				0.0	0.2	This was surface disturbance only for a fire line. No backfilling or topsoil replacement occurred.
C11	2022	0.1	1				0.0	0.1	This was surface disturbance only for a fire line. No backfilling or topsoil replacement occurred.
C12	2022	0.2	1				0.0	0.2	This was surface disturbance only for a fire line. No backfilling or topsoil replacement occurred.
C13	2022	0.2	1				0.0	0.2	This was surface disturbance only for a fire line. No backfilling or topsoil replacement occurred.
C14	2022	0.1	1				0.0	0.1	This was surface disturbance only for a fire line. No backfilling or topsoil replacement occurred.
C15	2022	0.1	1				0.0	0.1	This was surface disturbance only for a fire line. No backfilling or topsoil replacement occurred.
C16	2022	0.5	1				0.0	0.5	This was surface disturbance only for a fire line. No backfilling or topsoil replacement occurred.
Grand Total		**18.4**					**15.7**	**2.9**	

Figure 2-3 – Colowyo Seed Tag Documentation



Granite Seed - Lehi
From: 1697 W 2100 N
Lehi, UT 84043

Mix Name: **Table 2.05-7 Grassland** **1-60521**

Mix #: **210296** **. Table 2.05-7 Grassland**

% Pure	Common Name	Variety	G + D or H	Origin
14.85	BLUEBUNCH WHEATGRAS BEARDLESS	Whitmar	92 + 3 = 95	WA
12.77	SALTBUSH, FOURWING	Natrona	89 -TZ	AZ
11.84	WESTERN WHEATGRASS	Rosana	81 + 9 = 90	MT
9.25	THICKSPIKE WHEATGRASS	Critana	88 + 0 = 88	WA
7.26	BROMEGRASS, MOUNTAIN	Bromar	98 -TZ	WA
5.92	MOUNTAIN SNOWBERRY	VNS	90 -TZ	UT
5.73	MILKVETCH, CICER	Lutana	19 + 74 = 93	MT
5.44	SLENDER WHEATGRASS	Revenue	98 + 0 = 98	CAN
3.90	SAGEBRUSH, MOUNTAIN BIG	VNS	91 -TZ	UT
3.82	WILDRYE, GREAT BASIN	NBR	93 -TZ	OR
3.70	FESCUE, ROCKY MOUNTAIN	VNS	96 -TZ	CAN
2.20	GREEN NEEDLEGRASS	Lodorm	8 + 89 = 97	MT
2.09	BLUE FLAX	Appar	85 -TZ	MT
1.81	PENSTEMON, ROCKY MOUNTAIN	Bandera	98 -TZ	OR
0.76	YARROW, WESTERN	Eagle	94 -TZ	WA

0.03 Other Crop
8.49 Inert Matter
0.07 Weed Seed

Date Tested 04-Dec-19
Hard Seed 7.86
Noxious Weed NONE FOUND

Net Weight: 24.00 Lbs. PLS 28.16 Lbs. Bulk

Coverage: 2.000 Acre

NOTICE TO BUYER LIMITATIONS OF WARRANTIES AND REMEDIES

Crop yield and quality are dependent upon many factors beyond the control of the labeled seller and NO WARRANTY is made for crop yield and quality. The labeled seller warrants that all seed sold has been labeled as required under applicable state and federal seed law and that the seed conforms to the label description, within recognized tolerances. THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION ON THE LABEL.

No claim shall be asserted against the labeled seller unless Buyer reports to the labeled seller within a reasonable period after discovery (not to exceed thirty days), any condition that might lead to a complaint. BUYER'S EXCLUSIVE REMEDY FOR ANY CLAIM OR LOSS RESULTING FROM BREACH OF WARRANTY, BREACH OF CONTRACT OR NEGLIGENCE (INCLUDING BUT NOT LIMITED TO INCIDENTAL OR CONSEQUENTIAL DAMAGES) SHALL BE LIMITED TO REPAYMENT OF THE PURCHASE PRICE.

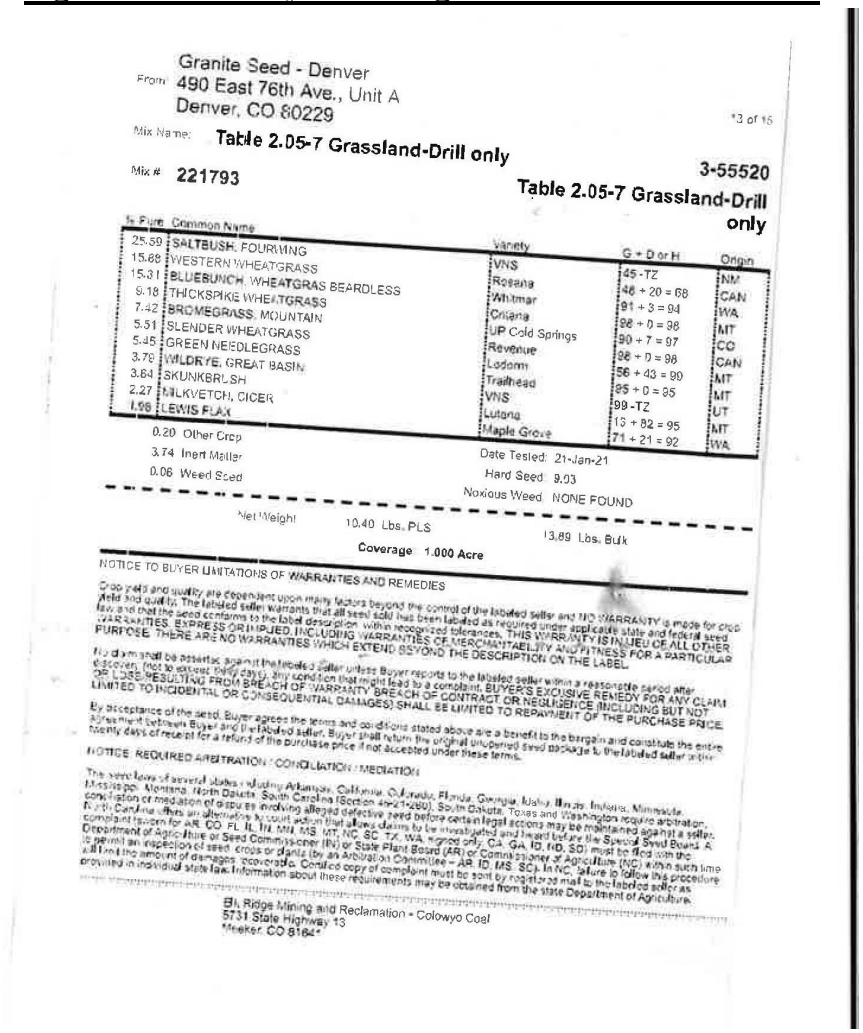
By acceptance of the seed, Buyer agrees the terms and conditions stated above are a benefit to the bargain and constitute the entire agreement between Buyer and the labeled seller. Buyer shall return the original unopened seed package to the labeled seller within twenty days of receipt for a refund of the purchase price if not accepted under these terms.

NOTICE: REQUIRED ARBITRATION / CONCILIATION / MEDIATION

The seed laws of several states including Arkansas, California, Colorado, Florida, Georgia, Idaho, Illinois, Indiana, Minnesota, Mississippi, Montana, North Dakota, South Carolina (Section 46-21-260), South Dakota, Texas and Washington require arbitration, conciliation or mediation of disputes involving alleged defective seed before certain legal actions may be maintained against a seller. North Carolina offers an alternative to court action that allows claims to be investigated and heard before the Special Seed Board. A complaint (sworn for AR, CO, FL, IL, IN, MN, MS, MT, NC, SC, TX, WA; signed only CA, GA, ID, ND, SD) must be filed with the Department of Agriculture or Seed Commissioner (IN) or State Plant Board (AR) or Commissioner of Agriculture (NC) within such time to permit an inspection of seed, crops or plants (by an Arbitration Committee – AR, ID, MS, SC). In NC, failure to follow this procedure will limit the amount of damages recoverable. Certified copy of complaint must be sent by registered mail to the labeled seller as provided in individual state law. Information about these requirements may be obtained from the state Department of Agriculture.

Elk Ridge Mining and Reclamation - Colowyo Coal
5731 State Highway 13
Meeker, CO 81641

Figure 2-3 – Colowyo Seed Tag Documentation Continued



Granite Seed - Denver
From: 490 East 76th Ave., Unit A
Denver, CO 80229

*3 of 15

Mix Name: **Table 2.05-7 Grassland-Drill only**

Mix # **221793**

3-55520

Table 2.05-7 Grassland-Drill only

% Pure	Common Name	Variety	G + D or H	Origin
25.59	SALTBUSH, FOURWING	VNS	45 -TZ	NM
15.68	WESTERN WHEATGRASS	Rosana	46 + 20 = 66	CAN
15.31	BLUEBUNCH, WHEATGRAS BEARDLESS	Whitmar	91 + 3 = 94	WA
9.18	THICKSPIKE WHEATGRASS	Critana	98 + 0 = 98	MT
7.42	BROMEGRASS, MOUNTAIN	UP Cold Springs	90 + 7 = 97	CO
5.51	SLENDER WHEATGRASS	Revenue	98 + 0 = 98	CAN
5.45	GREEN NEEDLEGRASS	Lodorm	56 + 43 = 99	MT
3.78	WILDRYE, GREAT BASIN	Trailhead	85 + 0 = 85	MT
3.64	SKUNKBRUSH	VNS	99 -TZ	UT
2.27	MILKVETCH, CICER	Lutana	13 + 82 = 95	MT
1.98	LEWIS FLAX	Maple Grove	71 + 21 = 92	WA

0.20 Other Crop
3.74 Inert Matter
0.06 Weed Seed

Date Tested: 21-Jan-21
Hard Seed 9.03
Noxious Weed NONE FOUND

Net Weight 10.40 Lbs. PLS 13.89 Lbs. Bulk

Coverage 1.000 Acre

NOTICE TO BUYER LIMITATIONS OF WARRANTIES AND REMEDIES

Crop yield and quality are dependent upon many factors beyond the control of the labeled seller and NO WARRANTY is made for crop yield and quality. The labeled seller warrants that all seed sold has been labeled as required under applicable state and federal seed law, and that the seed conforms to the label description within recognized tolerances. THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION ON THE LABEL.

No claim shall be asserted against the labeled seller unless Buyer reports to the labeled seller within a reasonable period after discovery, (not to exceed thirty days), any condition that might lead to a complaint. BUYER'S EXCLUSIVE REMEDY FOR ANY CLAIM OR LOSS RESULTING FROM BREACH OF WARRANTY, BREACH OF CONTRACT OR NEGLIGENCE (INCLUDING BUT NOT LIMITED TO INCIDENTAL OR CONSEQUENTIAL DAMAGES) SHALL BE LIMITED TO REPAYMENT OF THE PURCHASE PRICE.

By acceptance of the seed, Buyer agrees the terms and conditions stated above are a benefit to the bargain and constitute the entire agreement between Buyer and the labeled seller. Buyer shall return the original unopened seed package to the labeled seller within twenty days of receipt for a refund of the purchase price if not accepted under these terms.

NOTICE REQUIRED ARBITRATION / CONCILIATION / MEDIATION

The seed laws of several states including Arkansas, California, Colorado, Florida, Georgia, Idaho, Illinois, Indiana, Minnesota, Mississippi, Montana, North Dakota, South Carolina (Section 46-21-280), South Dakota, Texas and Washington require arbitration, conciliation or mediation of disputes involving alleged defective seed before certain legal actions may be maintained against a seller. North Carolina offers an alternative to court action that allows claims to be investigated and heard before the Special Seed Board. A complaint is given for AR, CO, FL, IL, IN, MN, MS, MT, NC, SC, TX, WA, signed only, CA, GA, ID, ND, SD) must be filed with the Department of Agriculture or Seed Commissioner (IN) or State Plant Board (AR) or Commissioner of Agriculture (NC) within such time as permit an inspection of seed, crops or plants (by an Arbitration Committee – AR, ID, MS, SC). In NC, failure to follow this procedure will limit the amount of damages recoverable. Certified copy of complaint must be sent by registered mail to the labeled seller as provided in individual state law. Information about these requirements may be obtained from the state Department of Agriculture.

Bk Ridge Mining and Reclamation - Colowyo Coal
5731 State Highway 13
Meeker, CO 8164*

SECTION 3 – REGRADED OVERBURDEN SAMPLING

RULE REQUIREMENT

Rule 2.04.13(2) the Permittee may provide additional monitoring information as required by the approved permit.

Specific overburden sample levels can be referenced in Volume 1 Section 2.05.3.

GENERAL DISCUSSION

Colowyo sampled 16 locations of regraded overburden during 2022. Results from both samples did not exceed parameter thresholds. Please see Figure 3-1 for analytical results for all samples taken in 2022.

Figure 3-1 – Regraded Overburden Analytical Results

GRID #	DATE	EC (mmhos/cm)	pH	SAR
Y-20	22-Jul-22	2.52	7.4	2.08
Z-20	22-Jul-22	3.13	7.4	2.28
AA-20	22-Jul-22	3.27	7.4	1.94
BB-21	22-Jul-22	2.84	7.5	3.31
CC-22	22-Jul-22	2.81	7.1	2.20
CC-23	22-Jul-22	2.34	7.1	0.48
Z-21	22-Jul-22	2.11	7.3	1.01
Y-21	22-Jul-22	2.75	7.4	2.41
AA-21	22-Jul-22	1.99	7.5	0.67
DD-22	19-Aug-22	0.41	8.1	1.49
DD-23	19-Aug-22	1.74	6.9	2.28
Z-20	01-Sep-22	2.35	7.2	1.91
W-22	01-Sep-22	3.89	7.5	6.35
X-22	01-Sep-22	1.51	7.5	3.07
Y-22	01-Sep-22	0.72	7.6	0.65
AA-22	01-Sep-22	0.84	7.5	0.52

SECTION 4 – INTERIM REVEGETATION MONITORING REPORT

RULE REQUIREMENT

Rule 2.04.13(2) the Permittee may provide additional monitoring information as required by the approved permit.

GENERAL DISCUSSION

The Interim Revegetation Monitoring Report can be found in Exhibit 4.

Exhibit 4

Interim Vegetation Report

Colowyo Mine

Permit No. C-1981-019

2022 Revegetation Monitoring Report

February, 2023

CEDAR CREEK ASSOCIATES, INC.

Table of Contents

Colowyo Mine

Permit Number: C-1981-019

2022 Revegetation Monitoring Report

Revegetation Units:	Reference Areas:
EP061 WP021 WP026 WP027	Mountain Shrub
WP028 WP029 WP032	Sagebrush

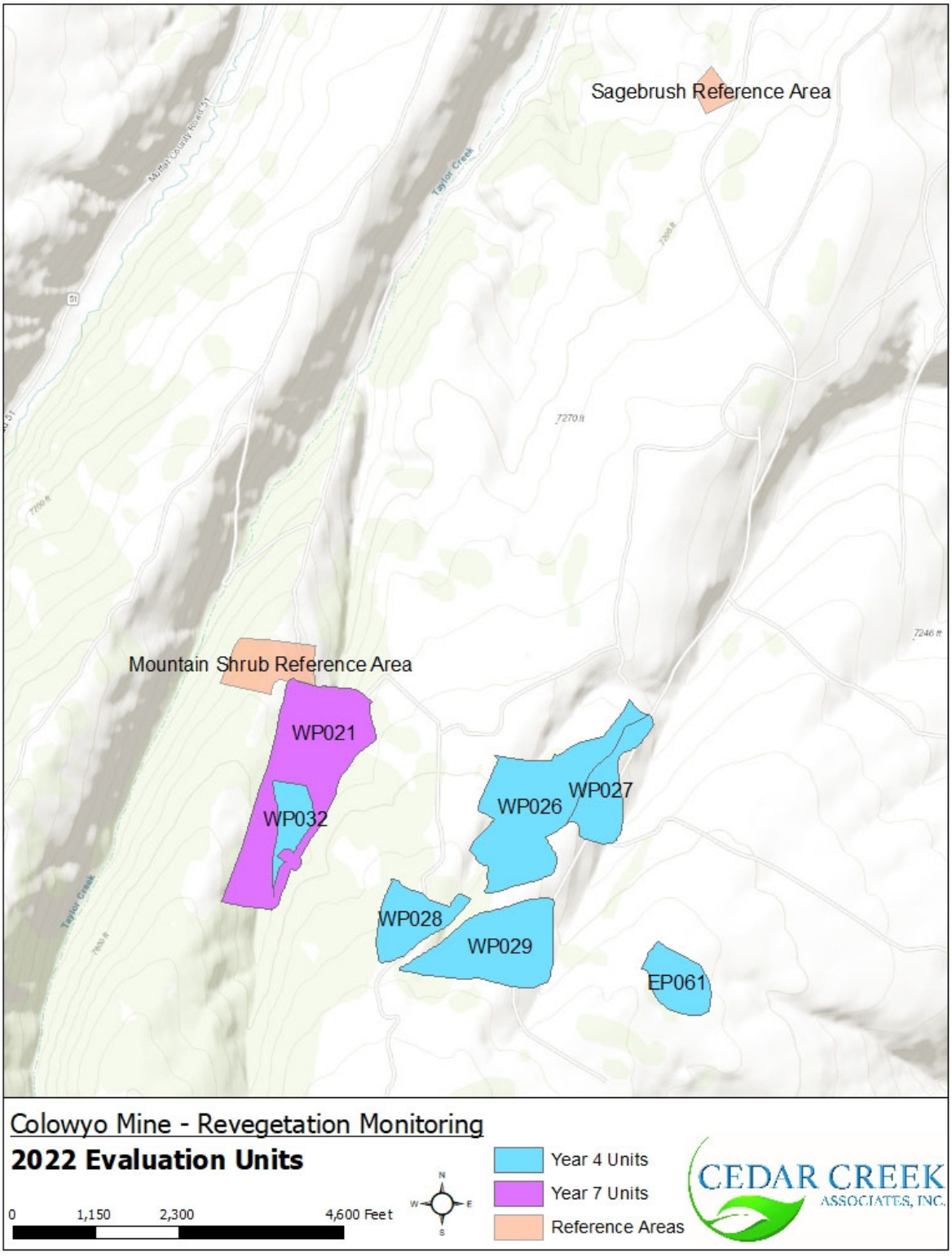
1.0 INTRODUCTION

Cedar Creek Associates, Inc. (Cedar Creek) was contracted in 2022 by Colowyo Coal Company (Colowyo) to implement a revegetation monitoring program within selected revegetated units at the Colowyo Mine. Monitoring was performed in the interest of ascertaining progress toward revegetation success in general accordance with Rule 3.03, Release of Performance Bonds. The revegetated areas evaluated in 2022 consisted of one unit within the East Pit and six units within the West Pit. Units evaluated in 2022 range in size from 10.5 acres to 75.4 acres. At the time of sampling, revegetation within evaluated units had experienced either 4 or 7 growing seasons following completion of seeding. In addition, two reference areas (Mountain Shrub – 1980 and Sagebrush – 1981) were sampled to provide cover and production comparison values to facilitate an evaluation of progress toward success for the reclaimed units. The location of each unit and associated reference areas evaluated in 2022 are indicated on Map 1, and the sample points within each area are provided on "in-text" maps for each unit in Section 3.0.

Field sampling for the directly measurable variables of ground cover, woody plant density (WPD), current annual production (seventh growing season units only) and species diversity was systematically conducted within the designated units from August 2nd through August 5th, 2022. Field efforts in 2022 were conducted under the direct supervision of Cedar Creek's Senior Reclamation Ecologist and Soil Specialist, Mr. Jesse H. Dillon.

The remainder of this document is divided into logical sections. Section 2.0 describes the revegetation performance standards. Section 3.0 provides results separated first by mine area (East Pit and West Pit) and then by revegetation unit. Each unit and resulting data/mapping are presented separately, along with a brief discussion of pertinent observations and/or recommendations. Section 4.0 presents conclusions and recommendations. Descriptions of vegetation sampling methodologies utilized in 2022 are presented in the Colowyo permit (Volume 1, section 4.15.11). Raw data tables and summaries are presented in Appendix

A. In this manner, only the most salient information is provided in the main body of this document. Acreages presented in this document were determined by Colowyo's technical services department.

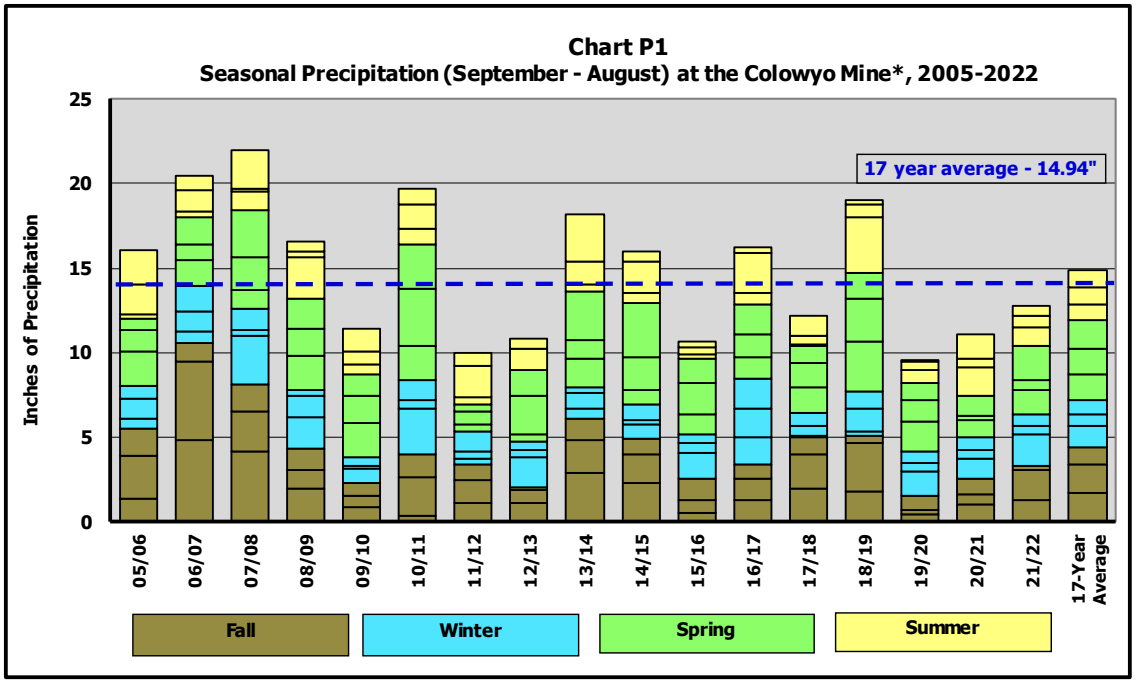

Sagebrush Reference Area
Mountain Shrub Reference Area
WP021
WP032
WP026
WP027
WP028
WP029
EP061
Taylor Creek
Colowyo Mine - Revegetation Monitoring
2022 Evaluation Units
0
1,150
2,300
4,600 Feet
N
W
E
S
Year 4 Units
Year 7 Units
Reference Areas
CEDAR CREEK
ASSOCIATES, INC.

