ontinued)	,
sies List 2021 (c	The same of the sa
lamation Spec	
irg Mine Rec	
Keenesbu	

Scientific Name	Common Name	Area 25	Area 29	Area 30	Area 31	Area 32	Area 33	Area 34	Area 37	Area
Forbs: Perennial Native							3		6	
Ratibida columnifera Rumex venosus Symphyotrichum falcatum Tradescantia occidentalis	upright prairie coneflower veiny dock white prairie aster prairie spiderwort	3.3	5.6				10.0	20.0 6.7 3.3	13.3	6.7
Forbs: Perennial Introduced	pa									
Cardaria draba Convolvulus arvensis	whitetop field bindweed	3.3								
Taraxacum officinale	common dandelion							"		
Subshrubs/Shrubs/Succulents: Perennial Native	nts: Perennial Native									
Artemisia filifolia Cylindropuntia whipplei	sand sagebrush Whipple cholla	3.3	44.4	6.7	6.7	20.0		3.3		
Opuntia phaeacantha Yucca glauca	tulip pricklypear soapweed yucca	23.3	33.3	0.09	40.0			26.7		7.9

Appendix D: Precipitation Data 1993 - 2021

Keenesburg Mine 2021 Vegetation Monitoring Report

Keenesburg Mine Precipitation Data 1993-2021

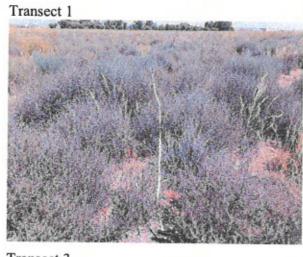
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Sept-	% from Avg Yr	from Avg Sep-Jul
1993	1	0.05	0.05	2.37	1.2	3	0.38	0.2	1.9	1.2	0.8	0	12.15	Jui	Avg II	Sep-Jui
1994	0.4	0.21	0.17	1.24	0.59	0.45	1.01	1.49	0.99	1.7	0.6	0.33	9.18	7.97	-32%	-34%
1995	0.13	0.3	0.57	2.49	4.53	4.55	0.58	0.47	1.07	0.3	0.21	0.04	15.24	16.77	13%	
1996	0.32	0.29	0.77	0.2	2.44	2.4	2.25	0.52	2.22	0.67	0.35	0.04	12.43	10.77	-8%	39%
1997	0.7	0.58	0.46	1.18	1.17	1.32	1.06	3.51	0.68	1.17	0.84	0.39	13.06	9.71	-3%	-15%
1998	0.14	0.2	0.67	1.34	2.33	2.53	1.09	2.03	0.08	1.95	0.44	0.51	13.31	11.38	-1%	-20%
1999	0.49	0	0.12	4.62	4.21	1.29	2.02	3.16	2.12	0.13	0.4	0.06	18.62	15.73	38%	-6% 30%
2000	0.05	0	1.35	0.55	2.64	0.78	1.62	0.9	1.42	0.21	1.1	0.31	10.93	9.7	-19%	
2001	0.61	0.45	0.73	2.41	4.12	1.4	2.92	0.83	0.84	0.51	0.76	0.07	15.65	15.68		-20%
2002	0.55	0	0.68	0.3	1.04	1.22	0.49	1.15	0.91	1	0.38	0.05	7.77	6.46	16% -42%	30%
2003	0	0.5	2.77	1.93	3.12	1.57	0.35	1.18	0.51	0.1	0.3	0.45	12.27	12.58		-47%
2004	0.5	0.41	0.04	1.69	1.25	1.55	0.56	0.89	1.31	0.96	0.73	0.43	9.89	6.85	-9%	4%
2005	0.23	0.1	0.46	2.25	1.45	2.78	0.51	1.12	0.2	3.01	0.73	0.31	13.14		-26%	-43%
2006	0.07	0	0.67	0.52	0.21	0.16	2.12	0.95	0.45	1.6	0.72	3.42	10.62	7.99	-2%	-11%
2007	0.79	0.07	0.4	1.58	4.48	0.3	1.44	3.68	0.43	0.53	0.43	1.08			-21%	-34%
2008	0	0.16	0.43	1.03	1.74	1.66	0.56	6.3	1.06	0.63	0.19	0.61	15.22	14.98	13%	24%
2009	0.07	0.02	0.62	3.51	1.81	2.02	3.17	0.65	1.07	1.92	0.19		14.37	8.06	7%	-33%
2010	0.1	0.34	0.89	2.62	2.28	2.13	1.52	0.75	0.04	0.75	0.73	0.89	16.5	13.71	23%	14%
2011	0.18	0.51	0	1.43	6.31	1.34	2.45	1.11	0.78	2.86	-	_	11.78	14.51	-12%	20%
2012	0	0.56	0	1.3	1.87	0.63	0.73	0.14	1.56	1.22	0.5	0.66	18.13	13.37	35%	11%
2013	0.11	0.62	0.95	1.39	1.67	0.6	1.04	1.55	3.69		0.47	0.22	8.7	9.89	-35%	-18%
2014	1.24	0.26	0.83	0.48	4.9	2.67	2.03	1.61	1.96	1.08	0.19	0.09	12.98	9.85	-4%	-18%
2015	0.31	0.34	0.36	2.45	6.79	2.03	1.11	0.42	0.16	0.45	0.41	0.45	17.29	17.46	29%	45%
2016	0.28	0.74	0.64	3.57	2.81	1.99	3.04	0.42	0.16	1.56	0.83	0.82	17.18	16.66	28%	38%
2017	0.53	0.08	0.95	1.51	4.5	1.13	0.72	2.62		0.37	0	0	14.58	16.44	8%	36%
2018	0.21	0.29	1	0.65	3.01	4.77	-		1.1	1.19	0.15	0.05	14.53	10.63	8%	-12%
2019	0.48	0.42	2.36	1.22	2.62	2.03	2.13	0.83	0.33	0.56	0.1	0	13.88	14.55	3%	21%
2020	0.05	0.57	2.44	0.78	1.24	1	1.36	1.42	0.72	0.67	0.84	0.31	14.45	11.48	7%	-5%
2021	0.19*	0.22	1.06	1.15	2.84	0.95	1.21	0.47	0.61*	0.36*	0.21*	0.42*	9.35	7.29	9.83	-31%
Mean (1993- 2019)	0.35	0.22	0.70	1.70		1.79	1.42	1.29	1.03	1.05	0.49	0.43	8.59	7.3	8.89	-36%