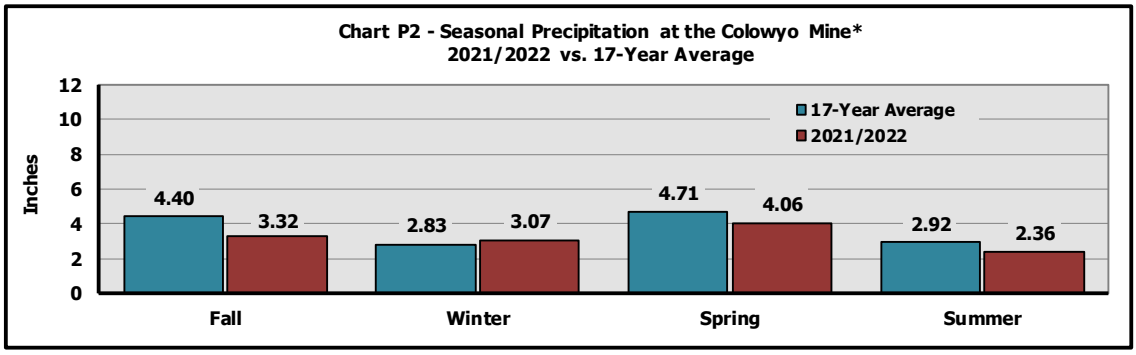
1.1 Climate Data

Precipitation data presented on Table P and Charts P1 and P2 is the average of two weather stations at the Colowyo Mine (SCN16 and SCN34 from 2006 to present). Table P presents precipitation accumulated annually at the Colowyo Mine over the past 17 years. Charts P1 and P2 display historical precipitation data organized by growing season. Precipitation in the project area for the 2021/2022 growing season (September 2021 through August 2022) was determined to be 86% of average when compared to the 17-year average (12.81 in. vs. 14.87 in.).

Perusal of Chart P2 indicates that 2021 fall precipitation was below average with 3.32 inches, 75% of the 17-year average. Winter of 2021 and Spring of 2022 saw approximately average levels with 3.07 inches, (108% of average) and 4.06 inches (86% of average) of precipitation, respectively. Summer of 2022 received slightly below average levels with 2.36 inches (81% of average). Since growing season precipitation were approximately average or just below average in 2021 and 2022, and well below average during 2019 and 2020, collected data are reflective of at or below average vegetative vigor and production. Further, it is not uncommon to observe an increase in opportunistic annuals such as annual bromes. In areas where perennial vegetation remains dominant, stress responses such as these will normally correct themselves once climate conditions improve.

Table P - Annual Precipitation at the Colowyo Mine*, 2006-2022													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2006	1.19	0.71	2.01	1.33	0.64	0.25	1.77	2.02	4.83	4.62	1.15	0.63	**21.15**
2007	1.21	1.50	1.54	0.92	1.67	0.30	1.27	0.84	4.18	2.38	1.60	2.84	**20.22**
2008	0.35	1.24	1.14	1.94	2.79	1.08	0.17	2.32	1.94	1.16	1.28	1.81	**17.19**
2009	1.32	0.31	1.99	1.67	1.79	2.42	0.33	0.59	0.85	0.71	0.78	0.81	**13.54**
2010	0.16	0.51	2.05	1.64	1.20	0.64	0.78	1.35	0.34	2.34	1.30	2.73	**15.01**
2011	0.55	1.18	1.96	3.45	2.59	0.93	1.38	0.96	1.09	1.38	0.90	0.38	**16.74**
2012	0.40	1.17	0.46	0.73	0.42	0.48	1.85	0.79	1.15	0.73	0.22	1.77	**10.13**
2013	0.43	0.45	0.45	2.25	1.54	0.00	1.26	0.60	2.93	1.96	1.24	0.60	**13.69**
2014	0.91	0.36	1.66	1.14	2.81	0.46	1.30	2.86	2.31	1.68	0.91	0.86	**17.26**
2015	0.27	0.93	0.88	1.91	3.24	0.59	1.87	0.57	0.52	0.79	1.29	1.51	**14.34**
2016	0.56	0.50	1.23	1.81	1.48	0.22	0.44	0.33	1.32	1.24	0.85	1.63	**11.58**
2017	1.63	1.80	1.31	1.31	1.79	0.69	2.34	0.38	1.95	2.03	1.02	0.14	**16.36**
2018	0.60	0.75	1.46	1.45	1.04	0.07	0.53	1.16	1.81	2.84	0.42	0.28	**12.36**
2019	1.37	1.02	2.98	2.47	1.55	3.30	0.78	0.22	0.44	0.30	0.78	1.49	**16.70**
2020	0.49	0.70	1.77	1.25	1.03	0.73	0.48	0.08	1.04	0.59	0.92	1.19	**10.27**
2021	0.48	0.80	1.04	0.25	1.17	1.65	0.50	1.50	1.28	1.80	0.25	1.90	**12.60**
2022	0.43	0.75	1.40	0.62	2.04	1.03	0.73	0.61	2.12	2.35	1.73	2.04	**15.83**
17 Year Avg.	**0.74**	**0.87**	**1.49**	**1.59**	**1.67**	**0.86**	**1.06**	**1.03**	**1.75**	**1.66**	**0.93**	**1.28**	**14.94**





* An average of data collected by Colowyo Weather Stations SCN16 and WSTPT prior to 2009, and then from stations SCN16 and SCN34 due to the relocation of WSTPT.

2.0 REVEGETATION SUCCESS STANDARDS

Colowyo has made the commitment to establish reclaimed plant communities that meet the designated post mining land use of rangeland, with the subcomponents of grazingland and wildlife habitat [Volume 1, Section 2.05.5]. Areas designated as grazingland for the post mining land use will aim to establish vegetation communities comprised of species primarily selected for palatability and production, with incidental wildlife habitat, implemented on those lands with slopes greater than 10%. Areas designated for wildlife habitat as the post mining land use will aim to establish a sagebrush steppe vegetation community and will be limited to those lands with slopes less than 10%.

Three reference areas selected to represent the three major vegetative communities are utilized to evaluate revegetation success at Colowyo; the Mountain Shrub reference area, Sagebrush reference area, and Collom Aspen reference area. The comparison between the reclamation area and the reference area occurs as follows:

East and West Pit (Including Gossard Facilities) Reclamation Areas - Reclaimed areas shall be compared to weighted parameters from the Mountain Shrub reference area (55% weight) and the Sagebrush reference area (45% weight) in accordance with Rule 4.15.7(4)(b).

South Taylor Pit Reclamation Areas - Areas reclaimed to grazing land shall be compared to weighted parameters from the Mountain Shrub reference area (52% weight), the Sagebrush reference area (25% weight), and the Collom Aspen reference area (23% weight) in accordance with Rule 4.15.7(4)(b).

Reference areas are utilized to test revegetation success for the metrics of herbaceous cover and herbaceous production, while woody plant density and diversity metrics are compared against technical standards. In addition, South Taylor reclamation areas require the establishment of aspens and tall shrubs, but establishment is not addressed in the monitoring efforts. The success criteria for each revegetation metric are described below:

Herbaceous Cover - For revegetation targeting (and achieving) the rangeland land use subcomponents of grazingland and wildlife habitat, herbaceous cover of the revegetated area will be considered adequate for final bond release if it is not less than 90% of the herbaceous cover as determined from the reference areas with a 90% statistical confidence utilizing a standard students statistical t-test comparison of the means, as described in Rule 4.15.8 (3) (a).

Herbaceous Production - For revegetation targeting the rangeland land use subcomponents of grazingland and wildlife habitat, herbaceous production of the revegetated area will be considered

adequate for final bond release if it is not less than 90% of the herbaceous production, as determined from the reference areas with a 90% statistical confidence utilizing a standard students statistical t-test comparison of the means, as described in Rule 4.15.8 (4).

Woody Plant Density - Where shrubs establish to form wildlife habitat, they will be segregated into low and high-density areas, each with a separate woody plant density success criterion. On high-density areas (areas of shrub concentration), the standard shall be 375 live woody plants per acre. At least one-half of these totals shall be sagebrush species, big sagebrush (*Artemisia tridentata*) or silver sagebrush (*Artemisia cana*). In low-density areas, the standard shall be 200 plants per acre. Furthermore, Colowyo will establish wildlife habitat areas, comprised of both low and high-density areas, on approximately 20% of the acres in each bond release evaluation, with at least 50% of those acres representing high-density areas. The grazingland acres will not be subject to woody plant density standards.

Diversity - The revegetation objective for diversity will be to establish at least four native* perennial species, each more than 3% composition, minimum of two of which are grasses and a minimum of one which is a forb, with the following caveat; If no single forb species exceeds 3% composition, the forb requirement can be met if:

a) at least two native* perennial forbs combined comprise at least 2% composition, or;
b) at least four native* perennial forbs combined comprise at least 1% composition.

The dominant species will contribute to the appropriate structure and stability of the post-mining vegetative community.

* The limitation to native status will not apply to introduced (and CDRMS approved taxa) specifically planted for an approved use such as Orchard grass or Cicer milkvetch.

3.0 RESULTS

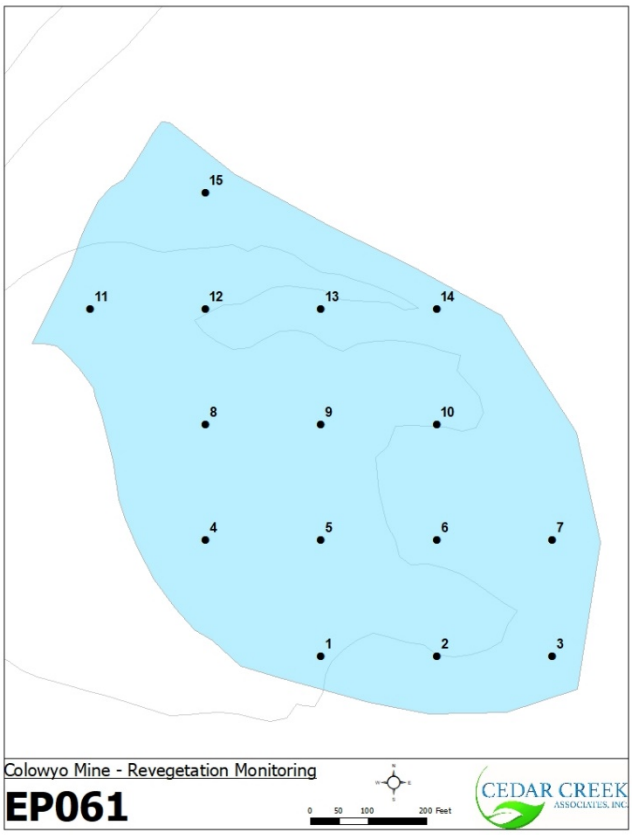
In 2022, five evaluated units (EP061, WP026, WP027, WP028, WP029) have existed for four years and were assessed with ground cover, diversity and woody plant density sampling protocols. Two evaluated units (WP021, WP032) have existed for seven growing seasons were assessed with ground cover, diversity, woody plant density, and production sampling protocols. Summaries of the results of all units are presented in in-text compendia, with additional summaries and raw data presented in Appendix A. Reference Area results are summarized in Appendix A along with additional raw data.

Considering the 2022 evaluation effort as a whole, observed revegetation at Colowyo is generally in fair condition and on a path to demonstrate success. As seems to be normal for Colowyo revegetation, a few younger units exhibit elevated levels of early seral taxa (annual weedy species). However, based on past history it is unlikely these units will need remediation (herbicide treatment), except in rare occasions, given that precipitation patterns in the area tend to favor seeded perennials over time. The unfavorable precipitation in the fall of 2019 which continued through 2020 and 2021 likely slowed the progress of the younger units but was not detrimental. These units should be closely monitored moving forward as revegetated communities continue to mature.

The following sections (Sections 3.1 to 3.6) provide a brief narrative of the results from each individual unit evaluated by Cedar Creek. Also included for each unit is a map indicating the 2022 sample points and a one-page summary (compendium) of all pertinent data collected from the unit in 2022 and previous years, if applicable.

3.1 East Pit

3.1.1 EP061 – Year 4 Unit



EP061 is comprised of approximately 14.50 acres of generally flat revegetation. This unit was seeded in 2018 and therefore, was undergoing its fourth growing season in 2022 (Compendium 1). Averages were determined from 15 transects in 2022.

Cover by desirable perennial plants in 2022 averaged 25.0% which is an increase from Year 2 sampling (12.1%). Annual forbs initially exhibited elevated cover in Year 2, but have decreased substantially in 2022 with 5.9% average cover. Noxious weeds other than cheatgrass have not contributed any cover through years 2 and 4. Cheatgrass has exhibited very low cover overall with a high of 3.3% average cover in Year 4. Annual forbs and grasses tend to decrease on Colowyo's reclamation as perennial plant communities develop.

There were 35 total species observed on this unit in 2022. There were 6 native perennial grasses with >3% relative cover, however, no perennial forbs met this standard. Only two perennial forb was recorded with 1.0% relative cover.

Woody plant density indicated 4,807.7 stems per acre in 2022 consisting of big sagebrush, silver sagebrush, and roundleaf snowberry (*Symphoricarpos rotundifolius*). Given the density of shrubs in the unit, the entire area will likely be included as wildlife habitat.

Unit EP061 exhibited improvement from Year 2 and exceptional perennial cover in Year 4, however it did not meet the diversity success criteria. It is recommended that this unit be evaluated in 2025 for Year 7 per Colowyo's monitoring schedule.

Compendium 1 2022

EP061

Location: **East Pit**
Acres: **14.5**
First Growing Season: **2018**
Targeted Post-Mining Community: **Grazingland Wildlife Habitat**

Ground Cover Results

Number of Ground Cover Transects = 15

	Average Ground Cover (%)			Relative Ground Cover (%)			Species Observed (#)		
	Year 2	Year 4	Year 7	Year 2	Year 4	Year 7	Year 2	Year 4	Year 7
Perennial Grasses	10.1	22.8		34.0	50.5		10	16	
Perennial Forbs	0.1	0.5		0.5	1.0		2	2	
Sub-shrubs	-	-		-	-		-	-	
Shrubs & Trees	1.8	1.7		6.1	3.8		1	1	
Annual Grass	-	10.9		-	24.2		-	1	
Annual / Biennial Forbs	15.5	5.9		52.5	13.0		8	14	
Noxious Weeds - Cheatgrass	2.1	3.3		7.0	7.4		-	1	
Noxious Weeds - Other	-	-		-	-		1	1	
Litter	18.5	23.4							
Rock	0.9	0.9							
Bareground	50.9	30.6							
Total	**100.0**	**100.0**		**100.1**	**100.0**		**22.0**	**36.0**	
Total Plant Cover	**29.7**	**45.1**							
Total Perennial Cover	**12.1**	**25.0**		**40.6**	**55.4**				
Allowable Perennial Herbaceous Cover	**10.3**	**23.3**		**34.5**	**51.6**				

Woody Plant Density Results

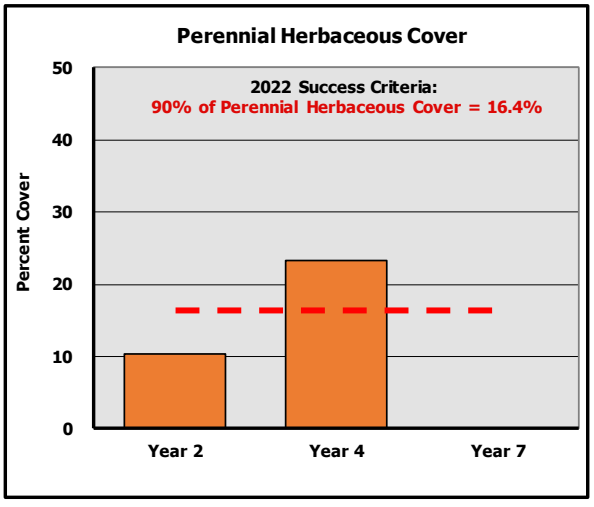
Number of Woody Plant Density Belts = 15

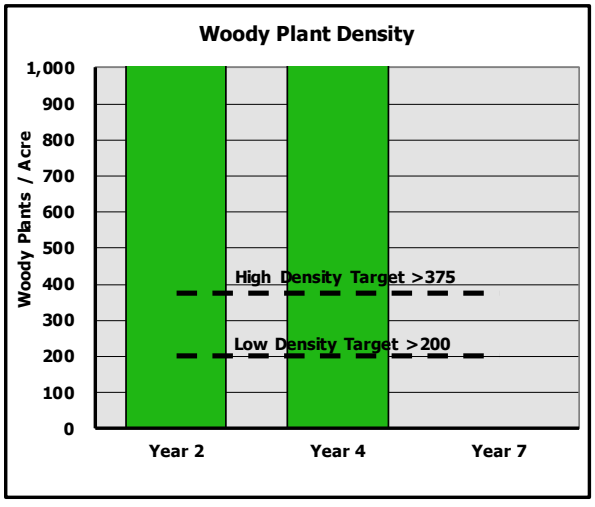
		Stems per Acre		
		Year 2	Year 4	Year 7
Artemisia cana	Silver Sagebrush	5.4	8.1	
Artemisia tridentata	Big Sagebrush	3,402.1	4,799.6	
Chry nause	Rubber Rabbitbrush	2.7	-	
Purshia tridentata	Antelope Bitterbrush	2.7	-	
Symphoricarpos rotundifolius	Roundleaf Snowberry	-	2.7	
Total		**3,412.9**	**4,810.4**	
Sagebrush Contribution (%)		100%	100%	
Percent of Transects Exceeding High-Density Standard (375 Stems per acre)		100%	93%	
Percent of Transects Exceeding Low-Density Standard (Between 200 and 375 Stems per acre)		100%	0%	

Production Results

		lbs per Acre
		Year 7
Perennial Grasses		
Perennial Forbs		
Sub-shrubs		
Annual Grasses		
Annual / Biennial Forbs		
Noxious Weeds	Cheatgrass	
	Other	
Total Production		
Total Perennial Production		
Allowable Perennial Herb. Production		

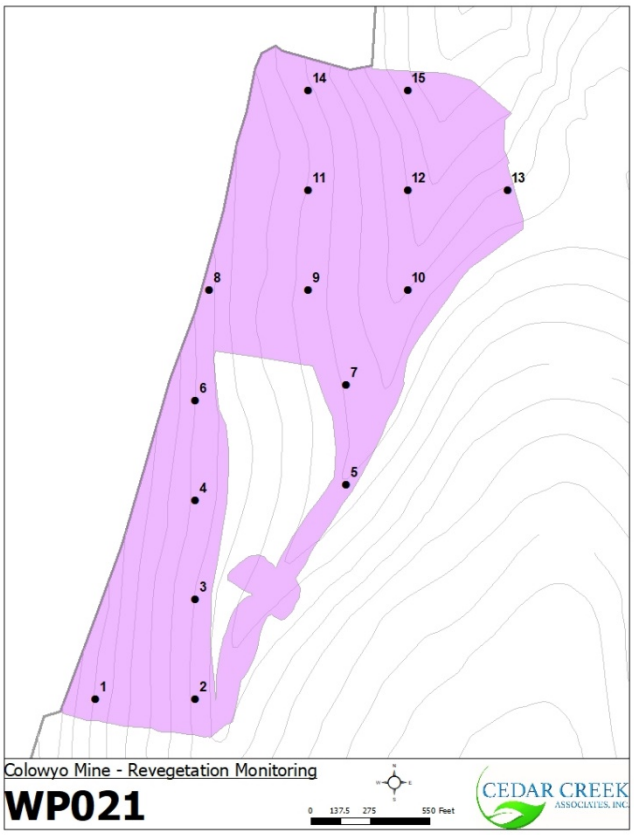
* Evolving post-mining vegetation communites (Wildlife Habitat) will be delineated after Year 7 evaluation, in preparation for bond release evaluation.





3.2 West Pit

3.2.1 WP021 – Year 7 Unit



Unit WP021 is comprised of approximately 75.4 acres of moderately to steeply sloped revegetation. This unit was seeded in 2015, and therefore, was undergoing its seventh growing season in 2022 (Compendium 2). Averages for ground cover, diversity, and WPD were determined by 15 transects in 2022. Average production was determined by 5 quadrats in 2022.

Ground cover by desirable perennial plants averaged 41.1% cover in 2022. Annual forb cover decreased from 11.4% in Year 4 to 3.3% in Year 7. Cheatgrass exhibited 1.9% average cover, while other noxious weeds comprised 0.1% cover.

There were 22 total species observed on this unit in 2022. There were 5 native perennial grasses with >3% relative cover, however, no perennial forbs met this standard. Only one perennial forb was recorded with 0.1% relative cover.

Woody plant density indicated 40.5 stems per acre in 2022, consisting entirely of big sagebrush. Only 2 of the 15 transects (13% of transects) exhibited densities between 200 and 375 stems per acre. It is likely that most of this unit will be considered Grazingland, with the potential for small patches of wildlife habitat. Perennial herbaceous production was determined by 5 plots and averaged 1,225.6 pounds per acre, significantly above the success criteria of 326.6 pounds per acre.

Unit WP021 exhibited excellent perennial cover and production in Year 7, however it did not meet the diversity success criteria. It is recommended that this unit be evaluated in 2024 for Year-9 bond release sampling.

Compendium 2 2022

WP021

Location: **West Pit**
Acres: **75.4**
First Growing Season: **2015**

Targeted Post-Mining Community: **Grazingland Wildlife Habitat**

Ground Cover Results

Number of Ground Cover Transects = 15

	Average Ground Cover (%)			Relative Ground Cover (%)			Species Observed (#)		
	Year 2	Year 4	Year 7	Year 2	Year 4	Year 7	Year 2	Year 4	Year 7
Perennial Grasses	22.7	44.5	41.0	42.6	68.8	88.4	11	11	12
Perennial Forbs	0.3	0.1	0.1	0.6	0.1	0.1	4	1	1
Sub-shrubs	-	-	-	-	-	-	-	-	-
Shrubs & Trees	-	0.3	-	-	0.5	-	-	1	-
Annual Grass	0.9	6.5	-	1.7	10.1	-	1	2	-
Annual / Biennial Forbs	12.4	11.4	3.3	23.3	17.6	7.2	5	4	6
Noxious Weeds - Cheatgrass	2.5	0.1	1.9	4.6	0.1	4.0	1	1	2
Noxious Weeds - Other	14.5	1.8	0.1	27.1	2.8	0.3	4	3	3
Litter	16.1	18.3	27.1						
Rock	4.1	1.1	3.5						
Bareground	26.4	15.9	23.0						
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**26**	**23**	**24**
Total Plant Cover	**53.3**	**64.7**	**46.4**						
Total Perennial Cover	**23.1**	**44.9**	**41.1**	**43.2**	**69.4**	**88.5**			
Allowable Perennial Herbaceous Cover	**23.1**	**44.6**	**41.1**	**43.2**	**68.9**	**88.5**			

Woody Plant Density Results

Number of Woody Plant Density belts = 15

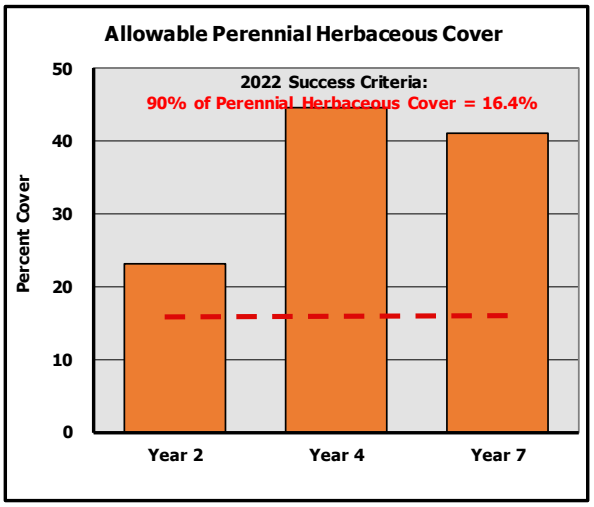
		Stems per Acre		
		Year 2	Year 4	Year 7
Artemisia tridentata	Big Sagebrush	0.0	45.9	40.5
Total		**0.0**	**45.9**	**40.5**
Sagebrush Contribution (%)		0%	100%	100%
Percent of Transects Exceeding High-Density Standard (375 Stems per acre)		0%	0%	0%
Percent of Transects Exceeding Low-Density Standard (Between 200 and 375 Stems per acre)		0%	7%	13%

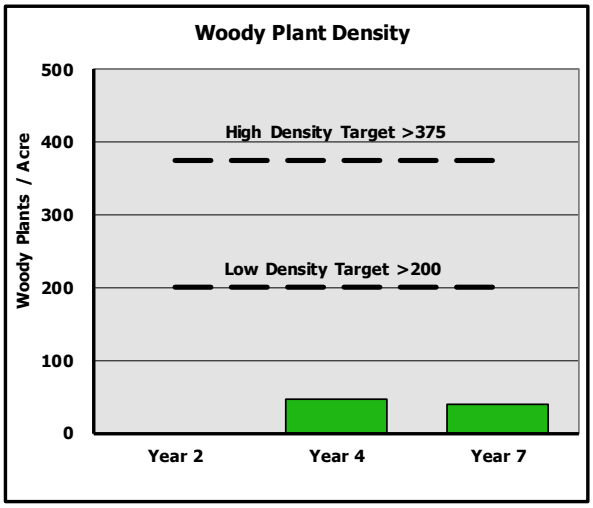
Production Results

Number of Production Plots = 5

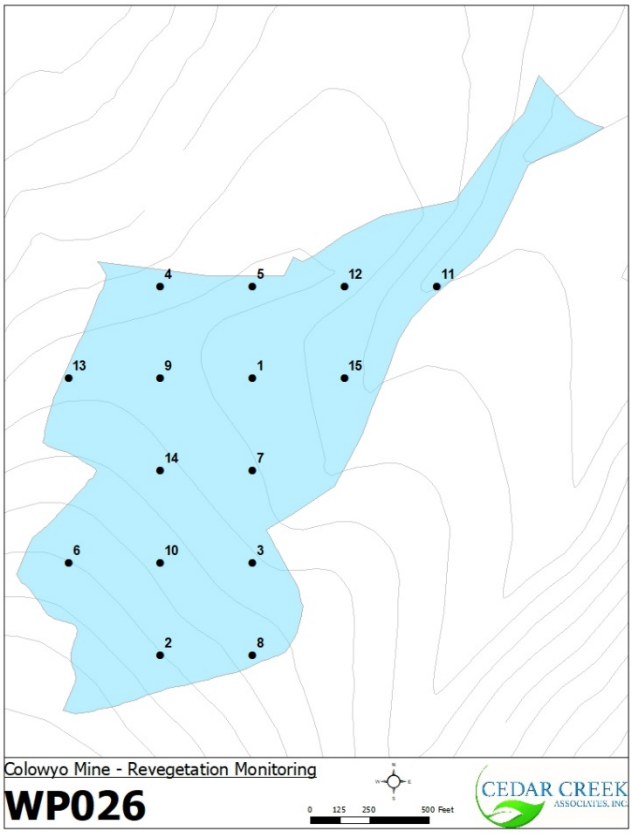
		lbs per Acre
		Year 7
Perennial Grasses		1,225.6
Perennial Forbs		0.0
Sub-shrubs		0.0
Annual Grasses		14.6
Annual / Biennial Forbs		2.1
Noxious Weeds	Cheatgrass	0.0
	Other	0.0
Total Production		**1,242.3**
Total Perennial Production		1,225.6
Allowable Perennial Herb. Production		**1,225.6**

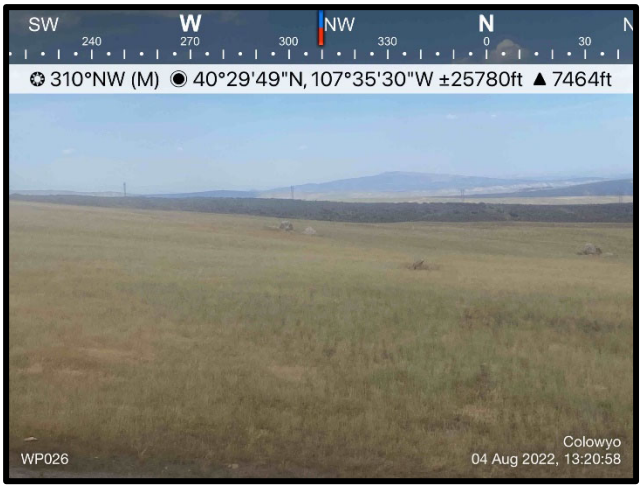
* Evolving post-mining vegetation communites (Wildlife Habitat) will be delineated after Year 7 evaluation, in preparation for bond release evaluation.





3.2.2 WP026 – Year 4 Unit





WP026 is comprised of approximately 54.2 acres of gentle to moderate sloping revegetation. This unit was seeded in 2018, and therefore, was undergoing its fourth growing season in 2022 (Compendium 3). Averages were determined by 15 transects in 2022.

Ground cover by desirable perennial plants averaged 21.5% cover in 2022. Annual forbs exhibited 5.5% average cover. Noxious weeds other than cheatgrass have not contributed any cover through Years 2 and 4. Cheatgrass has increased from 5.0% in Year 2, to 16.5% in Year 4.

There were 31 total species observed on this unit in 2022. There were 5 native perennial grasses with >3% relative cover, however, no perennial forbs met this standard. Three perennial forbs were recorded totaling 0.5% relative cover.

Woody plant density indicated 501.8 stems per acre in 2022, consisting of big sagebrush and silver sagebrush. Given the density of shrubs in the unit, the entire area will likely be included as wildlife habitat.

Unit WP026 exhibited improvement from Year 2 and exceptional perennial cover in Year 4, however it did not meet the diversity success criteria. It is recommended that this unit be evaluated in 2025 for Year 7 in accordance with Colowyo's monitoring schedule.

Compendium 3 2022

WP026

Location:	**West Pit**	Targeted Post-Mining Community:	**Grazingland Wildlife habitat**
Acres:	**54.2**		
First Growing Season:	**2018**		

Ground Cover Results

Number of Ground Cover Transects = 15

	Average Ground Cover (%)			Relative Ground Cover (%)			Species Observed (#)		
	Year 2	Year 4	Year 7	Year 2	Year 4	Year 7	Year 2	Year 4	Year 7
Perennial Grasses	9.9	21.0		40.4	48.2		7	13	
Perennial Forbs	-	0.3		-	0.8		-	4	
Sub-shrubs	-	-		-	-		-	-	
Shrubs & Trees	0.1	0.2		0.3	0.5		1	1	
Annual Grass	-	-		-	-		-	-	
Annual / Biennial Forbs	9.6	5.5		39.0	12.6		7	11	
Noxious Weeds - Cheatgrass	5.0	16.5		20.3	38.0		-	2	
Noxious Weeds - Other	-	-		-	-		1	2	
Litter	31.7	27.1							
Rock	0.3	1.8							
Bareground	43.4	27.6							
Total	**100.0**	**100.0**		**100.0**	**100.0**		**16.0**	**33.0**	
Total Plant Cover	**24.6**	**43.5**							
Total Perennial Cover	**10.0**	**21.5**		**40.7**	**49.5**				
Allowable Perennial Herbaceous Cover	**9.9**	**21.3**		**40.4**	**49.0**				

Woody Plant Density Results

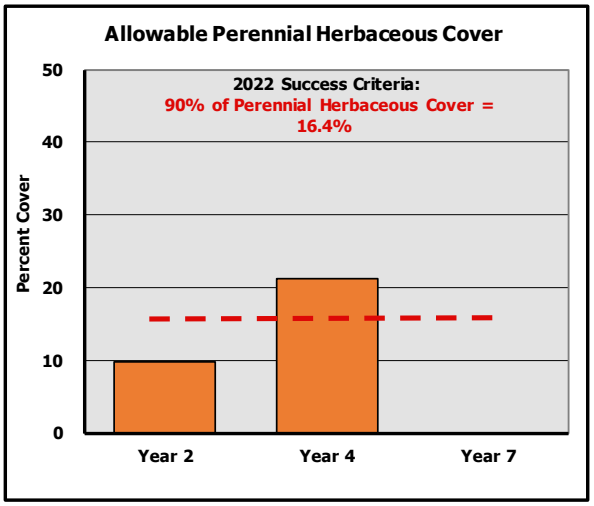
Number of Woody Plant Density belts = 15

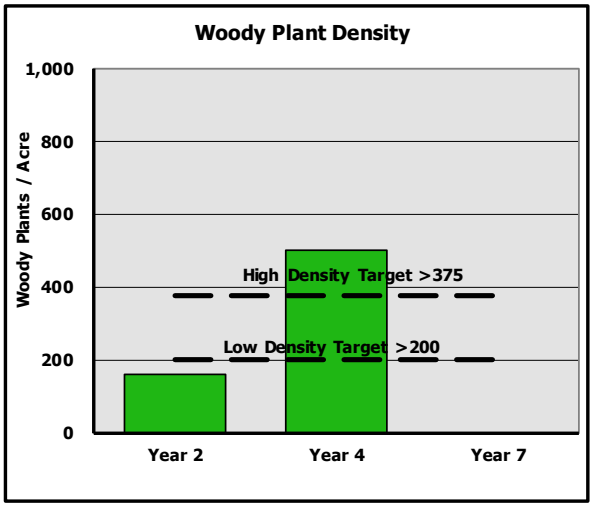
		Stems per Acre		
		Year 2	Year 4	Year 7
Artemisia cana	Silver Sagebrush	-	10.8	
Artemisia tridentata	Big Sagebrush	161.9	491.0	
Total		161.9	501.8	
Sagebrush Contribution (%)		100%	100%	
Percent of Transects Exceeding High-Density Standard (375 Stems per acre)		13%	33%	
Percent of Transects Exceeding Low-Density Standard (Between 200 and 375 Stems per acre)		33%	27%	

Production Results

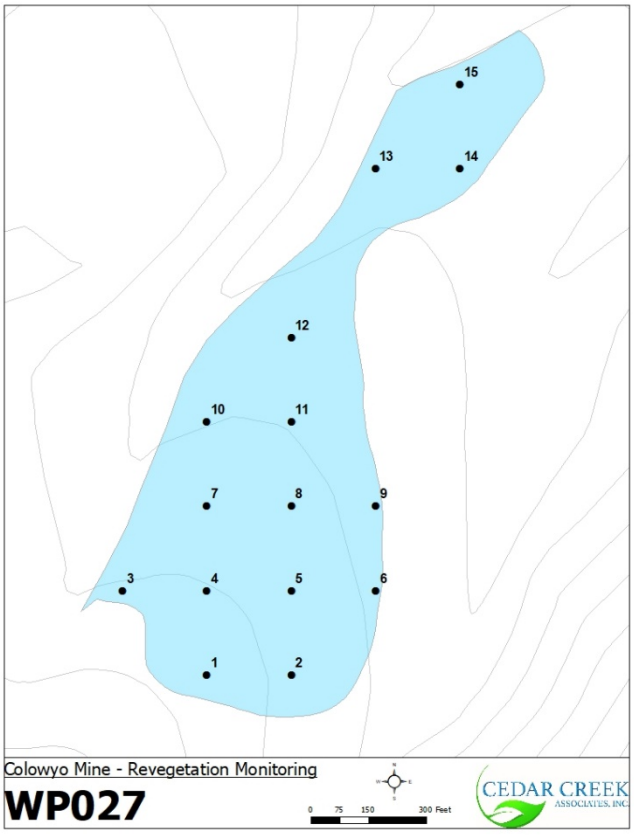
		lbs per Acre
		Year 7
Perennial Grasses		
Perennial Forbs		
Sub-shrubs		
Annual Grasses		
Annual / Biennial Forbs		
Noxious Weeds	Cheatgrass	
	Other	
Total Production		
Total Perennial Production		
Allowable Perennial Herb. Production		

* Evolving post-mining vegetation communites (Wildlife Habitat) will be delineated after Year 7 evaluation, in preparation for bond release evaluation.





3.2.3 WP027 – Year 4 Unit



WP027 is comprised of approximately 17.8 acres of gently sloping revegetation. This unit was seeded in 2018, and therefore, was undergoing its fourth growing season in 2022 (Compendium 4). Averages were determined from 15 transects.

Ground cover by desirable perennial plants averaged 16.2% cover in 2022. Annual forbs exhibited 14.1% average cover. Noxious weeds other than cheatgrass have not contributed any cover through years 2 and 4. Cheatgrass exhibited increased average cover from 2.1% in Year 2 to 15.1% in Year 4.

A total of 28 species were observed in 2022. There were 4 native perennial grasses with >3% relative cover, however, no perennial forbs met this standard. Two perennial forbs were recorded totaling 0.3% relative cover.

Woody plant density indicated 2,069.3 stems per acre in 2022, consisting mostly of big sagebrush. Given the density of shrubs in the unit, the entire area will likely be included as wildlife habitat.

Unit WP027 exhibited improvement from Year 2 and moderate perennial cover for four-year-old revegetation, however it does not meet the diversity success criteria. It is recommended that this unit be evaluated in 2025 for Year 7 in accordance with Colowyo's monitoring schedule.

Compendium 4 2022

WP027

Location: **West Pit**
Acres: **17.8**
First Growing Season: **2018**

Targeted Post-Mining Community: **Grazingland Wildlife habitat**

Ground Cover Results

Number of Ground Cover Transects = 15

	Average Ground Cover (%)			Relative Ground Cover (%)			Species Observed (#)		
	Year 2	Year 4	Year 7	Year 2	Year 4	Year 7	Year 2	Year 4	Year 7
Perennial Grasses	6.4	15.5		25.5	34.2		7	12	
Perennial Forbs	-	0.1		-	0.3		-	2	
Sub-shrubs	-	-		-	-		-	-	
Shrubs & Trees	0.1	0.5		0.3	1.2		1	1	
Annual Grass	-	-		-	-		-	-	
Annual / Biennial Forbs	16.5	14.1		66.0	31.1		7	11	
Noxious Weeds - Cheatgrass	2.1	15.1		8.2	33.2		-	2	
Noxious Weeds - Other	-	-		-	-		1	2	
Litter	35.3	1.2							
Rock	1.2	26.3							
Bareground	38.4	27.1							
Total	**100.0**	**100.0**		**100.0**	**100.0**		**16.0**	**30.0**	
Total Plant Cover	**25.1**	**45.4**							
Total Perennial Cover	**6.5**	**16.2**		**25.8**	**35.7**				
Allowable Perennial Herbaceous Cover	**6.4**	**15.7**		**25.5**	**34.5**				

Woody Plant Density Results

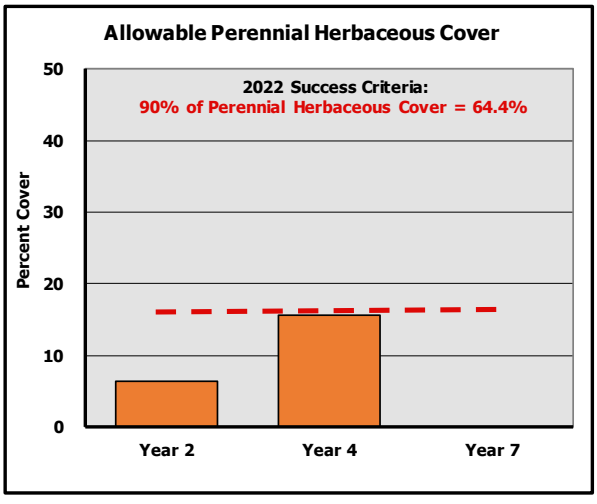
Number of Woody Plant Density belts = 15

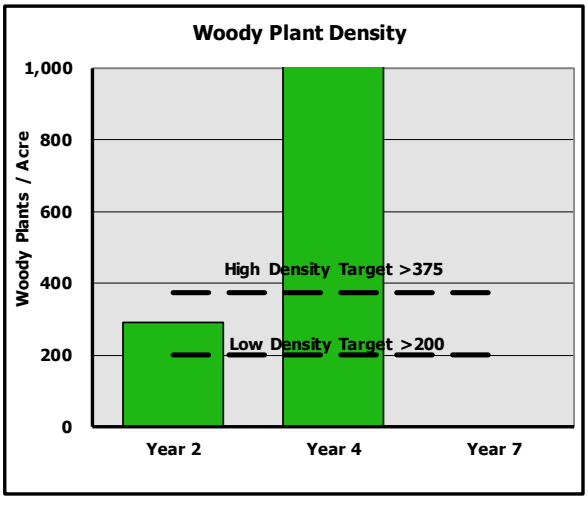
		Stems per Acre		
		Year 2	Year 4	Year 7
Artemisia cana	Silver Sagebrush	-	5.4	
Artemisia tridentata	Big Sagebrush	288.7	2,050.4	
Atriplex Canescens	Four-wing Saltbush	2.7	8.1	
Purshia tridentata	Antelope Bitterbrush	-	5.4	
Total		291.4	2,069.3	
Sagebrush Contribution (%)		99%	99%	
Percent of Transects Exceeding High-Density Standard (375 Stems per acre)		27%	73%	
Percent of Transects Exceeding Low-Density Standard (Between 200 and 375 Stems per acre)		67%	13%	

Production Results

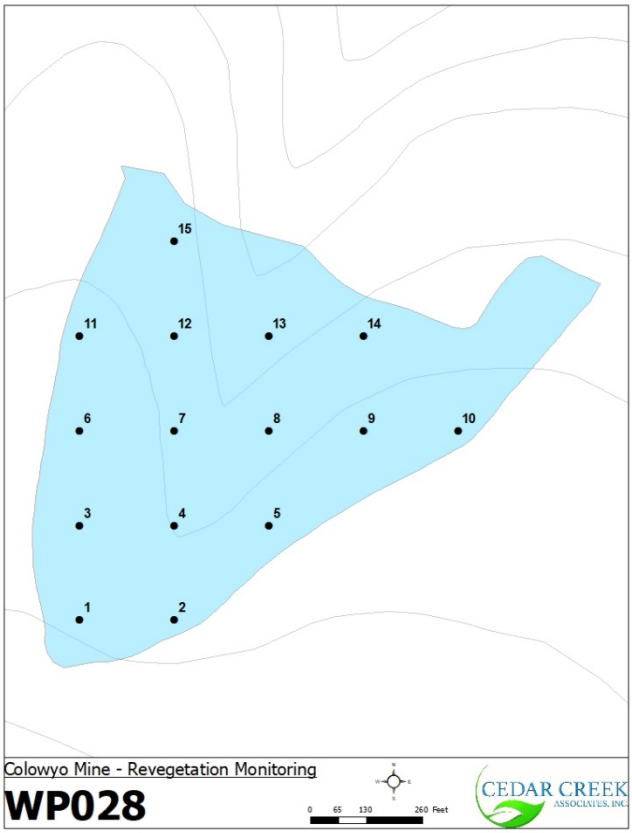
		lbs per Acre
		Year 7
Perennial Grasses		
Perennial Forbs		
Sub-shrubs		
Annual Grasses		
Annual / Biennial Forbs		
Noxious Weeds	Cheatgrass	
	Other	
Total Production		
Total Perennial Production		
Allowable Perennial Herb. Production		

* Evolving post-mining vegetation communites (Wildlife Habitat) will be delineated after Year 7 evaluation, in preparation for bond release evaluation.





3.2.4 WP028 – Year 4 Unit



WP028 is comprised of approximately 17.9 acres of south-facing sloping revegetation. This unit was seeded in 2018 and therefore, was undergoing its fourth growing season in 2022 (Compendium 5). Averages were determined from 15 transects.

Ground cover by desirable perennial plants had averaged 29.3% cover in 2022. Annual forbs decreased slightly from 17.9% in Year 2 to 9.8% in Year 4. Noxious weeds other than cheatgrass have not contributed any cover through years 2 and 4.. Cheatgrass exhibited increased average cover from 3.3% in Year 2 to 13.5% in Year 4.

There were 21 total species observed on this unit in 2022. There were 3 native perennial grasses with >3% relative cover, however, no perennial forbs met this standard. Only two perennial forbs were recorded with 0.3% relative cover.

Woody plant density indicated 54.0 stems per acre consisting of big sagebrush and four-wing saltbush. Only 1 of the 15 transects (7% of transects) exhibited densities greater than 375 stems per acre. It is likely that most of this unit will be considered Grazingland, with the potential for small patches of wildlife habitat.

Unit WP028 exhibited improvement since Year 2 and exceptional perennial cover during Year 4, however it does not meet the diversity success criteria. It is recommended that this unit be evaluated in 2025 for Year-7 in accordance with Colowyo's revegetation schedule.