\* CoCoRaHS (2021) data substituted for on-site data.

Appendix E: Cover Transect Photographs

## **Reclamation Area 25**

Transect 2



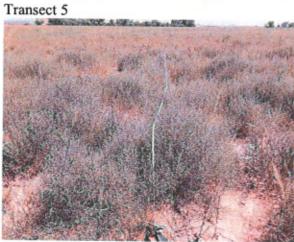


Transect 3

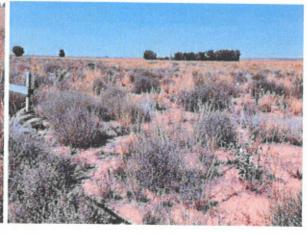


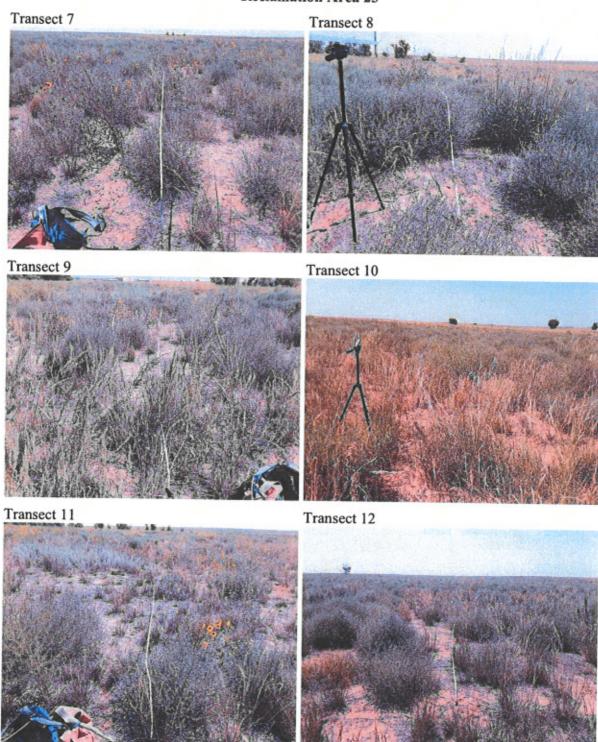
Transect 4

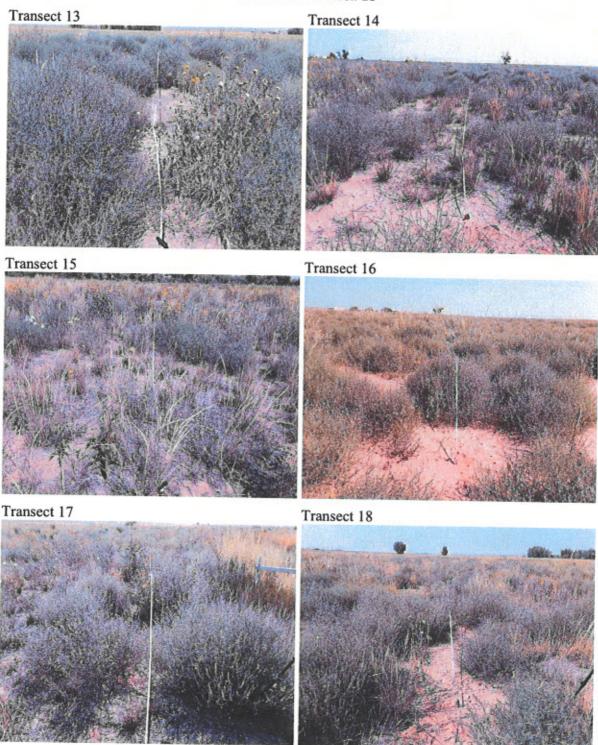


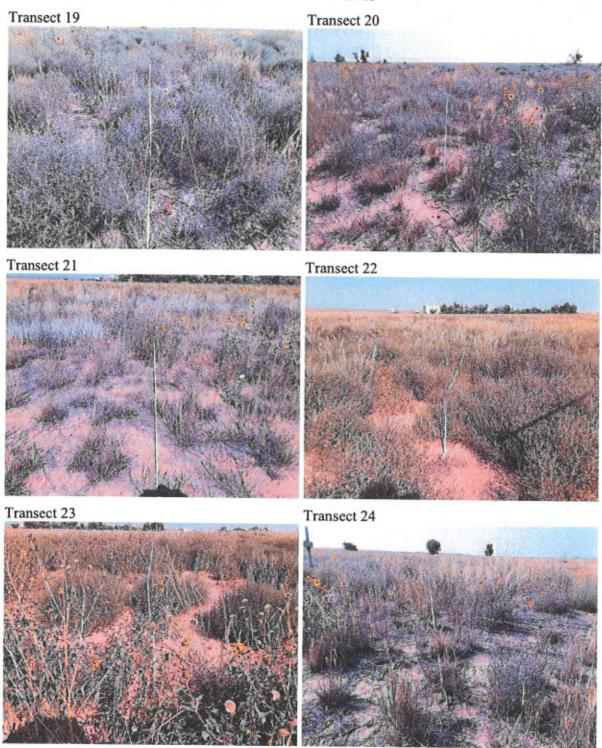


Transect 6













Transect 27



Transect 28



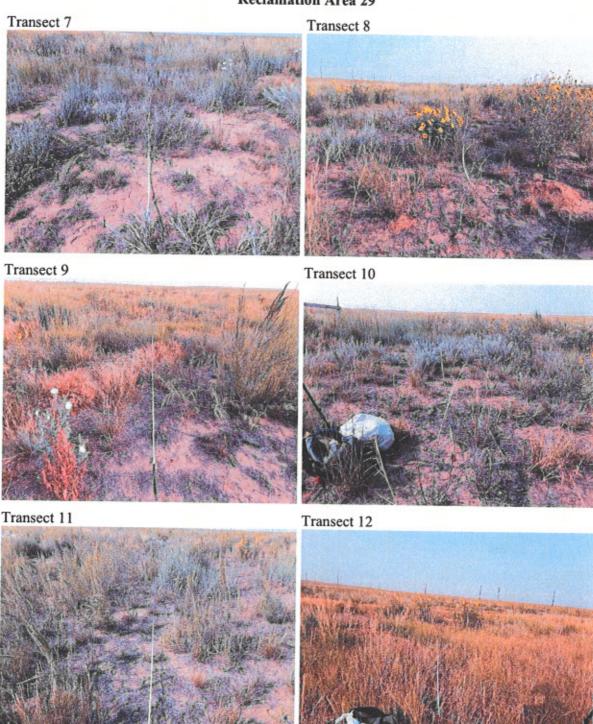
Transect 29