Compendium 5 2022

WP028

Location:	**West Pit**	Targeted Post-Mining Community:	**Grazingland Wildlife habitat**
Acres:	**17.9**		
First Growing Season:	**2018**		

Ground Cover Results

Number of Ground Cover Transects = 15

	Average Ground Cover (%)			Relative Ground Cover (%)			Species Observed (#)		
	Year 2	Year 4	Year 7	Year 2	Year 4	Year 7	Year 2	Year 4	Year 7
Perennial Grasses	14.1	29.1		39.8	55.3		7	8	
Perennial Forbs	-	0.1		-	0.3		-	2	
Sub-shrubs	-	-		-	-		-	-	
Shrubs & Trees	-	0.1		-	0.1		-	1	
Annual Grass	-	-		-	-		-	-	
Annual / Biennial Forbs	17.9	9.8		50.8	18.6		7	8	
Noxious Weeds - Cheatgrass	3.3	13.5		9.4	25.7		-	2	
Noxious Weeds - Other	-	-		-	-		2	2	
Litter	31.3	20.0							
Rock	1.9	1.4							
Bareground	31.5	25.9							
Total	**100.0**	**100.0**		**100.0**	**100.0**		**16.0**	**23.0**	
Total Plant Cover	**35.3**	**52.7**							
Total Perennial Cover	**14.1**	**29.3**		**39.8**	**55.7**				
Allowable Perennial Herbaceous Cover	**14.1**	**29.3**		**39.8**	**55.6**				

Woody Plant Density Results

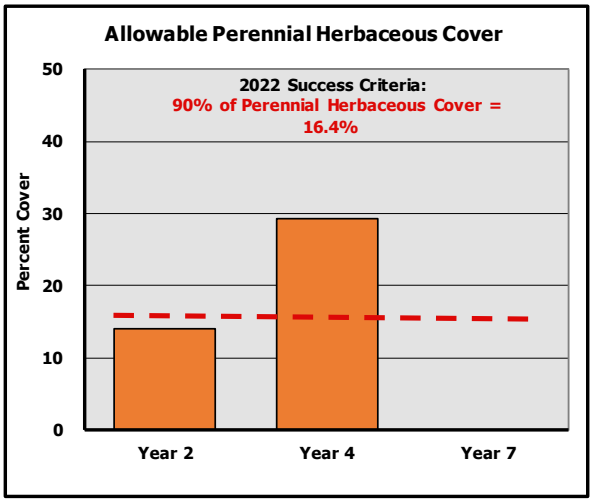
Number of Woody Plant Density belts = 15

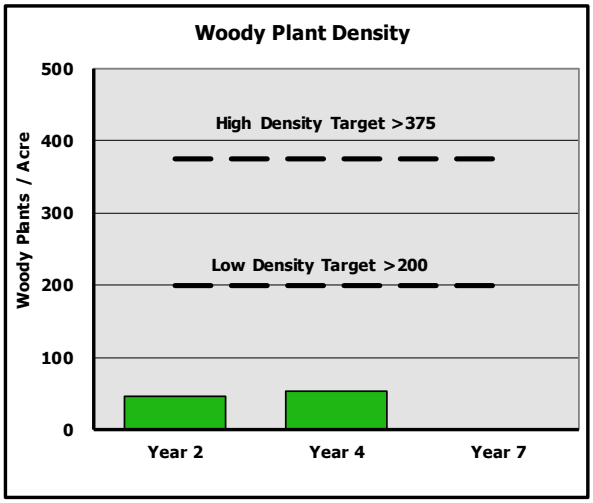
		Stems per Acre		
		Year 2	Year 4	Year 7
Artemisia tridentata vaseyana	Big Sagebrush	29.7	37.8	
Atriplex Canescens	Four-wing Saltbush	16.2	16.2	
Total		45.9	54.0	
Sagebrush Contribution (%)		65%	70%	
Percent of Transects Exceeding High-Density Standard (375 Stems per acre)		0%	7%	
Percent of Transects Exceeding Low-Density Standard (Between 200 and 375 Stems per acre)		13%	0%	

Production Results

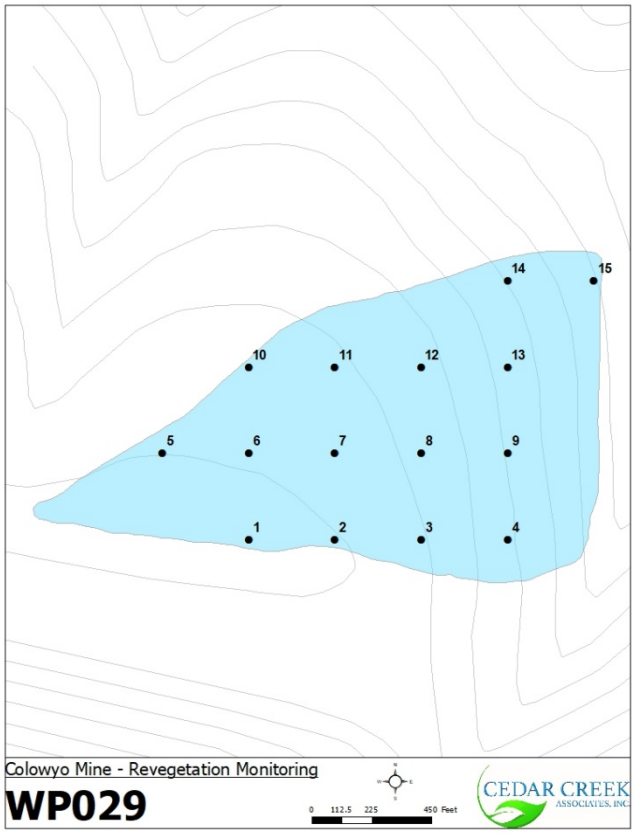
		lbs per Acre
		Year 7
Perennial Grasses		
Perennial Forbs		
Sub-shrubs		
Annual Grasses		
Annual / Biennial Forbs		
Noxious Weeds	Cheatgrass	
	Other	
Total Production		
Total Perennial Production		
Allowable Perennial Herb. Production		

* Evolving post-mining vegetation communites (Wildlife Habitat) will be delineated after Year 7 evaluation, in preparation for bond release evaluation.





3.2.5 WP029 – Year 4 Unit



WP029 is comprised of approximately 38.2 acres of moderately sloping revegetation. This unit was seeded in 2018 and therefore, was undergoing its fourth growing season in 2022 (Compendium 6). Averages were determined by 15 transects.

Ground cover by desirable perennial plants had averaged 38.0% cover in 2022. Annual forbs decreased slightly since 13.0% in Year 2 to 8.1% in Year 4. Noxious weeds other than cheatgrass have not contributed any cover through years 2 and 4. Cheatgrass exhibited increased cover from 4.7% in Year 2 to 14.3% in Year 4.

There were 23 total species observed on this unit in 2022. There were 2 native perennial grasses with >3% relative cover, however, no perennial forbs were observed.

Woody plant density indicated 170.0 stems per acre in 2022. Only 3 of the 15 transects (20% of transects) exhibited density greater than 375 stems per acre. It is likely that most of this unit will be considered Grazingland, with the potential for small patches of wildlife habitat.

Unit WP029 exhibited improvement since Year 2 and exceptional perennial cover during Year 4, however, the unit does not meet the diversity success criteria. It is recommended that this unit be evaluated in 2025 for Year-7 in accordance with Colowyo's revegetation schedule.

Compendium 6 2022

WP029

Location:	**West Pit**	Targeted Post-Mining Community:	**Grazingland Wildlife habitat**
Acres:	**38.2**		
First Growing Season:	**2018**		

Ground Cover Results

Number of Ground Cover Transects = 15

	Average Ground Cover (%)			Relative Ground Cover (%)			Species Observed (#)		
	Year 2	Year 4	Year 7	Year 2	Year 4	Year 7	Year 2	Year 4	Year 7
Perennial Grasses	8.0	37.8		31.2	62.6		5	11	
Perennial Forbs	-	-		-	-		-	-	
Sub-shrubs	-	-		-	-		-	-	
Shrubs & Trees	-	0.2		-	0.3		-	2	
Annual Grass	-	-		-	-		-	-	
Annual / Biennial Forbs	13.0	8.1		50.6	13.4		7	8	
Noxious Weeds - Cheatgrass	4.7	14.3		18.2	23.7		-	2	
Noxious Weeds - Other	-	-		-	-		2	2	
Litter	28.5	10.4							
Rock	0.5	0.8							
Bareground	45.4	28.4							
Total	**100.0**	**100.0**		**100.0**	**100.0**		**14**	**25**	
Total Plant Cover	**25.7**	**60.4**							
Total Perennial Cover	**8.0**	**38.0**		**31.2**	**62.9**				
Allowable Perennial Herbaceous Cover	**8.0**	**37.8**		**31.2**	**62.6**				

Woody Plant Density Results

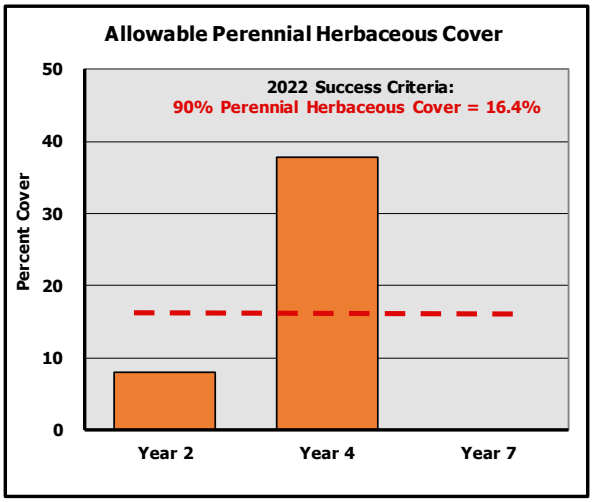
Number of Woody Plant Density belts = 15

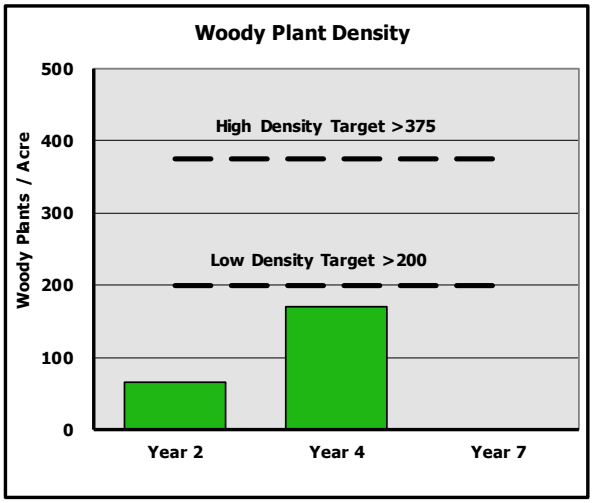
		Stems per Acre		
		Year 2	Year 4	Year 7
Artemisia tridentata vaseyana	Big Sagebrush	18.9	35.1	
Atriplex Canescens	Four-wing Saltbush	45.9	134.9	
Total		64.8	170.0	
Sagebrush Contribution (%)		29%	21%	
Percent of Transects Exceeding High-Density Standard (375 Stems per acre)		0%	20%	
Percent of Transects Exceeding Low-Density Standard (Between 200 and 375 Stems per acre)		20%	0%	

Production Results

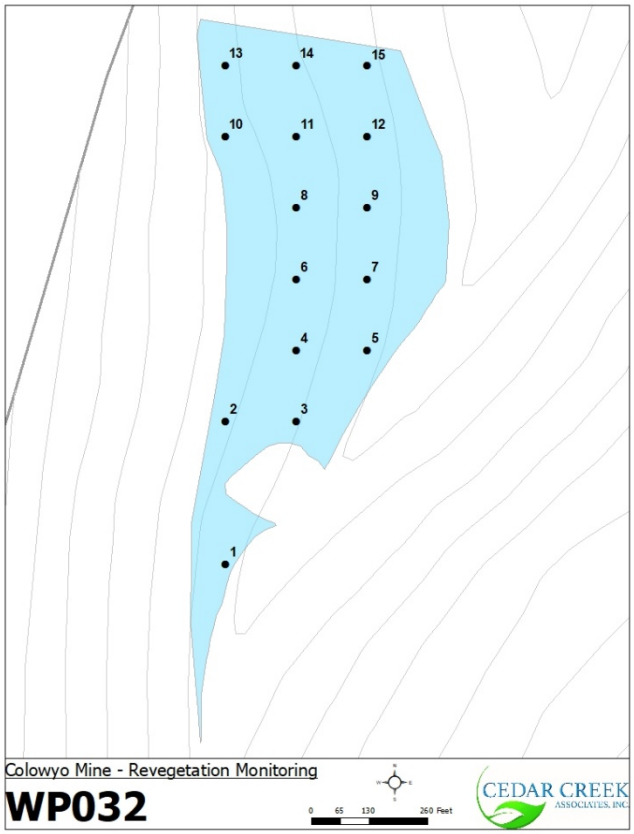
		lbs per Acre
		Year 7
Perennial Grasses		
Perennial Forbs		
Sub-shrubs		
Annual Grasses		
Annual / Biennial Forbs		
Noxious Weeds	Cheatgrass	
	Other	
Total Production		
Total Perennial Production		
Allowable Perennial Herb. Production		

* Evolving post-mining vegetation communites (Wildlife Habitat) will be delineated after Year 7 evaluation, in preparation for bond release evaluation.





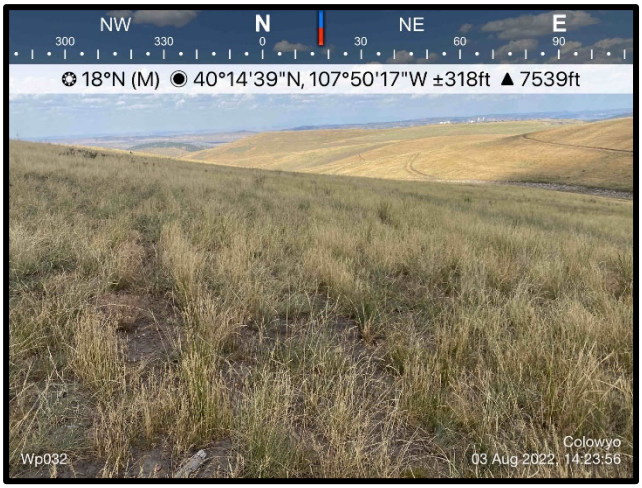
3.2.6 WP032 – Year 4 Unit



WP032 is comprised of approximately 10.5 acres of steeply sloping revegetation. This unit was seeded in 2015 and therefore, was undergoing its seventh growing season in 2022 (Compendium 7). Averages for ground cover, diversity, and WPD were determined by 15 transects in 2022. Average production was determined by 5 transects in 2022.

Ground cover by desirable perennial plants had averaged 42.3% cover in 2022. Annual grasses exhibited 2.9% average cover. The noxious weed cheatgrass exhibited 2.2% average cover, while other noxious weeds comprised 0.1% cover.

A total of 15 species were observed in 2022. There were 5 native perennial grasses with >3% relative cover, however, no perennial forbs met this standard. Only two native perennial forbs were recorded with 0.3% relative cover.



Woody plant density indicated 51.3 stems per acre in 2022 consisting of big sagebrush and four-wing saltbush. Only 1 of the 15 transects (7% of transects) exhibited density greater than 375 stems per acre. It is likely that most of this unit will be considered Grazingland, with the potential for small patches of wildlife habitat.

Perennial herbaceous production was 1,176.1 pounds per acre, significantly above the success criteria of 326.6 pounds per acre. Perennial grasses comprise the majority of production while annuals comprised 0.7% of the total production with 8.6 pounds per acre.

Unit WP032 exhibited exceptional perennial cover and production during Year 7 however, the unit does not meet the diversity or woody plant density success criteria. It is recommended that this unit be evaluated in 2024 for bond release.

Compendium 7 2022

WP032

Location:	**West Pit**	Targeted Post-Mining Community:	**Grazingland Wildlife habitat**
Acres:	**10.5**		
First Growing Season:	**2015**		

Ground Cover Results

Number of Ground Cover Transects = 15

	Average Ground Cover (%)			Relative Ground Cover (%)			Species Observed (#)		
	Year 2	Year 4	Year 7	Year 2	Year 4	Year 7	Year 2	Year 4	Year 7
Perennial Grasses		42.1			88.6			10	
Perennial Forbs		0.1			0.3			2	
Sub-shrubs		-			-			-	
Shrubs & Trees		-			-			-	
Annual Grass		2.9			6.2			1	
Annual / Biennial Forbs		-			-			-	
Noxious Weeds - Cheatgrass		2.2			4.6			1	
Noxious Weeds - Other		0.1			0.3			2	
Litter		28.3							
Rock		3.2							
Bareground		20.9							
Total		**100.0**			**100.0**			**16**	
Total Plant Cover		**47.5**							
Total Perennial Cover		**42.3**			**88.9**				
Allowable Perennial Herbaceous Cover		**42.3**			**88.9**				

Woody Plant Density Results

Number of Woody Plant Density belts = 15

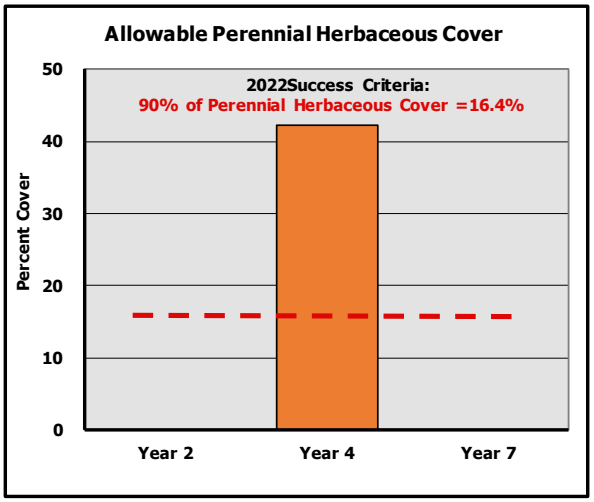
		Stems per Acre		
		Year 2	Year 4	Year 7
Artemisia tridentata vaseyana	Big Sagebrush		48.6	
Atriplex Canescens	Four-wing Saltbush		2.7	
Total			51.3	
Sagebrush Contribution (%)			95%	
Percent of Transects Exceeding High-Density Standard (375 Stems per acre)			7%	
Percent of Transects Exceeding Low-Density Standard (Between 200 and 375 Stems per acre)			0%	

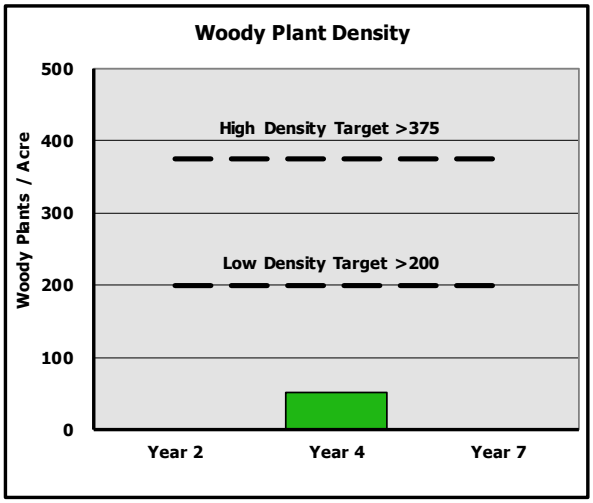
Production Results

Number of Production Plots = 5

		lbs per Acre
		Year 7
Perennial Grasses		1,167.5
Perennial Forbs		0.0
Sub-shrubs		0.0
Annual Grasses		8.6
Annual / Biennial Forbs		0.0
Noxious Weeds	Cheatgrass	0.0
	Other	0.0
Total Production		**1,176.1**
Total Perennial Production		1,167.5
Allowable Perennial Herb. Production		**1,167.5**

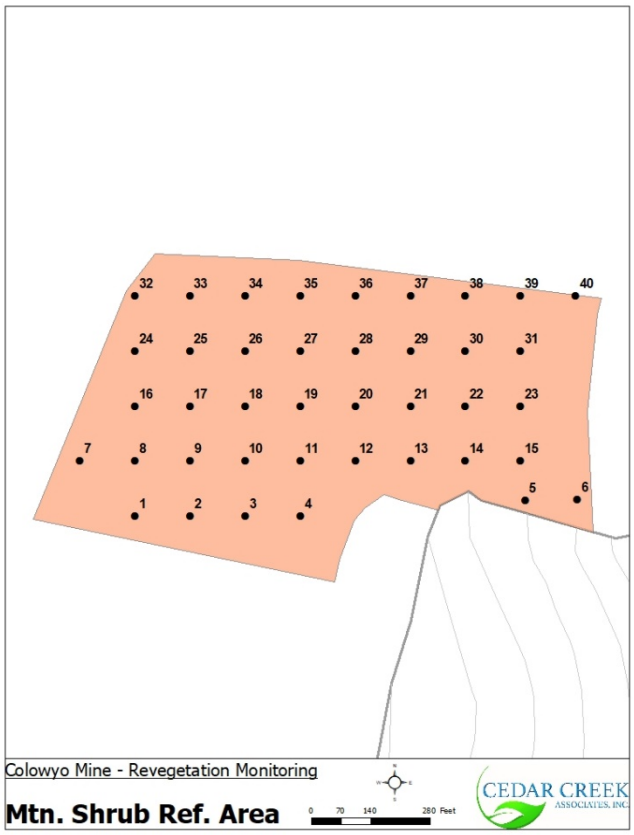
* Evolving post-mining vegetation communites (Wildlife Habitat) will be delineated after Year 7 evaluation, in preparation for bond release evaluation.



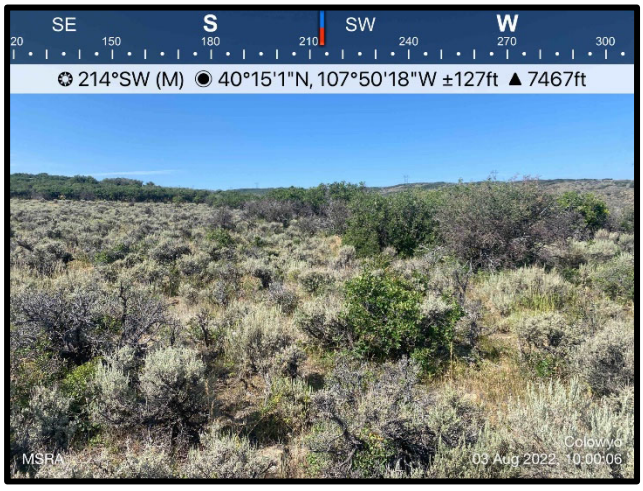


3.3 Reference Areas

3.3.1 Mountain Shrub Reference Area



The Mountain Shrub Reference Area is comprised of approximately 18 acres of gently to moderately sloping vegetation with a predominately northwestern aspect (mesic) and eastern aspect (xeric). Rationale for the larger reference area with two dominant aspects is to provide a better representation of the distribution of Mountain Shrub communities located on and around Colowyo Coal Mine properties. The xeric exposure tends to exhibit more elevated herbaceous parameters, given a modest reduction in the overstory. This reference area is located on the undisturbed ridge immediately west of the West Pit Area (Map 1). Averages for ground cover were determined by 20 transects. Averages for production were determined by 40 plots. A representative photo for 2022 is presented below.

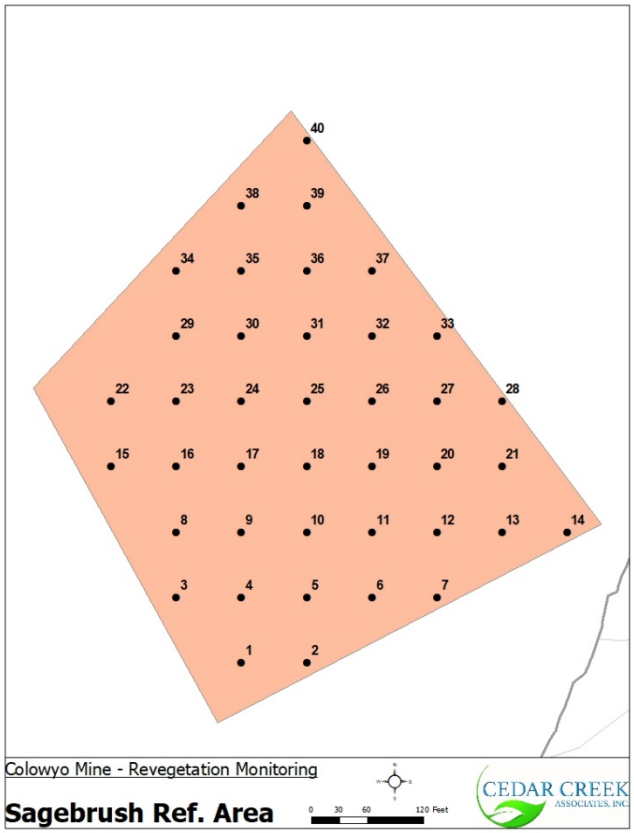


Ground cover in the Mountain Shrub Reference consisted of 46.0% live vegetation, 2.2% rock, 41.6% litter, and bare soil exposure of 10.4%. Perennial cover across the unit averaged 41.2% with annual and biennial cover averaging 4.6%. No noxious weeds contributed towards cover except for cheatgrass. Cheatgrass comprised 0.2% cover in 2022.

Perennial herbaceous production was 361.0 pounds per acre, with perennial grasses comprise most of the production (285.9 pounds per acre). Annuals contributed 69.0 pounds per acre and perennial forbs followed with 62.3 pounds per acre. Sub-shrubs comprised 3.0% of total production with 12.8 pounds per acre. Noxious weeds contributed less than 0.1 pounds per acre, comprised entirely of cheatgrass.

3.3.2 Sagebrush Reference Area

The Sagebrush Reference Area is comprised of approximately 4.7 acres of gentle to moderately sloping topography that has a predominately northern aspect. This reference area is located on a gently sloping ridge north of the Administration / Facilities Area (Map 1). Averages for ground cover were determined by 20 transects. Averages for production were determined by 40 plots. A representative photo from 2022 is presented below.



Ground cover in the Sagebrush Reference Area consisted of 49.3% live vegetation, 2.7% rock, 32.4% litter, and bare soil exposure of 15.7%. Perennial cover across the unit averaged 33.4%, with annual and biennial cover of 14.2%, noxious cheatgrass cover of 1.7%, and 0.1% of other noxious weed cover.

Perennial herbaceous production was 474.9 pounds per acre, with perennial grasses comprise most of the production (320.6 pounds per acre). Annuals contributed 153.4 pounds per acre and sub-shrubs followed with 94.0 pounds per acre. Perennial forbs contributed 60.3 pounds per acre towards total production. Noxious weeds comprised less than 1% of total production with 5.7 pounds per acre, comprised entirely of cheatgrass.

4.0 Conclusions and Recommendations

Overall, the revegetation at Colowyo evaluated by Cedar Creek in 2022 can generally be considered in fair to good condition and is typical of reclamation efforts at most western coal mines. As revegetation units age, they typically "thicken" with desirable (seeded) perennial species and exhibit increased diversity, cover, and production. Recent unfavorable precipitation conditions have occurred at Colowyo. Aside from the above-average precipitation in the 2018/2019 growing seasons, consecutive low-rainfall years occurred in 2012 and 2013 as well as 2018, 2020, and 2021. While total annual precipitation in 2022 increased to average amounts, the seasonal values remained below average (Chart P2) which likely extended the stressed and/or poor revegetation conditions caused by adverse climate conditions in the two years prior to sampling. Units planted during or just prior to the drought will take time to recover. Given the updated comparisons for vegetation parameters presented in the permit (Volume 1, Section 4.15.8; and Volume 15, Section 4.15.8), most areas at Colowyo appear to be progressing along expected pathways whereby success criteria should be achieved at or near the conclusion of the 10-year bond responsibility period.

The West Pit seven-year and older unit (WP021) has developed enough desirable perennial cover and are exceeding the performance standards excluding perennial forb diversity. These units have the potential for delineation of Wildlife Habitat but will likely remain designated as Grazingland. The East Pit and West Pit four-year old units (EP061, WP026, WP027, WP028, and WP029) are all exhibiting an increase in perennial vegetation and are at or exceeding the cover performance standard, but perennial forb diversity has not met the standard in any of the units. Three of the units (EP061, WP026, and WP027) have shrubs in densities that designate the units as Wildlife Habitat. The remaining units (WP028, WP029, and WP032) have the potential for delineation of Wildlife Habitat but will likely remain designated as Grazingland. All units monitored in 2022 showed a decrease in annual forbs and little to no noxious weeds other than cheatgrass. Annual bromes, including cheatgrass increased in all units. This increase is likely due to the climate conditions which have reduced perennial competition and cover values should go back down once precipitation returns.

Appendix A

Charts, Tables, and Raw Data

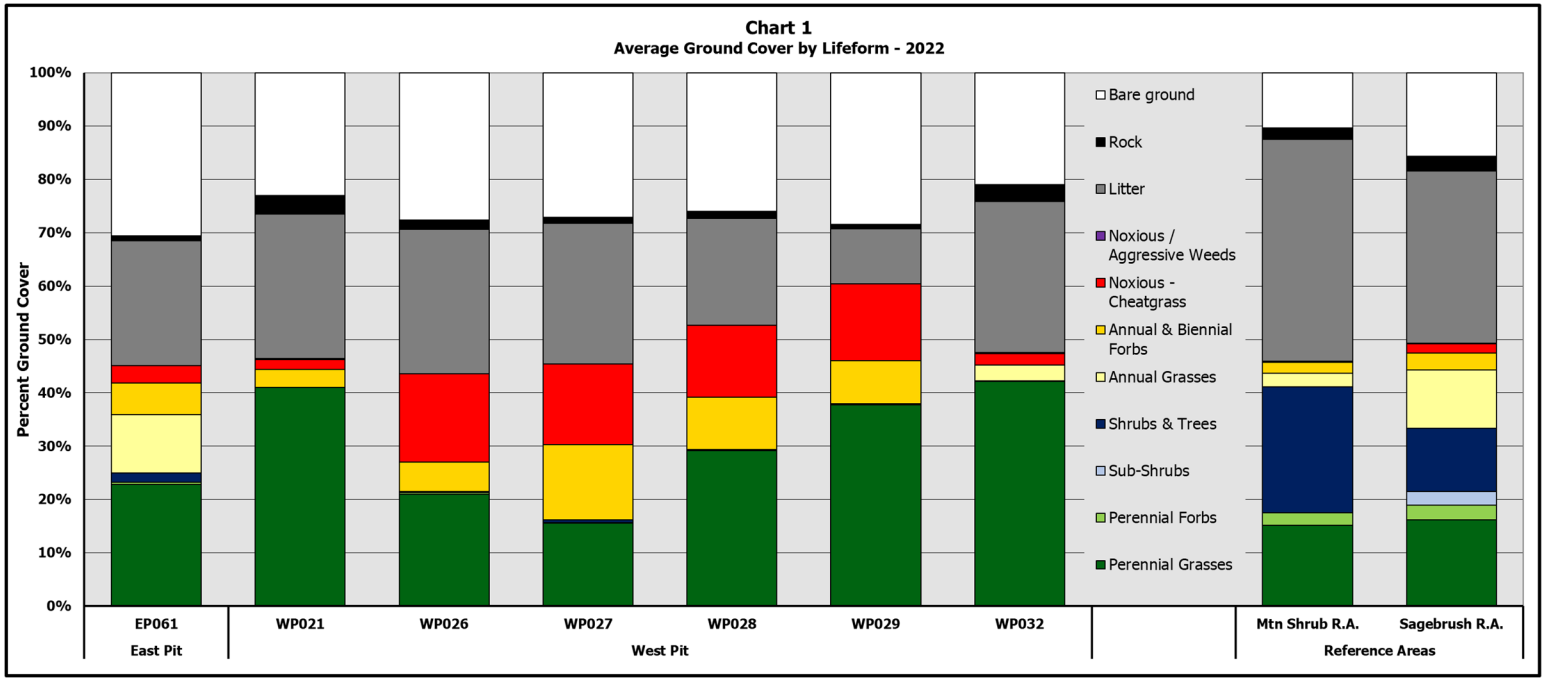


Chart 1
Average Ground Cover by Lifeform - 2022
Percent Ground Cover
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Bare ground
Rock
Litter
Noxious / Aggressive Weeds
Noxious - Cheatgrass
Annual & Biennial Forbs
Annual Grasses
Shrubs & Trees
Sub-Shrubs
Perennial Forbs
Perennial Grasses
EP061
East Pit
WP021
WP026
WP027
WP028
WP029
WP032
West Pit
Mtn Shrub R.A.
Sagebrush R.A.
Reference Areas

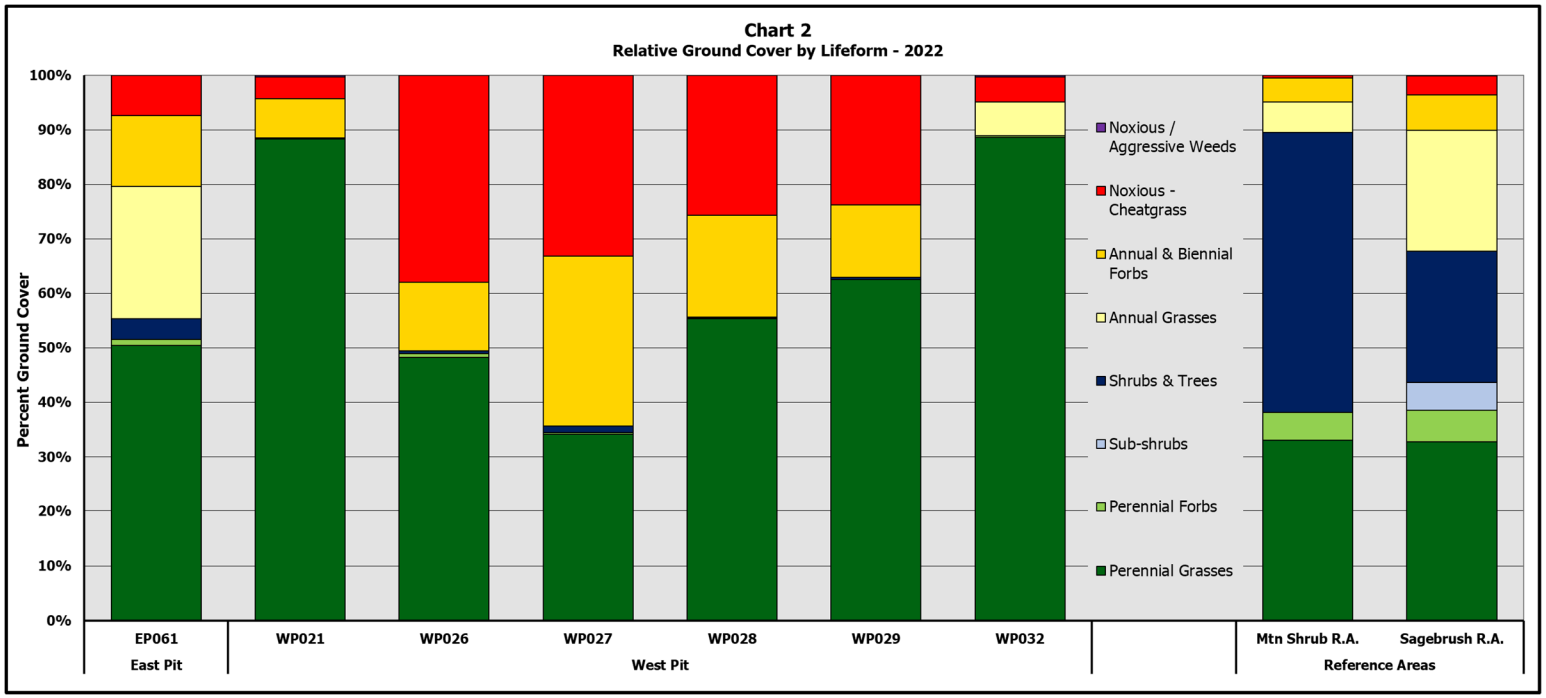


Chart 2
Relative Ground Cover by Lifeform - 2022
Percent Ground Cover
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Noxious / Aggressive Weeds
Noxious - Cheatgrass
Annual & Biennial Forbs
Annual Grasses
Shrubs & Trees
Sub-shrubs
Perennial Forbs
Perennial Grasses
EP061
East Pit
WP021
WP026
WP027
WP028
WP029
WP032
West Pit
Mtn Shrub R.A.
Sagebrush R.A.
Reference Areas

Table 1 Colowyo - Vegetation Cover - 2022

Absolute Ground Cover Summary

East Pit, West Pit, and Reference Areas

Percent Ground Cover Based on Point-Intercept Sampling

Area ——>	EP061	WP021	WP026	WP027	WP028	WP029	WP032	Mtn Shrub R.A.	Sagebrush R.A.	Weighted Reference Values
Weight ——>	100%	100%	100%	100%	100%	100%	100%	55%	45%	
Total Plant Cover	**45.13**	**46.40**	**43.53**	**45.40**	**52.67**	**60.40**	**47.53**	**45.95**	**49.25**	**47.44**
Rock	0.87	3.53	1.80	1.20	1.40	0.80	3.20	2.15	2.70	2.40
Litter	23.40	27.07	27.07	26.33	20.00	10.40	28.33	41.55	32.35	37.41
Bare ground	30.60	23.00	27.60	27.07	25.93	28.40	20.93	10.35	15.70	12.76
Total Perennial Cover	**25.00**	**41.07**	**21.53**	**16.20**	**29.33**	**38.00**	**42.27**	**41.15**	**33.35**	**37.64**
Total Annual Cover (Non-noxious)	16.80	3.33	5.47	14.13	9.80	8.07	2.93	4.60	14.15	8.90
Summary by Lifeform:										
Perennial Grasses	**22.80**	**41.00**	**21.00**	**15.53**	**29.13**	**37.80**	**42.13**	**15.20**	**16.15**	**15.63**
Annual Grasses	10.93	-	-	-	-	-	2.93	2.55	10.95	6.33
Noxious - Cheatgrass	3.33	1.87	16.53	15.07	13.53	14.33	2.20	0.20	1.70	0.88
Perennial Forbs	**0.47**	**0.07**	**0.33**	**0.13**	**0.13**	**-**	**0.13**	**2.35**	**2.85**	**2.58**
Annual & Biennial Forbs	5.87	3.33	5.47	14.13	9.80	8.07	-	2.05	3.20	**2.57**
Noxious / Aggressive Weeds	-	0.13	-	-	-	-	0.13	-	0.05	**0.02**
Sub-Shrubs	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2.50**	**1.13**
Shrubs & Trees	**1.73**	**-**	**0.20**	**0.53**	**0.07**	**0.20**	**-**	**23.60**	**11.85**	**18.31**
Sample Adequacy Calculations										
Mean=	45.13	46.40	43.53	45.40	52.67	60.40	47.53	45.95	49.25	
Variance=	210.12	212.83	127.27	181.97	83.24	200.69	27.84	121.84	297.78	
n=	15	15	15	15	15	15	15	20	20	
n_{min}=	18.66	17.88	12.15	15.97	5.43	9.95	2.23	10.17	21.64	

Table 2 Colowyo - Vegetation Cover - 2022

Relative Ground Cover Summary

East Pit, West Pit, and Reference Areas

Area ——>	EP061	WP021	WP026	WP027	WP028	WP029	WP032	Mtn Shrub R.A.	Sagebrush R.A.
Weight ——>	100%	100%	100%	100%	100%	100%	100%	55%	45%
Summary by Lifeform:									
Perennial Grasses	**50.52**	**88.36**	**48.24**	**34.21**	**55.32**	**62.58**	**88.64**	**33.08**	**32.79**
Annual Grasses	**24.22**	-	-	-	-	-	**6.17**	**5.55**	**22.23**
Noxious - Cheatgrass	**7.39**	**4.02**	**37.98**	**33.19**	**25.70**	**23.73**	**4.63**	0.44	**3.45**
Perennial Forbs	1.03	0.14	0.77	0.29	0.25	-	0.28	**5.11**	**5.79**
Annual & Biennial Forbs	**13.00**	**7.18**	**12.56**	**31.13**	**18.61**	**13.36**	-	**4.46**	**6.50**
Noxious / Aggressive Weeds	-	0.29	-	-	-	-	0.28	-	0.10
Sub-Shrubs	-	-	-	-	-	-	-	-	**5.08**
Shrubs & Trees	**3.84**	-	0.46	1.17	0.13	0.33	-	**51.36**	**24.06**
Diversity (Number of Native Perennial Grasses and Native Perennial Forbs > 3% composition is at least 4 with minimum of 2 grasses and 1 forb species)									
(If no single forb species > 3%: a) Min. of 2 Native Perennial Forbs ≥ 2% combined composition, or b) Min. of 4 Native Perennial Forbs ≥ 1% combined composition):									
Number of Native Perennial Grasses =	**6**	**5**	**5**	**4**	**3**	**2**	**5**	**3**	**3**
Number of Native Perennial Forbs =	**2**	**1**	**3**	**2**	**2**	**0**	**2**	**10**	**14**
Native Perennial Forb Composition =	**1.03**	**0.14**	**0.46**	**0.29**	**0.25**	**0.00**	**0.28**	**5.11**	**5.79**
Total Number of Native Perennial Species =	**8**	**6**	**8**	**6**	**5**	**2**	**7**	**13**	**17**

Table 3 Colowyo - Woody Plant Density - 2022

Summary of Areas Sampled
East Pit and West Pit

Woody Plants Per Acre

				East Pit	West Pit					
			Unit -->	**EP061**	**WP021**	**WP026**	**WP027**	**WP028**	**WP029**	**WP032**
			Growing Seasons -->	4	7	4	4	4	4	4
N	P	*Amelanchier alnifolia*	Serviceberry							
N	P	*Artemisia cana*	Silver Sagebrush	8.1		10.8	5.4			
N	P	*Artemisia tridentata*	Big Sagebrush	4,799.6	40.5	491.0	2,050.4	37.8	35.1	48.6
N	P	*Atriplex canescens*	Four-wing Saltbush				8.1	16.2	134.9	2.7
N	P	*Chrysothamnus viscidiflorus*	Low Rabbitbrush							
N	P	*Purshia tridentata*	Antelope Bitterbrush				5.4			
N	P	*Symphoricarpos rotundifolius*	Roundleaf Snowberry	2.7						
			Total Per Acre	**4,810.4**	**40.5**	**501.8**	**2,069.3**	**54.0**	**170.0**	**51.3**

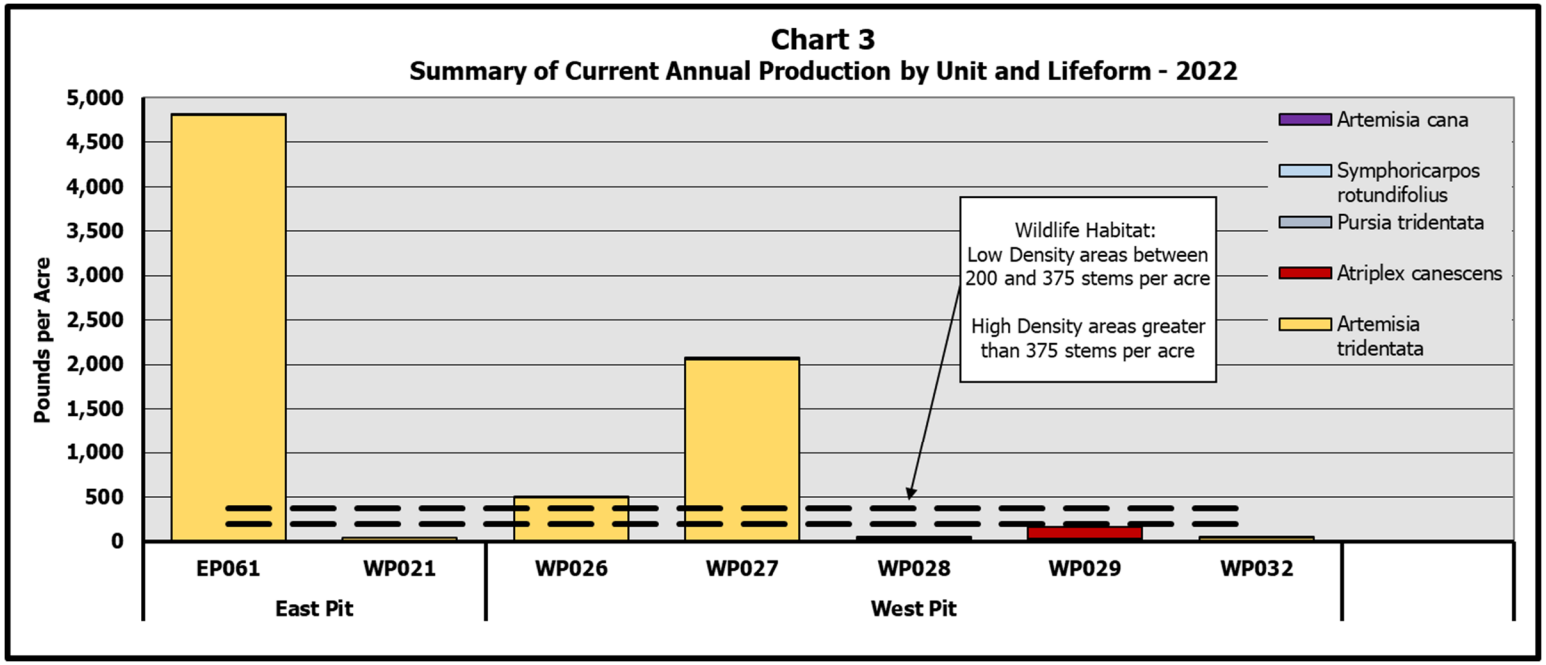


Table 4 Colowyo - Vegetation Production - 2022

Summary of Areas Sampled

East Pit, West Pit, and Reference Areas

Pounds (lbs) per Acre

	Area	Weight	*Perennial Grasses*	*Perennial Forbs*	*Sub-shrubs*	*Annual Grasses*	*Annual Forbs*	*Noxious Weeds*		TOTAL Average	
								Cheatgrass	*Other*	lbs / ac	Perennial lbs / ac
Reclamation Units	**WP021**	**100%**	1,225.6	-	-	14.6	2.1	-	-	**1,242.3**	**1,225.6**
	WP032	**100%**	1,167.5	-	-	8.6	-	-	-	**1,176.1**	**1,167.5**
Reference Areas	**Mountain Shrub**	**55%**	285.9	62.3	12.8	20.2	48.8	0.0	-	**430.1**	**361.0**
	Sagebrush	**45%**	320.6	60.3	94.0	98.9	54.5	5.7	-	**634.0**	**474.9**
Weighted Averages	**East Pit Comparison**	**55%/45%**	**301.5**	**61.4**	**49.4**	**55.6**	**51.4**	**2.6**	**-**	**521.8**	**412.3**