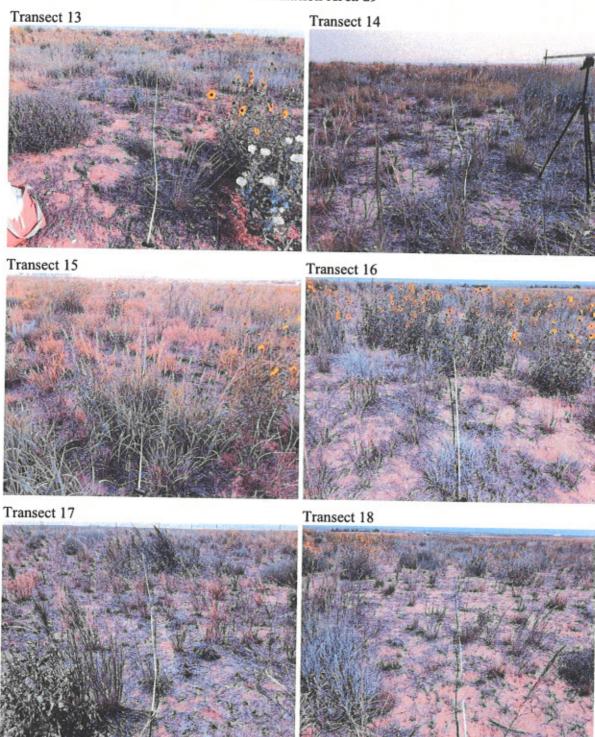


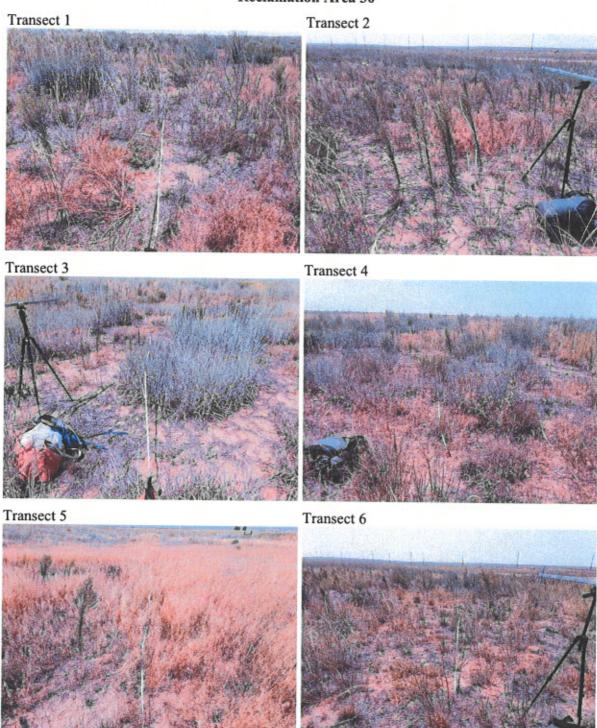
Transect 30

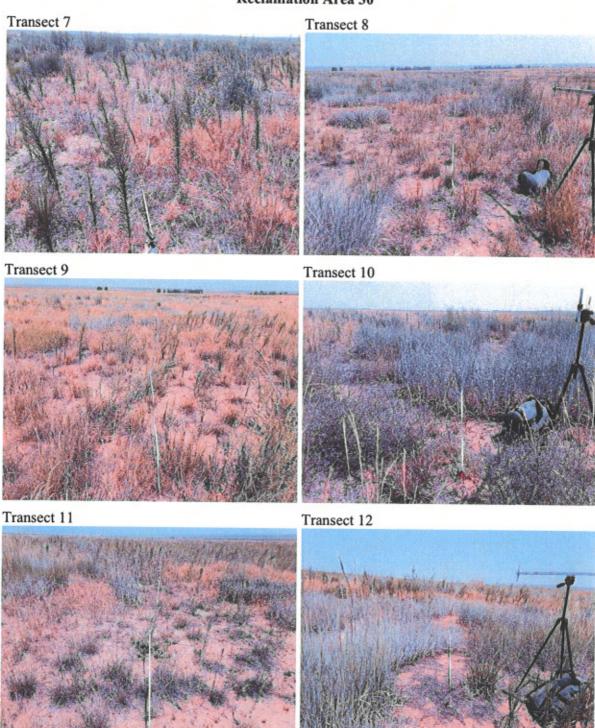
















Transect 14



Transect 15



Reclamation Area 31

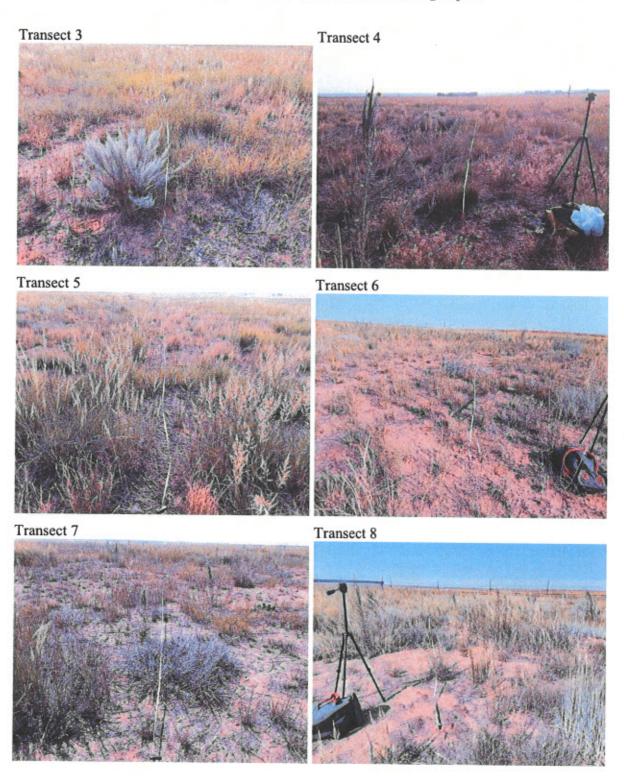
Transect 1