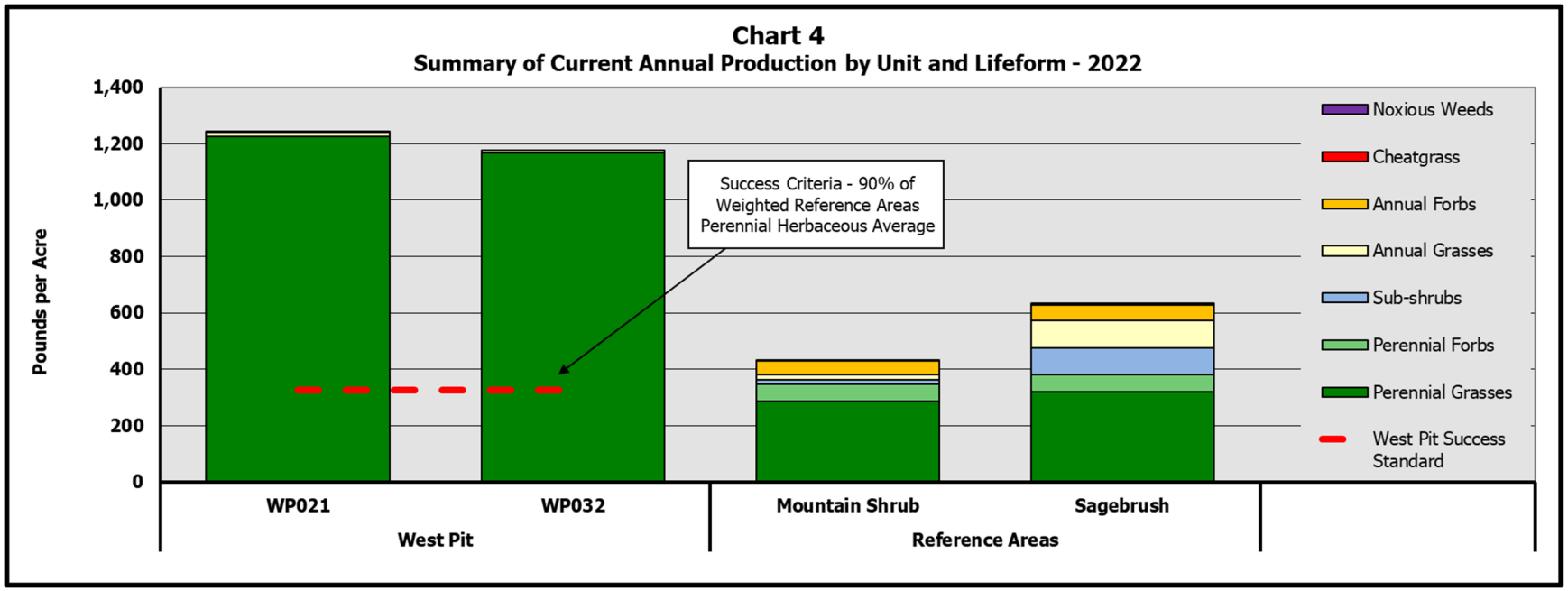


Table 5 Colowyo - Vegetation Cover - 2022

EP061

Raw Data - Individual Transects — **Percent Ground Cover Based on Point-Intercept Sampling**

			Transect No.——>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Average Cover	Relative Cover	Freq.
Grasses and Grass-likes																					
I	P	*Agropyron cristatum*	Crested Wheatgrass						7			2	4		1				**0.93**	**2.07**	**27**
N	P	*Agropyron dasystachyum*	Thickspike Wheatgrass						20	3						5		3	**2.07**	**4.58**	**27**
I	P	*Agropyron intermedium*	Intermediate Wheatgrass									8	6	1		3			**1.20**	**2.66**	**27**
N	P	*Agropyron riparium*	Streambank Wheatgrass						3	1									**0.27**	**0.59**	**13**
N	P	*Agropyron smithii*	Western Wheatgrass	3	5	2	1	6	5	3	2	3		1	1	5	5		**2.80**	**6.20**	**87**
N	P	*Agropyron spicatum*	Bluebunch Wheatgrass					1	4		4				3	4		3	**1.27**	**2.81**	**40**
N	P	*Agropyron trachycaulum*	Slender Wheatgrass				8				6	2	7	5	6	9	10		**3.53**	**7.83**	**53**
I	P	*Bromus inermis*	Smooth Brome		2											1			**0.20**	**0.44**	**13**
I	A	*Bromus japonicus*	Japanese Brome		4	7	21	1	14	10	26	25	10		7		31	8	**10.93**	**24.22**	**80**
X		*Bromus tectorum*	Cheatgrass	21	7	8			4			5	4	1					**3.33**	**7.39**	**47**
N	P	*Elymus cinereus*	Basin Wildrye	1		1	11		5	3		4	1	1		2	2	6	**2.47**	**5.47**	**73**
I	P	*Festuca ovina/saximontana*	Hard Fescue									1	1			1			**0.20**	**0.44**	**20**
N	P	*Koeleria macrantha*	Prairie Junegrass													1			**0.07**	**0.15**	**7**
N	P	*Nassela viridula*	Green Needlegrass	1	9		10	1		4	10	11		7		1		3	**3.80**	**8.42**	**67**
I	P	*Poa pratensis*	Kentucky Bluegrass										2						**0.13**	**0.30**	**7**
N	P	*Poa secunda*	Sandberg Bluegrass								2	1	1		2				**0.40**	**0.89**	**27**
N	P	*Poa secunda ssp. juncifolia*	Alkali Bluegrass															1	**0.07**	**0.15**	**7**
N	P	*Sitanion hystrix*	Bottlebrush Squirreltail			3	7	7		12		1		13	1	5		2	**3.40**	**7.53**	**60**
Forbs																					
N	P	*Achillea millefolium*	Common Yarrow											1	1	1			**0.20**	**0.44**	**20**
N	A	*Alyssum alyssoides*	Pale Madwort										1						**0.07**	**0.15**	**7**
N	A	*Alyssum desertorum*	Desert Alyssum	1	4	1													**0.40**	**0.89**	**20**
I	P	*Astragalus cicer*	Cicer Milkvetch					2				1			1				**0.27**	**0.59**	**20**
I	A	*Camelina microcarpa*	Littlepod False Flax	1															**0.07**	**0.15**	**7**
I	A	*Chorispora tenella*	Crossflower	2	2	2													**0.40**	**0.89**	**20**
N	A	*Descurainia pinnata*	Pinnate Tansymustard			2	1				1							2	**0.40**	**0.89**	**27**
I	B	*Lactuca serriola*	Prickly Lettuce					1											**0.07**	**0.15**	**7**
I	A	*Pocilla biloba*	Twolobed Speedwell											1	3				**0.27**	**0.59**	**13**
I	A	*Polygonum aviculare*	Prostrate Knotweed							2				1				1	**0.27**	**0.59**	**20**
I	A	*Ranunculus testiculata*	Curveseed Butterwort		2					1									**0.20**	**0.44**	**13**
I	A	*Salsola tragus*	Russian Thistle					2								1	2		**0.33**	**0.74**	**20**
I	A	*Sisymbrium altissimum*	Tumble Mustard	10	1	7	1			4	1	1					9	1	**2.33**	**5.17**	**60**
I	A	*Thlaspi arvense*	Field Pennycress	12														1	**0.87**	**1.92**	**13**
I	B	*Tragopogon dubius*	False Salsify								1								**0.07**	**0.15**	**7**
N	A		Unknown species		1			1											**0.13**	**0.30**	**13**
Shrubs & Trees																					
N	P	*Artemisia tridentata*	Big Sagebrush		3	1	1	3	5	2	2	4	3	1				1	**1.73**	**3.84**	**73**
																				Mean	
			Total Plant Cover	**52**	**40**	**34**	**61**	**25**	**67**	**45**	**55**	**69**	**40**	**33**	**26**	**39**	**59**	**32**		**45.13**	
			Rock	2	0	1	0	1	0	1	0	0	1	1	3	3	0	0		**0.87**	
			Litter	33	29	39	24	38	13	13	17	16	24	21	22	24	24	14		**23.40**	
			Bare ground	13	31	26	15	36	20	41	28	15	35	45	49	34	17	54		**30.60**	
			Total Perennial Cover	**5**	**19**	**7**	**38**	**20**	**49**	**28**	**26**	**38**	**25**	**30**	**16**	**38**	**17**	**19**		**25.00**	

Diversity	**Number of Native Perennial Grasses >3% Rel. Cover = 6**	**N. Pern. Forbs** **Count = 2** **Percent = 1.03**
	Number of Native Perennial Forbs > 3% Rel. Cover= 0	
Sample Adequacy Calculations	**Plant Cover Mean = 45.13** **t= 1.345** **n = 15**	
	Variance = 210.12 n_{min} **= 18.66**	

N=Native, I=Introduced, X-Noxious A=Annual, B=Biennial, P=Perennial

Table 6 Colowyo - Vegetation Cover - 2022

WP021

Raw Data - Individual Transects — **Percent Ground Cover Based on Point-Intercept Sampling**

			Transect No.——>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Average Cover	Relative Cover	Freq.
Grasses and Grass-likes																					
I	P	*Agropyron cristatum*	Crested Wheatgrass										3					4	**0.47**	**1.01**	**13**
N	P	*Agropyron dasystachyum*	Thickspike Wheatgrass	7	30	30	6	20	8	20	23	44	21	14	24	10	27	36	**21.33**	**45.98**	**100**
I	P	*Agropyron intermedium*	Intermediate Wheatgrass			2													**0.13**	**0.29**	**7**
N	P	*Agropyron smithii*	Western Wheatgrass	12	9	10	15	6	7					3					**4.13**	**8.91**	**47**
N	P	*Agropyron spicatum*	Bluebunch Wheatgrass		2	1		2	2						3	2			**0.80**	**1.72**	**40**
N	P	*Agropyron trachycaulum*	Slender Wheatgrass					2			1	1		3		2	1		**0.67**	**1.44**	**40**
I	A	*Bromus japonicus*	Japanese Brome				2				1			2	1			1	**0.47**	**1.01**	**33**
X		*Bromus tectorum*	Cheatgrass	4	6	4	5		2										**1.40**	**3.02**	**33**
N	P	*Elymus cinereus*	Basin Wildrye	2	3	6		6	4		4	15		6	4	2	2	4	**3.87**	**8.33**	**80**
I	P	*Festuca ovina/saximontana*	Hard Fescue							6		1				2			**0.60**	**1.29**	**20**
N	P	*Nassela viridula*	Green Needlegrass	1	21	7	4		4	6	10	6	2	1		3	3	5	**4.87**	**10.49**	**87**
I	P	*Poa pratensis*	Kentucky Bluegrass	1		1							13		6	1		13	**2.33**	**5.03**	**40**
N	P	*Poa secunda*	Sandberg Bluegrass	1	1	2													**0.27**	**0.57**	**20**
N	P	*Poa secunda ssp. juncifolia*	Alkali Bluegrass							13		1		9					**1.53**	**3.30**	**20**
Forbs																					
N	A	*Alyssum desertorum*	Desert Alyssum				1												**0.07**	**0.14**	**7**
I	A	*Camelina microcarpa*	Littlepod False Flax		2														**0.13**	**0.29**	**7**
X	P	*Carduus nutans*	Musk Thistle													2			**0.13**	**0.29**	**7**
N	A	*Epilobium brachycarpum*	Tall Annual Willowherb	1															**0.07**	**0.14**	**7**
N	P	*Penstemon strictus*	Rocky Mtn. Penstemon										1						**0.07**	**0.14**	**7**
I	A	*Pocilla biloba*	Twolobed Speedwell	19			1			1						6		1	**1.87**	**4.02**	**33**
I	A	*Sisymbrium altissimum*	Tumble Mustard	1			3			2					10				**1.07**	**2.30**	**27**
I	A	*Thlaspi arvense*	Field Pennycress				2												**0.13**	**0.29**	**7**
																			Mean		
			Total Plant Cover	**49**	**74**	**63**	**39**	**36**	**27**	**48**	**39**	**68**	**40**	**38**	**48**	**30**	**33**	**64**	**46.40**		
			Rock	6	1	2	5	5	10	2	3	0	7	1	4	1	5	1	**3.53**		
			Litter	24	23	23	43	34	29	23	20	28	29	23	30	28	20	29	**27.07**		
			Bare ground	21	2	12	13	25	34	27	38	4	24	38	18	41	42	6	**23.00**		
			Total Perennial Cover	**24**	**66**	**59**	**25**	**36**	**25**	**45**	**38**	**68**	**40**	**36**	**37**	**22**	**33**	**62**	**41.07**		

Diversity	**Number of Native Perennial Grasses >3% Rel. Cover = 5** **Number of Native Perennial Forbs > 3% Rel. Cover= 0**	**N. Pern. Forbs** **Count = 1** **Percent = 0.14**
Sample Adequacy Calculations	**Plant Cover Mean = 46.40** **t= 1.35** **n = 15** **Variance = 212.83** **n_{min} = 17.88**	

N=Native, I=Introduced, X-Noxious A=Annual, B=Biennial, P=Perennial

Table 7 Colowyo - Vegetation Cover - 2022

WP026

Raw Data - Individual Transects — **Percent Ground Cover Based on Point-Intercept Sampling**

			Transect No.——>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Average Cover	Relative Cover	Freq.
Grasses and Grass-likes																					
I	P	*Agropyron cristatum*	Crested Wheatgrass						1							5			**0.40**	**0.92**	**13**
N	P	*Agropyron dasystachyum*	Thickspike Wheatgrass	1	4	3	10	1	5		32	6	8	22	19	4		10	**8.33**	**19.14**	**87**
I	P	*Agropyron intermedium*	Intermediate Wheatgrass	4															**0.27**	**0.61**	**7**
N	P	*Agropyron smithii*	Western Wheatgrass		12		2			2	9	2	22			1	6		**3.73**	**8.58**	**53**
N	P	*Agropyron spicatum*	Bluebunch Wheatgrass			2	6		2			4				3	4		**1.40**	**3.22**	**40**
N	P	*Agropyron trachycaulum*	Slender Wheatgrass	1	12					1		3		1	1	2	6	10	**2.47**	**5.67**	**60**
I	A	*Bromus japonicus*	Japanese Brome	25	2	1	9	1	15	17	1	19	6	9	16	10	10	30	**11.40**	**26.19**	**100**
N	P	*Bromus marginatus*	Mountain Brome									1							**0.07**	**0.15**	**7**
X		*Bromus tectorum*	Cheatgrass				2		8	45						22			**5.13**	**11.79**	**27**
N	P	*Elymus cinereus*	Basin Wildrye	1			1										2	3	**0.47**	**1.07**	**27**
N	P	*Nassela viridula*	Green Needlegrass	4	1	11	1	1			2	9		1	1	1	9	5	**3.07**	**7.04**	**80**
I	P	*Poa pratensis*	Kentucky Bluegrass									1	1			1			**0.20**	**0.46**	**20**
N	P	*Poa secunda*	Sandberg Bluegrass		1						1								**0.13**	**0.31**	**13**
N	P	*Poa secunda ssp. juncifolia*	Alkali Bluegrass	1										2				1	**0.27**	**0.61**	**20**
N	P	*Sitanion hystrix*	Bottlebrush Squirreltail															3	**0.20**	**0.46**	**7**
Forbs																					
N	A	*Alyssum desertorum*	Desert Alyssum										2			5			**0.47**	**1.07**	**13**
N	P	*Astragalus bisulcatus*	Twogrooved Milkvetch														1		**0.07**	**0.15**	**7**
I	A	*Camelina microcarpa*	Littlepod False Flax								1								**0.07**	**0.15**	**7**
I	A	*Chorispora tenella*	Crossflower					3	4				1						**0.53**	**1.23**	**20**
N	A	*Descurainia pinnata*	Pinnate Tansymustard			1													**0.07**	**0.15**	**7**
I	B	*Lactuca serriola*	Prickly Lettuce															1	**0.07**	**0.15**	**7**
N	P	*Linum lewisii*	Lewis Flax									1							**0.07**	**0.15**	**7**
N	A	*Microsteris gracilis*	Slender Phlox									1							**0.07**	**0.15**	**7**
I	A	*Pocilla biloba*	Twolobed Speedwell			2	1					1	3			1			**0.53**	**1.23**	**33**
I	A	*Ranunculus testiculata*	Curveseed Butterwort	4								1					1		**0.40**	**0.92**	**20**
I	A	*Salsola tragus*	Russian Thistle			3	2												**0.33**	**0.77**	**13**
I	P	*Sanguisorba minor*	Small Burnet									2							**0.13**	**0.31**	**7**
I	A	*Sisymbrium altissimum*	Tumble Mustard			2		20		1						2	3		**1.87**	**4.29**	**33**
I	A	*Thlaspi arvense*	Field Pennycress			6	1	5	1						3				**1.07**	**2.45**	**33**
N	P	Unknown species															1		**0.07**	**0.15**	**7**
Shrubs & Trees																					
N	P	*Artemisia tridentata*	Big Sagebrush			1						1			1				**0.20**	**0.46**	**20**
																			Mean		
			Total Plant Cover	**41**	**32**	**32**	**35**	**31**	**36**	**66**	**46**	**52**	**43**	**35**	**41**	**57**	**43**	**63**	**43.53**		
			Rock	0	1	5	6	2	4	1	0	0	2	1	0	2	3	0	**1.80**		
			Litter	14	33	31	22	28	29	21	28	31	33	24	34	31	32	15	**27.07**		
			Bare ground	45	34	32	37	39	31	12	26	17	22	40	25	10	22	22	**27.60**		
			Total Perennial Cover	**12**	**30**	**17**	**20**	**2**	**8**	**3**	**44**	**30**	**31**	**26**	**22**	**17**	**29**	**32**	**21.53**		

Diversity	**Number of Native Perennial Grasses >3% Rel. Cover = 5**	**N. Pern. Forbs** **Count = 3**
	Number of Native Perennial Forbs > 3% Rel. Cover= 0	**Percent = 0.46**
Sample Adequacy Calculations	**Plant Cover Mean = 43.53** **t= 1.35** **n = 15**	
	Variance = 127.27 n_{min} **= 12.15**	

N=Native, I=Introduced, X-Noxious A=Annual, B=Biennial, P=Perennial

Table 8 Colowyo - Vegetation Cover - 2022

WP027

Raw Data - Individual Transects — **Percent Ground Cover Based on Point-Intercept Sampling**

			Transect No.——>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Average Cover	Relative Cover	Freq.
Grasses and Grass-likes																					
I	P	*Agropyron cristatum*	Crested Wheatgrass					3		2			1	1					**0.47**	**1.03**	**27**
N	P	*Agropyron dasystachyum*	Thickspike Wheatgrass		1	14	5	1			1	4	14	5	2	2	3	4	**3.73**	**8.22**	**80**
I	P	*Agropyron intermedium*	Intermediate Wheatgrass			1	1						2						**0.27**	**0.59**	**20**
N	P	*Agropyron smithii*	Western Wheatgrass			5							2						**0.47**	**1.03**	**13**
N	P	*Agropyron trachycaulum*	Slender Wheatgrass	4	2	1	3	3	5	1	3	7	1			2	2		**2.27**	**4.99**	**80**
I	A	*Bromus japonicus*	Japanese Brome	3	3	24	17	19	6	9	8	14		18	12	1	20	4	**10.53**	**23.20**	**93**
N	P	*Bromus marginatus*	Mountain Brome		1		1				1								**0.20**	**0.44**	**20**
X		*Bromus tectorum*	Cheatgrass		12	2	4		2		3	6				10	29		**4.53**	**9.99**	**53**
N	P	*Elymus cinereus*	Basin Wildrye					6	13		1	1				7	5		**2.20**	**4.85**	**40**
I	P	*Festuca ovina/saximontana*	Hard Fescue					1											**0.07**	**0.15**	**7**
N	P	*Nassela viridula*	Green Needlegrass	6	7		3	6	4	2	3	2	4	2		10	4		**3.53**	**7.78**	**80**
I	P	*Poa pratensis*	Kentucky Bluegrass	2		2						6							**0.67**	**1.47**	**20**
N	P	*Poa secunda ssp. juncifolia*	Alkali Bluegrass	2	2			2			1	2	2	1		2	1	2	**1.13**	**2.50**	**67**
N	P	*Sitanion hystrix*	Bottlebrush Squirreltail					2						4			2		**0.53**	**1.17**	**20**
Forbs																					
N	A	*Alyssum desertorum*	Desert Alyssum	1	1														**0.13**	**0.29**	**13**
N	P	*Astragalus bisulcatus*	Twogrooved Milkvetch				1												**0.07**	**0.15**	**7**
I	A	*Chorispora tenella*	Crossflower															8	**0.53**	**1.17**	**7**
N	A	*Collinsia parviflora*	Blue-eyed Mary				1		1										**0.13**	**0.29**	**13**
N	A	*Descurainia pinnata*	Pinnate Tansymustard	8	1		2	1		1					31				**2.93**	**6.46**	**40**
I	B	*Lactuca serriola*	Prickly Lettuce						3										**0.20**	**0.44**	**7**
N	P	*Penstemon strictus*	Rocky Mtn. Penstemon									1							**0.07**	**0.15**	**7**
I	A	*Pocilla biloba*	Twolobed Speedwell	3	2				1	1	3		1		1			4	**1.07**	**2.35**	**53**
I	A	*Ranunculus testiculata*	Curveseed Butterwort							2	5								**0.47**	**1.03**	**13**
I	A	*Salsola tragus*	Russian Thistle							1									**0.07**	**0.15**	**7**
I	A	*Sisymbrium altissimum*	Tumble Mustard	14	16		1	11	7	6				2	6		1	4	**4.53**	**9.99**	**67**
I	A	*Thlaspi arvense*	Field Pennycress	9	5		1	3	5	4		1	2	4	6		9	11	**4.00**	**8.81**	**80**
I	B	*Tragopogon dubius*	False Salsify						1										**0.07**	**0.15**	**7**
Shrubs & Trees																					
N	P	*Artemisia tridentata*	Big Sagebrush	1	2	3			1							1			**0.53**	**1.17**	**33**
																				Mean	
			Total Plant Cover	**53**	**55**	**52**	**40**	**58**	**49**	**29**	**29**	**44**	**29**	**37**	**58**	**35**	**76**	**37**		**45.40**	
			Rock	1	1	3	0	0	1	0	3	2	4	2	1	0	0	0		**1.20**	
			Litter	25	24	23	21	30	26	29	25	28	29	22	27	25	20	41		**26.33**	
			Bare ground	21	20	22	39	12	24	42	43	26	38	39	14	40	4	22		**27.07**	
			Total Perennial Cover	**15**	**15**	**26**	**14**	**24**	**23**	**5**	**10**	**23**	**26**	**13**	**2**	**24**	**17**	**6**		**16.20**	

Diversity	**Number of Native Perennial Grasses >3% Rel. Cover = 4**	**N. Pern. Forbs** **Count = 2**
	Number of Native Perennial Forbs > 3% Rel. Cover= 0	**Percent = 0.29**
Sample Adequacy Calculations	**Plant Cover Mean = 45.40** **t= 1.35** **n = 15**	
	Variance = 181.97 n_{min} **= 15.97**	

N=Native, I=Introduced, X-Noxious A=Annual, B=Biennial, P=Perennial

Table 9 Colowyo - Vegetation Cover - 2022

WP028

Raw Data - Individual Transects — **Percent Ground Cover Based on Point-Intercept Sampling**

			Transect No.——>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Average Cover	Relative Cover	Freq.
Grasses and Grass-likes																					
N	P	*Agropyron dasystachyum*	Thickspike Wheatgrass	30	44	21	27	41								2			**11.00**	**20.89**	**40**
N	P	*Agropyron smithii*	Western Wheatgrass						24	32	19	1	2	11	25	11	8	21	**10.27**	**19.49**	**67**
N	P	*Agropyron spicatum*	Bluebunch Wheatgrass	1	1						13	33	4			11	20		**5.53**	**10.51**	**47**
N	P	*Agropyron trachycaulum*	Slender Wheatgrass								1	1	2				2		**0.40**	**0.76**	**27**
I	A	*Bromus japonicus*	Japanese Brome	2		2	11		15	2		3	4	38	3	5	1	8	**6.27**	**11.90**	**80**
X		*Bromus tectorum*	Cheatgrass	2	1	1	8	13	3	5	9	2	10		11	9		35	**7.27**	**13.80**	**87**
I	P	*Festuca ovina/saximontana*	Hard Fescue														1		**0.07**	**0.13**	**7**
N	P	*Koeleria macrantha*	Prairie Junegrass								1								**0.07**	**0.13**	**7**
N	P	*Nassela viridula*	Green Needlegrass	2	2	5	2	4					3			2			**1.33**	**2.53**	**47**
N	P	*Sitanion hystrix*	Bottlebrush Squirreltail	1		1	1							3	1				**0.47**	**0.89**	**33**
Forbs																					
N	P	*Achillea millefolium*	Common Yarrow								1								**0.07**	**0.13**	**7**
N	A	*Alyssum alyssoides*	Pale Madwort									1							**0.07**	**0.13**	**7**
I	P	*Astragalus cicer*	Cicer Milkvetch											1					**0.07**	**0.13**	**7**
I	A	*Chenopodium album*	Lambsquarter		1	1							1						**0.20**	**0.38**	**20**
N	A	*Descurainia pinnata*	Pinnate Tansymustard							1									**0.07**	**0.13**	**7**
I	A	*Pocilla biloba*	Twolobed Speedwell	2		2							1	3	1				**0.60**	**1.14**	**33**
I	A	*Polygonum aviculare*	Prostrate Knotweed	1	1	1													**0.20**	**0.38**	**20**
I	A	*Salsola tragus*	Russian Thistle	3		4							4				11		**1.47**	**2.78**	**27**
I	A	*Sisymbrium altissimum*	Tumble Mustard	4	1	1	2			3		3	10	1	2			2	**1.93**	**3.67**	**67**
I	A	*Thlaspi arvense*	Field Pennycress	2	1	5	1	2	7	15	3	5	4	4	14	2	2	12	**5.27**	**10.00**	**100**
Shrubs & Trees																					
N	P	*Artemisia tridentata*	Big Sagebrush													1			**0.07**	**0.13**	**7**
																			Mean		
			Total Plant Cover	**50**	**52**	**44**	**52**	**60**	**49**	**58**	**47**	**49**	**45**	**61**	**57**	**43**	**45**	**78**	**52.67**		
			Rock	0	0	1	0	1	3	2	1	2	0	3	3	3	2	0	**1.40**		
			Litter	10	20	10	15	8	28	25	38	24	21	15	27	29	12	18	**20.00**		
			Bare ground	40	28	45	33	31	20	15	14	25	34	21	13	25	41	4	**25.93**		
			Total Perennial Cover	**34**	**47**	**27**	**30**	**45**	**24**	**32**	**35**	**35**	**11**	**15**	**26**	**27**	**31**	**21**	**29.33**		

Diversity	**Number of Native Perennial Grasses >3% Rel. Cover = 3**	**N. Pern. Forbs** **Count = 2**
	Number of Native Perennial Forbs > 3% Rel. Cover= 0	**Percent = 0.25**
Sample Adequacy Calculations	**Plant Cover Mean = 52.67** **t= 1.35** **n = 15**	
	Variance = 83.24 n_{min} **= 5.43**	

N=Native, I=Introduced, X-Noxious A=Annual, B=Biennial, P=Perennial

Table 10 Colowyo - Vegetation Cover - 2022

WP029

Raw Data - Individual Transects — **Percent Ground Cover Based on Point-Intercept Sampling**

			Transect No.——>	1	2	3	3	4	5	6	7	8	9	10	11	12	14	15	Average Cover	Relative Cover	Freq.
Grasses and Grass-likes																					
I	P	*Agropyron cristatum*	Crested Wheatgrass															3	**0.20**	**0.33**	**7**
N	P	*Agropyron dasystachyum*	Thickspike Wheatgrass	9	33	34	22	3	40	16	18	18	19	14	41	33	25	20	**23.00**	**38.08**	**100**
N	P	*Agropyron riparium*	Streambank Wheatgrass									3							**0.20**	**0.33**	**7**
N	P	*Agropyron smithii*	Western Wheatgrass	14	18	18	2		12	6	13	11	13	13	6	7	25	18	**11.73**	**19.43**	**93**
N	P	*Agropyron spicatum*	Bluebunch Wheatgrass				1			4	5			3					**0.87**	**1.43**	**27**
N	P	*Agropyron trachycaulum*	Slender Wheatgrass										4				6		**0.67**	**1.10**	**13**
I	P	*Bromus inermis*	Smooth Brome							2									**0.13**	**0.22**	**7**
I	A	*Bromus japonicus*	Japanese Brome		1						1		8		7	9		14	**2.67**	**4.42**	**40**
N	P	*Bromus marginatus*	Mountain Brome											3					**0.20**	**0.33**	**7**
X		*Bromus tectorum*	Cheatgrass				42	86	2	42		1					2		**11.67**	**19.32**	**40**
N	P	*Nassela viridula*	Green Needlegrass			2								2			3	1	**0.53**	**0.88**	**27**
N	P	*Poa secunda ssp. juncifolia*	Alkali Bluegrass							1								2	**0.20**	**0.33**	**13**
N	P	*Sitanion hystrix*	Bottlebrush Squirreltail							1									**0.07**	**0.11**	**7**
Forbs																					
N	A	*Alyssum desertorum*	Desert Alyssum						1										**0.07**	**0.11**	**7**
I	A	*Camelina microcarpa*	Littlepod False Flax								1								**0.07**	**0.11**	**7**
N	A	*Descurainia pinnata*	Pinnate Tansymustard	3						2				2					**0.47**	**0.77**	**20**
I	B	*Lactuca serriola*	Prickly Lettuce								1								**0.07**	**0.11**	**7**
I	A	*Pocilla biloba*	Twolobed Speedwell			1							8		3			2	**0.93**	**1.55**	**27**
I	A	*Salsola tragus*	Russian Thistle	1							5	2		10					**1.20**	**1.99**	**27**
I	A	*Sisymbrium altissimum*	Tumble Mustard			4	6	2	1	4		2	11	3		1	3	3	**2.67**	**4.42**	**73**
I	A	*Thlaspi arvense*	Field Pennycress	11	8	3	1		5			1	4	2		4			**2.60**	**4.30**	**60**
Shrubs & Trees																					
N	P	*Artemisia tridentata*	Big Sagebrush						1										**0.07**	**0.11**	**7**
N	P	*Atriplex canescens*	Four-wing Saltbush	2															**0.13**	**0.22**	**7**
																			Mean		
			Total Plant Cover	**40**	**60**	**62**	**74**	**91**	**62**	**78**	**44**	**38**	**67**	**52**	**57**	**54**	**64**	**63**	**60.40**		
			Rock	1	2	2	0	0	0	0	2	2	1	0	1	0	1	0	**0.80**		
			Litter	11	1	13	16	7	7	14	6	9	18	8	6	9	13	18	**10.40**		
			Bare ground	48	37	23	10	2	31	8	48	51	14	40	36	37	22	19	**28.40**		
			Total Perennial Cover	**25**	**51**	**54**	**25**	**3**	**53**	**30**	**36**	**32**	**36**	**35**	**47**	**40**	**59**	**44**	**38.00**		

Diversity	**Number of Native Perennial Grasses >3% Rel. Cover = 2** **Number of Native Perennial Forbs > 3% Rel. Cover= 0**	**N. Perm. Forbs** **Count = 0** **Percent = 0.00**
Sample Adequacy Calculations	**Plant Cover Mean = 60.40** **t= 1.35** **n = 15** **Variance = 200.69** n_{min} **= 9.95**	

N=Native, I=Introduced, X-Noxious A=Annual, B=Biennial, P=Perennial

Table 11 Colowyo - Vegetation Cover - 2022

WP032

Raw Data - Individual Transects — **Percent Ground Cover Based on Point-Intercept Sampling**

			Transect No.——>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Average Cover	Relative Cover	Freq.
Grasses and Grass-likes																					
N	P	*Agropyron dasystachyum*	Thickspike Wheatgrass	6	2	5	6	2	25	15	33	19	13	20	24	23	16	25	**15.60**	**32.82**	**100**
N	P	*Agropyron smithii*	Western Wheatgrass	19	8	15	10	8	1	4	1		1	1		9	11	1	**5.93**	**12.48**	**87**
N	P	*Agropyron spicatum*	Bluebunch Wheatgrass			3				1	2		13		4	7			**2.00**	**4.21**	**40**
N	P	*Agropyron trachycaulum*	Slender Wheatgrass		10		18												**1.87**	**3.93**	**13**
I	A	*Bromus japonicus*	Japanese Brome		6	8	2	13	1		9	1		4					**2.93**	**6.17**	**53**
X		*Bromus tectorum*	Cheatgrass	16	4					1		6			6				**2.20**	**4.63**	**33**
N	P	*Elymus cinereus*	Basin Wildrye		4	2	1	1		1			1				3	6	**1.27**	**2.66**	**53**
I	P	*Festuca ovina/saximontana*	Hard Fescue						11	1		1			1			3	**1.13**	**2.38**	**33**
N	P	*Hesperostipa comata*	Needla and Thread									2							**0.13**	**0.28**	**7**
N	P	*Nassela viridula*	Green Needlegrass	5	5	4	5	2	2	17		5	15	8	5	7	10	7	**6.47**	**13.60**	**93**
I	P	*Poa pratensis*	Kentucky Bluegrass	5	1	14	3	22	5	7	6	10	3	5	2	2	17	12	**7.60**	**15.99**	**100**
N	P	*Poa secunda*	Sandberg Bluegrass											2					**0.13**	**0.28**	**7**
Forbs																					
I	P	*Astragalus cicer*	Cicer Milkvetch								1								**0.07**	**0.14**	**7**
X	P	*Cirsium vulgare*	Bull Thistle								2								**0.13**	**0.28**	**7**
N	P	*Linum lewisii*	Lewis Flax														1		**0.07**	**0.14**	**7**
																			Mean		
			Total Plant Cover	**51**	**40**	**51**	**45**	**48**	**45**	**47**	**54**	**44**	**46**	**40**	**42**	**48**	**58**	**54**	**47.53**		
			Rock	2	5	4	2	4	4	2	1	4	5	2	6	5	1	1	**3.20**		
			Litter	31	38	28	35	27	26	37	32	25	19	40	16	21	25	25	**28.33**		
			Bare ground	16	17	17	18	21	25	14	13	27	30	18	36	26	16	20	**20.93**		
			Total Perennial Cover	**35**	**30**	**43**	**43**	**35**	**44**	**46**	**43**	**37**	**46**	**36**	**36**	**48**	**58**	**54**	**42.27**		

Diversity	**Number of Native Perennial Grasses >3% Rel. Cover = 5** **Number of Native Perennial Forbs > 3% Rel. Cover= 0**	**N. Pern. Forbs** **Count = 2** **Percent = 0.28**
Sample Adequacy Calculations	**Plant Cover Mean = 47.53** **t= 1.35** **n = 15** **Variance = 27.84** **n_{min} = 2.23**	

N=Native, I=Introduced, X-Noxious A=Annual, B=Biennial, P=Perennial

Table 12 Colowyo - Vegetation Cover - 2022

Mountain Shrub Reference Area

Raw Data - Individual Transects — **Percent Ground Cover Based on Point-Intercept Sampling**

			Transect No.——>	1	3	5	7	9	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39	Average Cover	Relative Cover	Freq.
Grasses and Grass-likes																										
I	P	*Agropyron intermedium*	Intermediate Wheatgrass															14		1		9		**1.20**	**2.61**	**15**
N	P	*Agropyron smithii*	Western Wheatgrass			1	2			4	1			4				1	1	1				**0.75**	**1.63**	**40**
N	P	*Agropyron spicatum*	Bluebunch Wheatgrass	2																				**0.10**	**0.22**	**5**
N	P	*Agropyron trachycaulum*	Slender Wheatgrass					3												1				**0.20**	**0.44**	**10**
I	P	*Bromus inermis*	Smooth Brome															9				1	12	**1.10**	**2.39**	**15**
I	A	*Bromus japonicus*	Japanese Brome	3		5	9	3		1	3	1		1	4	2	2		10	2	3		2	**2.55**	**5.55**	**75**
N	P	*Bromus marginatus*	Mountain Brome				2				2													**0.20**	**0.44**	**10**
X		*Bromus tectorum*	Cheatgrass			1											1						2	**0.20**	**0.44**	**15**
N	P	*Carex geyeri*	Geyer's Sedge	6	12	4		9	3	1	1	6	9	1	11	21	1		1	9	13	3		**5.55**	**12.08**	**85**
N	P	*Carex stenophylla*	Needleleaf Sedge				1			3				3								1		**0.40**	**0.87**	**20**
N	P	*Koeleria macrantha*	Prairie Junegrass							1														**0.05**	**0.11**	**5**
N	P	*Melica bulbosa*	Oniongrass									3				2	2		1	2				**0.50**	**1.09**	**25**
N	P	*Nassela viridula*	Green Needlegrass					4				8				6	2		9			2	3	**1.70**	**3.70**	**35**
I	P	*Poa pratensis*	Kentucky Bluegrass		2					3					1			2		2	1			**0.55**	**1.20**	**30**
N	P	*Sitanion hystrix*	Bottlebrush Squirreltail							1				3										**0.20**	**0.44**	**10**
N	P	*Stipa nelsonii*	Nelson Needlegrass	7	5		5	7		1		2	5	2		2	6			7	5			**2.70**	**5.88**	**60**
Forbs																										
N	P	*Achillea lanulosa*	Western Yarrow	1				1				1												**0.15**	**0.33**	**15**
N	P	*Allium textile*	Wild Onion	1			1													1				**0.15**	**0.33**	**15**
N	A	*Alyssum alyssoides*	Pale Madwort		2				1						1									**0.20**	**0.44**	**15**
I	A	*Chenopodium album*	Lambsquarter									1							1					**0.10**	**0.22**	**10**
N	A	*Collomia linearis*	Slenderleaf Collomia					1				1				1	2			1	1			**0.35**	**0.76**	**30**
N	A	*Descurainia pinnata*	Pinnate Tansymustard			1									1									**0.10**	**0.22**	**10**
N	A	*Epilobium brachycarpum*	Tall Annual Willowherb																1					**0.05**	**0.11**	**5**
N	P	*Erigeron engelmannii*	Engelmann's Fleabane														1							**0.05**	**0.11**	**5**
N	P	*Erigeron speciosus*	Showy Fleabane					2												1				**0.15**	**0.33**	**10**
N	A	*Galium aparine*	Stickywilly													1								**0.05**	**0.11**	**5**
N	P	*Lathyrus laetivirens*	Aspen Pea	2										1						1				**0.20**	**0.44**	**15**
N	P	*Lupinus argenteus*	Silver Lupine					6						1					2		3	2		**0.70**	**1.52**	**25**
N	P	*Lupinus caudatus*	Tailcup Lupine		4					1	1			1										**0.35**	**0.76**	**20**
N	B	*Machaeranthera canescens*	Hoary Aster				1																	**0.05**	**0.11**	**5**
N	P	*Phlox longifolia*	Longleaf Phlox	2				1																**0.15**	**0.33**	**10**
I	A	*Pocilla biloba*	Twolobed Speedwell									2					2				2		2	**0.40**	**0.87**	**20**
N	A	*Polygonum douglasii*	Douglas's Knotweed																1					**0.05**	**0.11**	**5**
N	P	*Pseudostellaria jamesiana*	Tuber Starwort			2							3			1					2			**0.40**	**0.87**	**20**
I	A	*Thlaspi arvense*	Field Pennycress			5					3				5				1					**0.70**	**1.52**	**20**
N	P	*Vicia americana*	American Vetch													1								**0.05**	**0.11**	**5**
Shrubs & Trees																										
N	P	*Amelanchier alnifolia*	Serviceberry			2		2	12	1	2			21	3		1	12		1				**1.00**	**2.18**	**30**
N	P	*Artemisia tridentata*	Big Sagebrush		16	16	4		3	13	12				3		1	12		1	1	19	7	**6.45**	**14.04**	**70**
N	P	*Chrysothamnus viscidiflorus*	Low Rabbitbrush								12									2				**0.70**	**1.52**	**10**
N	P	*Mahonia repens*	Creeping Barberry						1															**0.05**	**0.11**	**5**
N	P	*Quercus gambellii*	Gambel Oak		5			1	21			4	14		30	16	2		3			4	38	**6.90**	**15.02**	**55**
N	P	*Symphoricarpos rotundifolius*	Roundleaf Snowberry	23	9	14	1	8	15	20	19	2	4	2		8	10		4	5	15	11		**8.50**	**18.50**	**85**
																								Mean		
			Total Plant Cover	**47**	**55**	**51**	**26**	**48**	**56**	**50**	**56**	**31**	**35**	**40**	**56**	**61**	**32**	**38**	**35**	**38**	**46**	**52**	**66**	**45.95**		
			Rock	7	0	0	7	0	10	3	0	0	0	3	0	1	1	2	0	2	3	4	0	**2.15**		
			Litter	25	41	29	56	48	26	35	33	55	64	45	40	37	44	45	51	48	45	37	27	**41.55**		
			Bare ground	21	4	20	11	4	8	12	11	14	1	12	4	1	23	15	14	12	6	7	7	**10.35**		
			Total Perennial Cover	**44**	**53**	**39**	**16**	**44**	**55**	**49**	**50**	**26**	**35**	**39**	**45**	**57**	**25**	**38**	**21**	**35**	**40**	**52**	**60**	**41.15**		

Diversity	**Number of Native Perennial Grasses >3% Rel. Cover = 3** **Number of Native Perennial Forbs > 3% Rel. Cover= 0**	**N. Perm. Forbs** **Count = 10** **Percent = 5.11**
Sample Adequacy Calculations	**Plant Cover Mean = 45.95** **t= 1.33** **Variance = 121.84** n_{min} **= 10.17**	**n = 20**

N=Native, I=Introduced, X-Noxious A=Annual, B=Biennial, P=Perennial

Table 13 Colowyo - Vegetation Cover - 2022

Sagebrush Reference Area

Raw Data - Individual Transects — **Percent Ground Cover Based on Point-Intercept Sampling**

			Transect No.——>	1	3	5	7	9	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39	Average Cover	Relative Cover	Freq.
Grasses and Grass-likes																										
I	P	*Agropyron cristatum*	Crested Wheatgrass								6													**0.30**	**0.61**	**5**
N	P	*Agropyron dasystachyum*	Thickspike Wheatgrass			2			1		1	1	3											**0.40**	**0.81**	**25**
I	P	*Agropyron intermedium*	Intermediate Wheatgrass				8	6	2		6	2	5		1									**1.50**	**3.05**	**35**
N	P	*Agropyron smithii*	Western Wheatgrass	3		1			3		1	3				2	9			10		9	11	**2.60**	**5.28**	**50**
N	P	*Agropyron spicatum*	Bluebunch Wheatgrass												11			3						**0.70**	**1.42**	**10**
I	P	*Bromus inermis*	Smooth Brome				11			4	1		8	40								7		**3.55**	**7.21**	**30**
I	A	*Bromus japonicus*	Japanese Brome	2	26	5	6	4	9		7	14	14	8		2	40		3	39		25	15	**10.95**	**22.23**	**80**
X		*Bromus tectorum*	Cheatgrass	1		2	1			21	3	3											3	**1.70**	**3.45**	**35**
N	P	*Koeleria macrantha*	Prairie Junegrass	3	10	5		8	3	4	2	2	5		11	12		14	15		10			**5.20**	**10.56**	**70**
N	P	*Oryzopsis hymenoides*	Indian Ricegrass									1												**0.05**	**0.10**	**5**
N	P	*Poa secunda*	Sandberg Bluegrass	2	3	3	1	4	2	3	6	1	1	1	1	5					4			**1.85**	**3.76**	**70**
Forbs																										
N	P	*Achillea millefolium*	Common Yarrow														1			2		1		**0.15**	**0.30**	**10**
N	P	*Allium textile*	Wild Onion														1			1			1	**0.15**	**0.30**	**15**
N	A	*Alyssum alyssoides*	Pale Madwort											3	1	1	2					3	2	**0.60**	**1.22**	**30**
N	A	*Alyssum desertorum*	Desert Alyssum	1	2		2		2	1	3	2	2											**0.75**	**1.52**	**40**
N	P	*Aster sp.*	Aster			1																		**0.05**	**0.10**	**5**
N	P	*Astragalus tenellus*	Looseflower Milkvetch			1	2																	**0.15**	**0.30**	**10**
I	A	*Camelina microcarpa*	Littlepod False Flax									1												**0.05**	**0.10**	**5**
X	P	*Cirsium arvense*	Canada Thistle		1																			**0.05**	**0.10**	**5**
N	A	*Collinsia parviflora*	Blue-eyed Mary													1	2							**0.15**	**0.30**	**10**
N	P	*Crepis acuminata*	Tapertip Hawksbeard		1												2							**0.15**	**0.30**	**10**
N	A	*Descurainia pinnata*	Pinnate Tansymustard							1			1				2			1				**0.25**	**0.51**	**20**
N	P	*Heliomeris multiflora*	Showy Goldeneye																				1	**0.05**	**0.10**	**5**
N	P	*Linum rigidum*	Stiffstem Flax													1	1	1						**0.15**	**0.30**	**15**
N	P	*Lupinus caudatus*	Tailcup Lupine																	1				**0.05**	**0.10**	**5**
N	A	*Microsteris gracilis*	Slender Phlox										1											**0.05**	**0.10**	**5**
N	P	*Penstemon strictus*	Rocky Mtn. Penstemon													1								**0.05**	**0.10**	**5**
N	P	*Phlox hoodii*	Hood Phlox												1			2			2			**0.25**	**0.51**	**15**
N	P	*Phlox longifolia*	Longleaf Phlox	1		2		2			1								1			1		**0.40**	**0.81**	**30**
I	A	*Ranunculus testiculata*	Curveseed Butterwort						1	3					1		1							**0.30**	**0.61**	**20**
N	P	*Solidago mollis*	Velvety Goldenrod														2			6			2	**0.50**	**1.02**	**15**
N	P	*Sphaeralcea coccinea*	Scarlet Globemallow																3					**0.15**	**0.30**	**5**
N	P	*Stenotus armerioides*	Thrifty Goldenweed	3	1			1		6					3	1		3		5		2	6	**0.60**	**1.22**	**30**
I	A	*Thlaspi arvense*	Field Pennycress														2							**1.05**	**2.13**	**25**
Sub-Shrubs																										
N	P	*Gutierrezia sarothrae*	Snakeweed	3	1	1		4	2		5	9			1	10		5			8			**2.45**	**4.97**	**55**
N	P	*Krascheninnikovia lanata*	Winterfat																1					**0.05**	**0.10**	**5**
Shrubs & Trees																										
N	P	*Amelanchier alnifolia*	Serviceberry	1			2		4			2												**0.45**	**0.91**	**20**
N	P	*Artemisia tridentata*	Big Sagebrush	13		5	2	3	9			1		11	2	6	2	4	6	1	9	11	8	**4.65**	**9.44**	**80**
N	P	*Chrysothamnus nauseosus*	Rubber Rabbitbrush																				19	**0.95**	**1.93**	**5**
N	P	*Chrysothamnus viscidiflorus*	Low Rabbitbrush		10		7	2		18	1		2	8			4			3		10		**3.25**	**6.60**	**50**
N	P	*Opuntia polyacantha*	Plains Pricklypear												2									**0.10**	**0.20**	**5**
N	P	*Prunus virgiana*	Chokecherry																			3		**0.15**	**0.30**	**5**
N	P	*Symphoricarpos rotundifolius*	Roundleaf Snowberry				3		2					3	5		7	4		7		5	4	**2.00**	**4.06**	**45**
N	P		Moss	2	1								3											**0.30**	**0.61**	**15**
																								Mean		
			Total Plant Cover	**35**	**56**	**28**	**45**	**34**	**40**	**61**	**43**	**42**	**45**	**74**	**40**	**42**	**77**	**36**	**29**	**76**	**33**	**77**	**72**	**49.25**		
			Rock	9	1	1	2	2	10	1	3	2	0	0	5	5	0	11	1	0	1	0	0	**2.70**		
			Litter	29	18	50	50	44	43	36	42	48	50	21	30	12	22	28	24	23	41	18	18	**32.35**		
			Bare ground	27	25	21	3	20	7	2	12	8	5	5	25	41	1	25	46	1	25	5	10	**15.70**		
			Total Perennial Cover	**31**	**27**	**21**	**36**	**30**	**28**	**29**	**30**	**22**	**27**	**63**	**38**	**38**	**28**	**36**	**26**	**31**	**33**	**47**	**46**	**33.35**		

Diversity	**Number of Native Perennial Grasses >3% Rel. Cover = 3** **Number of Native Perennial Forbs > 3% Rel. Cover= 0**	**N. Pern. Forbs**	**Count = 14** **Percent = 5.79**
Sample Adequacy Calculations	**Plant Cover Mean = 49.25** **t= 1.33** **Variance = 297.78** n_{min} **= 21.64**	**n = 20**	

N=Native, I=Introduced, X-Noxious A=Annual, B=Biennial, P=Perennial

Table 14 Colowyo - Woody Plant Density - 2022

EP061

Raw Data - Individual Transects — **Sampling by 2m x 50m Belt Transects**

		Transect No.——>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Count	Per Acre
Shrubs & Trees																			
N	P	*Artemisia cana* Silver Sage										2				1		**3.0**	**8.1**
N	P	*Artemisia tridentata* Big Sagebrush	45	79	92	107	2	112	48	144	281	257	76	49	157	201	129	**1,779.0**	**4,799.6**
N	P	*Symphoricarpos rotundifolius* Roundleaf Snowberry														1		**1.0**	**2.7**
		Total	**45**	**79**	**92**	**107**	**2**	**112**	**48**	**144**	**281**	**259**	**76**	**49**	**157**	**203**	**129**	**1,783.0**	**4,810.4**

Sample Adequacy Calculations: **Mean = 118.87** **t= 1.35** **n = 15** **Variance = 6324.70** **n_{min} = 80.98**

Table 15 Colowyo - Woody Plant Density - 2022

WP021

Raw Data - Individual Transects — **Sampling by 2m x 50m Belt Transects**

		Transect No.——>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Count	Per Acre
Shrubs & Trees																			
N	P	*Artemisia tridentata* Big Sagebrush					1					7			1		6	**15**	**40.5**
		Total	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**7**	**0**	**0**	**1**	**0**	**6**	**15**	**40.5**

Sample Adequacy Calculations: **Mean = 1.00** **t= 1.35** **n = 15** **Variance = 5.14** **n_{min} = 930.40**

Table 16 Colowyo - Woody Plant Density - 2022

WP026

Raw Data - Individual Transects — **Sampling by 2m x 50m Belt Transects**

		Transect No.——>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Count	Per Acre
Shrubs & Trees																			
N	P	*Artemisia cana* Silver Sage	1											3				**4**	**10.8**
N	P	*Artemisia tridentata* Big Sagebrush	1	5	30	31	20	2	12	1	54	5		5	3	9	4	**182**	**491.0**
		Total	**2**	**5**	**30**	**31**	**20**	**2**	**12**	**1**	**54**	**5**	**0**	**8**	**3**	**9**	**4**	**186**	**501.8**

Sample Adequacy Calculations: **Mean = 12.40** **t= 1.35** **n = 15** **Variance = 231.69** **n_{min} = 272.60**

Table 17 Colowyo - Woody Plant Density - 2022

WP027

Raw Data - Individual Transects — **Sampling by 2m x 50m Belt Transects**

		Transect No.——>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Count	Per Acre
Shrubs & Trees																			
N	P	*Artemisia cana*	Silver Sage	2														**2.0**	**5.4**
N	P	*Artemisia tridentata*	Big Sagebrush	186	41	29	57	53	48	7	4	110	24	3	14	85	5	94	**760.0**	**2,050.4**
N	P	*Atriplex canescens*	Four-wing Saltbush		2								1						**3.0**	**8.1**
N	P	*Purshia tridentata*	Antelope Bitterbrush	2															**2.0**	**5.4**
		Total		**190**	**43**	**29**	**57**	**53**	**48**	**7**	**4**	**110**	**25**	**3**	**14**	**85**	**5**	**94**	**767.0**	**2,069.3**

Sample Adequacy Calculations

Mean = 51.13 **t= 1.35** **n = 15**

Variance = 2643.84 **n_{min} = 182.93**

Table 18 Colowyo - Woody Plant Density - 2022

WP028

Raw Data - Individual Transects — **Sampling by 2m x 50m Belt Transects**

		Transect No.——>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Count	Per Acre
Shrubs & Trees																			
N	P	*Artemisia tridentata*	Big Sagebrush		1			1			9	1					2		**14**	**37.8**
N	P	*Atriplex canescens*	Four-wing Saltbush			1		1	1		2						1		**6**	**16.2**
		Total		**0**	**1**	**1**	**0**	**2**	**1**	**0**	**11**	**1**	**0**	**0**	**0**	**0**	**3**	**0**	**20**	**54.0**

Sample Adequacy Calculations

Mean = 1.33 **t= 1.35** **n = 15**

Variance = 7.95 **n_{min} = 809.25**

Table 19 Colowyo - Woody Plant Density - 2022

WP029

Raw Data - Individual Transects — **Sampling by 2m x 50m Belt Transects**

		Transect No.——>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Count	Per Acre
Shrubs & Trees																			
N	P	*Artemisia tridentata* Big Sagebrush	7				1		4		1							**13**	**35.1**
N	P	*Atriplex canescens* Four-wing Saltbush	11	27				4	8									**50**	**134.9**
		Total	**18**	**27**	**0**	**0**	**1**	**4**	**12**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**63**	**170.0**

Sample Adequacy Calculations

Mean = 4.20 **t= 1.35** **n = 15**

Variance = 67.89 **n_{min} = 696.22**

Table 20 Colowyo - Woody Plant Density - 2022

WP032

Raw Data - Individual Transects — **Sampling by 2m x 50m Belt Transects**

		Transect No.——>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Count	Per Acre
Shrubs & Trees																			
N	P	*Artemisia tridentata* Big Sagebrush						2		2		1	10			2	1	**18**	**48.6**
N	P	*Atriplex canescens* Four-wing Saltbush								1								**1**	**2.7**
		Total	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**3**	**0**	**1**	**10**	**0**	**0**	**2**	**1**	**19**	**51.3**

Sample Adequacy Calculations

Mean = 1.27 **t= 1.35** **n = 15**

Variance = 6.78 **n_{min} = 764.59**

Table 21 Colowyo - Vegetation Production - 2022

WP021

Raw Data - Individual Transects — **Oven Dry Weight (grams per 1/2 square meter)**

Sample No.	*Perennial Grasses*	*Perennial Forbs*	*Sub-shrubs*	*Annual Grasses*	*Annual / Biennial Forbs*	*Noxious Weeds*		TOTAL	
						Cheatgrass	*Other*	g/0.5m^2	lbs / ac
1	77.8			2.2				**80.00**	**1,425.12**
2	46.1							**46.10**	**821.23**
3	53.4							**53.40**	**951.27**
4	69.9			1.9	0.6			**72.40**	**1,289.73**
5	96.8							**96.80**	**1,724.40**
Average	**68.8**	**0.0**	**0.0**	**0.8**	**0.1**	**0.0**	**0.0**	**69.74**	**1,242.35**

Sampling Adequacy:	**n= 5**	**t = 1.533**	**var. = 417.608**
		Mean = 69.74	**n_{min} = 20.18**

Table 22 Colowyo - Vegetation Production - 2022

WP032

Raw Data - Individual Transects — **Oven Dry Weight (grams per 1/2 square meter)**

Sample No.	*Perennial Grasses*	*Perennial Forbs*	*Sub-shrubs*	*Annual Grasses*	*Annual / Biennial Forbs*	*Noxious Weeds*		TOTAL	
						Cheatgrass	*Other*	g/0.5m^2	lbs / ac
1	42.4			0.8				**43.2**	**769.6**
2	43.4			1.2				**44.6**	**794.5**
3	54.2			0.4				**54.6**	**972.6**
4	89.8							**89.8**	**1,599.7**
5	97.9							**97.9**	**1,744.0**
Average	**65.5**	**0.0**	**0.0**	**0.5**	**0.0**	**0.0**	**0.0**	**66.0**	**1176.1**

Sampling Adequacy:	**n= 5**	**t = 1.533**	**var. = 672.952**
		Mean = 66.02	**n_{min} = 36.29**

Table 23 Colowyo - Vegetation Production - 2022

Mountain Shrub Reference Area

Raw Data - Individual Transects — **Oven Dry Weight (grams per 1/2 square meter)**

Sample No.	*Perennial Grasses*	*Perennial Forbs*	*Sub-shrubs*	*Annual Grasses*	*Annual / Biennial Forbs*	*Noxious Weeds*		TOTAL	
						Cheatgrass	*Other*	g/0.5m^2	lbs / ac
1	12.1	22.0			2.0			**36.1**	**643.1**
2	8.4	8.9			0.1			**17.4**	**310.0**
3	13.1	0.1			1.6			**14.8**	**263.6**
4		1.8		0.1	8.3	0.1		**10.3**	**183.5**
5	2.5	2.8		3.0	4.2			**12.5**	**222.7**
6	17.9	0.5		1.6	5.9			**25.9**	**461.4**
7	7.3	16.1			0.1			**23.5**	**418.6**
8	33.0	3.9			0.9			**37.8**	**673.4**
9	9.0	1.6			0.1			**10.7**	**190.6**
10	12.1	2.1						**14.2**	**253.0**
11	7.6	5.3	3.6		0.1			**16.6**	**295.7**
12	14.6	1.5		6.9	3.7			**26.7**	**475.6**
13	20.6	2.9		0.2	0.5			**24.2**	**431.1**
14	25.9	0.4		0.9	3.2			**30.4**	**541.5**
15	28.5	0.9		0.4	1.4			**31.2**	**555.8**
16	12.8	0.1			1.0			**13.9**	**247.6**
17	5.5	2.5			3.0			**11.0**	**196.0**
18	3.8	5.7			2.6			**12.1**	**215.5**
19	14.9	4.4			0.1			**19.4**	**345.6**
20	12.4	0.1		6.0	2.2			**20.7**	**368.7**
21	25.6							**25.6**	**456.0**
22	2.8	13.0		2.4	3.5			**21.7**	**386.6**
23	5.8	0.6		13.8	2.1			**22.3**	**397.3**
24	72.7	6.6			4.9			**84.2**	**1,499.9**
25	24.8							**24.8**	**441.8**
26	7.3	5.6	25.2		0.1			**38.2**	**680.5**
27	15.5	2.4			2.3			**20.2**	**359.8**
28	11.0	3.3			0.9			**15.2**	**270.8**
29	39.1			0.2	2.6			**41.9**	**746.4**
30	15.6	1.3		0.7	6.6			**24.2**	**431.1**
31	16.5	0.3		0.4	0.2			**17.4**	**310.0**
32	8.4	4.4			0.1			**12.9**	**229.8**
33	6.2	6.8		5.4	2.2			**20.6**	**367.0**
34	6.6	6.8			1.1			**14.5**	**258.3**
35	10.5	2.8		0.2	1.7			**15.2**	**270.8**
36	20.0	0.5			1.7			**22.2**	**395.5**
37	50.7				0.6			**51.3**	**913.9**
38	16.5	0.4		0.2				**17.1**	**304.6**
39	3.6	1.1		1.1	26.4			**32.2**	**573.6**
40	20.8	0.3		1.9	11.6			**34.6**	**616.4**
Average	**16.1**	**3.5**	**0.7**	**1.1**	**2.7**	**0.0**	**0.0**	**24.1**	**430.1**

Sampling Adequacy:	**n= 40**	**t = 1.304**	**var. = 185.428**
		Mean = 24.14	**n_{min} = 54.07**

Table 24 Colowyo - Vegetation Production - 2022

Sagebrush Reference Area

Raw Data - Individual Transects — **Oven Dry Weight (grams per 1/2 square meter)**

Sample No.	*Perennial Grasses*	*Perennial Forbs*	*Sub-shrubs*	*Annual Grasses*	*Annual / Biennial Forbs*	*Noxious Weeds*		TOTAL	
						Cheatgrass	*Other*	g/0.5m^2	lbs / ac
1	6.2	2.7	9.9	2.2	1.7			**22.7**	**404.4**
2	4.5	9.8		3.2	3.6			**21.1**	**375.9**
3	6.8	2.5	1.9	12.4	6.7			**30.3**	**539.8**
4	14.9	1.9		11.3	1.8			**29.9**	**532.6**
5	4.8		14.2	11.1	1.4			**31.5**	**561.1**
6	9.5	5.5		10.1				**25.1**	**447.1**
7	4.9	2.3	15.5	2.1	2.0			**26.8**	**477.4**
8	1.6		18.2	11.8	4.5			**36.1**	**643.1**
9	26.8	7.0	3.7	1.4	1.0			**39.9**	**710.8**
10	13.2	3.2		3.0	1.4			**20.8**	**370.5**
11	4.9	1.0	2.2	17.0	2.5			**27.6**	**491.7**
12	5.0	12.8		27.2	2.6			**47.6**	**847.9**
13	66.2	1.7		1.2	2.4			**71.5**	**1,273.7**
14	102.5				0.8			**103.3**	**1,840.2**
15	0.1			0.1	10.2	12.8		**23.2**	**413.3**
16	10.5	3.5		4.0	3.5			**21.5**	**383.0**
17	38.0			0.8	1.5			**40.3**	**717.9**
18	2.9	3.1	2.2	8.3	4.9			**21.4**	**381.2**
19	51.1	1.0		2.5	2.7			**57.3**	**1,020.7**
20	10.3	2.0		3.3	3.6			**19.2**	**342.0**
21	60.2			1.4	1.7			**63.3**	**1,127.6**
22	35.6	0.4		2.2	1.8			**40.0**	**712.6**
23	5.2	2.2	6.2	1.8	2.1			**17.5**	**311.7**
24	3.0	1.9		0.7				**5.6**	**99.8**
25	3.0	9.0	4.4	3.5	1.2			**21.1**	**375.9**
26	2.8	2.0		8.0	6.7			**19.5**	**347.4**
27	19.5	1.2		31.0	4.5			**56.2**	**1,001.1**
28	62.1	0.7		8.3	6.3			**77.4**	**1,378.8**
29	7.9	14.4	16.0	0.1	1.0			**39.4**	**701.9**
30	0.8	5.1	16.5		1.8			**24.2**	**431.1**
31	4.5	1.8	0.4	1.5				**8.2**	**146.1**
32	17.2	4.3	9.4	0.8	1.9			**33.6**	**598.6**
33	42.3	9.1		17.5	4.6			**73.5**	**1,309.3**
34	1.0	0.8	31.7	0.2				**33.7**	**600.3**
35	0.5	7.1	8.2					**15.8**	**281.5**
36	5.0		46.8	1.1	1.8			**54.7**	**974.4**
37	14.4	2.2						**16.6**	**295.7**
38	7.6	0.1	3.7					**11.4**	**203.1**
39	18.9	4.7		1.4	8.2			**33.2**	**591.4**
40	23.7	8.4		9.6	19.9			**61.6**	**1,097.3**
Average	**18.0**	**3.4**	**5.3**	**5.6**	**3.1**	**0.3**	**0.0**	**35.6**	**634.0**

Sampling Adequacy:			
	n= 40	**t = 1.304**	**var. = 452.706**
		Mean = 35.59	**n_{min} = 60.74**

SECTION 5 – TOPSOIL

RULE REQUIREMENT

Rule 2.04.13(2) the Permittee may provide additional monitoring information as required by the approved permit.

GENERAL DISCUSSION

In 2022, Colowyo removed topsoil and placed it in stockpile for advancement of the Collom Pit, to support installation of sumps and ditches along the Collom Haul Road, and to support widening of the Collom Haul Road for the dragline crossing. Figure 5-1 provides the topsoil pile location for all topsoil that was removed.

In 2022, topsoil was staged with a reclamation area that is still undergoing backfilling and final grading. The topsoil was staged only and was not spread nor seeded.

Figure 5-2 provides each topsoil stockpile and the corresponding volume of material contained within each pile. Figure 5-3 provides the overall topsoil balance at the end of the year 2022 for the entire Colowyo mine site.

Figure 5-1 – Topsoil Movements During Report Period

Topsoil Removal

Task	Activity	Topsoil Placement Area
1	Removed Topsoil for advancement of the Collom Pit	Pile 26A
2	Remove Topsoil for Expansion of Collom Haul Road for the Dragline Crossing	Pile 22A
3	Removed Topsoil for construction of Collom Haul Road Ditches and Sumps	Pile 29A

Topsoil Replacement

Task	Activity	Topsoil Pile Mined
1	Topsoil staged on West Pit Reclamation Area	Topsoil Pile 16E

Areas Exempt from Topsoil Stripping

Task	Activity	Acres Exempt
1	None	

Figure 5-2 - Topsoil Stockpile for Report Year

Topsoil Stockpile or Windrow Number	Volume (CY)
9B	26,612
15A	1,130,663
15E	3,201
15F	8,119
15G	24,656
15I	14,889
16C	141,291
16D	923,289
16E	698,215
17A	5,982
17B	3,673
17C	1,396
17D	1,310
17E	735
18	458,707
17F	1,460
20A	24,968
21A	25,615
21B	42,433
21C	19,262
21D	53,537
22A	60,196
25A	533,961
26A	1,004,378
26B	19,979
27A	12,316
28A	1,059
29A	35,631
30A	31,806
30B	21,631
36A	66,417
Windrow 1	3,410
Windrow 2	298
Windrow 3	3,892
Windrow 4	2,189
Windrow 6	120
Windrow 8	1,490
Windrow 9	9,781
Windrow 12	9,960
Windrow 13	5,355
Windrow 14	2,135
Windrow 15	3,392
Collom Drill Pad Windrows	16,131
Grand Total	**5,455,540**

Figure 5-3 –Topsoil Balance

Topsoil Balance As of December 2022

1	Disturbed Lands (See Figure 2-1)	5,185.5	acres
2	Lands with Redistributed Topsoil (See Figure 2-1)	1,903.9	acres
3	Lands Yet to be Retopsoiled (Line 1 Minus 2)	3,281.6	acres
4	Lands Yet to be Retopsoiled	142,946,000.0	sq. feet
5	Volume of Topsoil in Stockpiles (From Figure 5-2)	5,455,539.8	cu. yards*
6	Line 5 times 27	147,300,000.0	cu. ft
7	Average Replacement Depth Available (Line 6 divided by Line 4)	1.0	feet
8	Average Replacement Depth Available	12.4	inches

Note: Values presented above represent an estimate of areas and volumes as of the date shown above. Stockpile inventories change frequently as mining plans vary.

SECTION 6 –DITCH CONSTRUCTION CERTIFICATIONS

RULE REQUIREMENT

Rule 2.04.13(2) the Permittee may provide additional monitoring information as required by the approved permit.

Please see Volume 1 Section 2.04.13 for the requirement that these ditch construction certifications be included in the annual reclamation report.

GENERAL DISCUSSION

During 2022, a portion of the Taylor Ditch was roughly constructed but not completed. Once the entire segment of the Taylor Ditch is a constructed to design and riprap is installed a ditch construction certification will be included in the Annual Reclamation Report.

SECTION 7 –WEED MANAGEMENT

RULE REQUIREMENT

Rule 2.04.13(2) the Permittee may provide additional monitoring information as required by the approved permit.

Please see Volume 1 Section 2.04.13 for the requirement that weed management be included in the annual reclamation report.

GENERAL DISCUSSION

Colowyo utilizes a combination of pickup mounted and UTV mounted boom/hand wand applicators to facilitate chemical control of noxious weeds within the entire permit boundary. Specifically, targeted weed species include A listed knapweed and purple looseftrife, B listed black henbane, bull thistle, Canada thistle, hoary cress, houndstongue, musk thistle, and C listed common burdock, common mullein, downy brome and halogeton.

The below noted reclamation parcels were specifically treated. However, Colowyo makes every attempt to spray all lands within the permit boundary where noxious weeks are present. It is not practical to map each location, and many are too small of patch or individual plant and are random in nature to map out effectively.

- East Pit Reclamation Units
  - Units EP051 through EP053, Units EP056 through EP059, and EP061
- West Pit Reclamation Units
  - Units WP010 , Units WP014 through WP018, Units WP020 through WP021, Units WP023 through WP028, and Units WP031 and WP032
- South Taylor Reclamation Units
  - Units ST001-ST004

Please see Exhibit 2 for the reclamation units noted above.