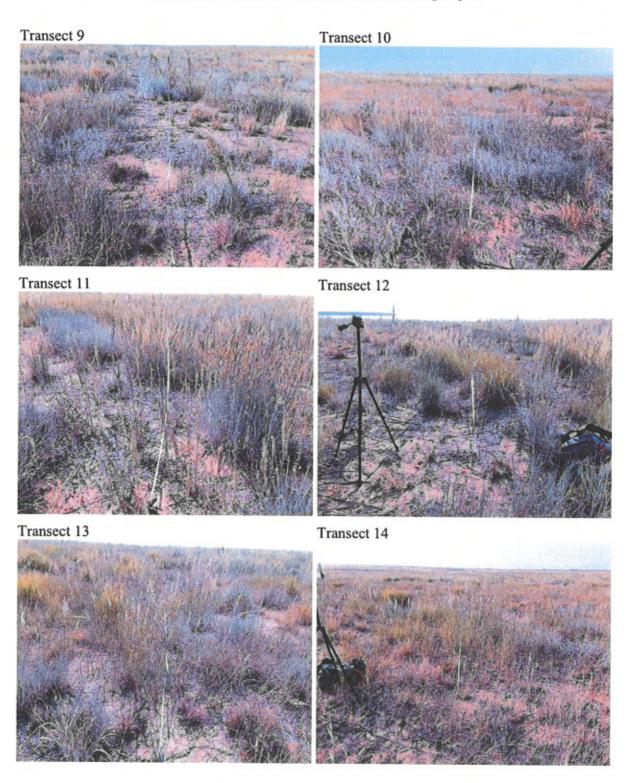
Transect 2



Reclamation Area 31



**Reclamation Area 31** 



Reclamation Area 31

Transect 15



**Reclamation Area 32** 

Transect 1



Transect 2



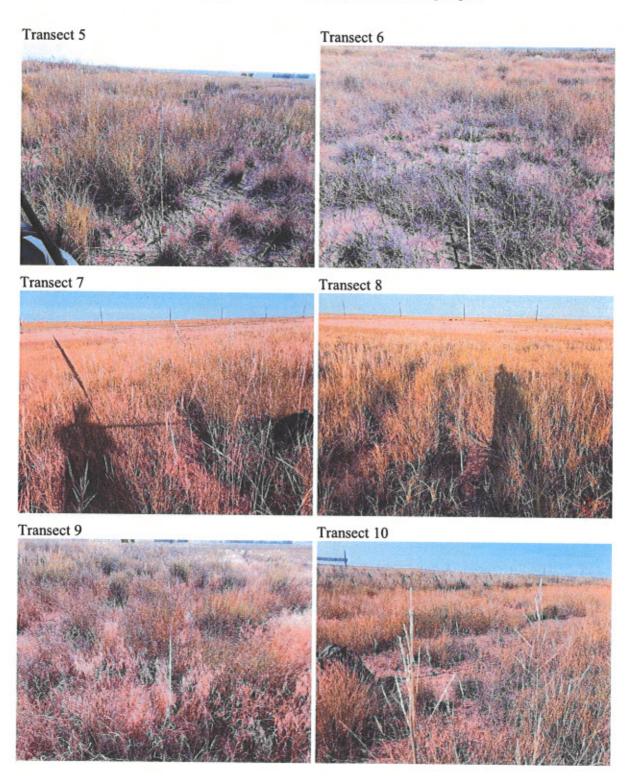
Transect 3

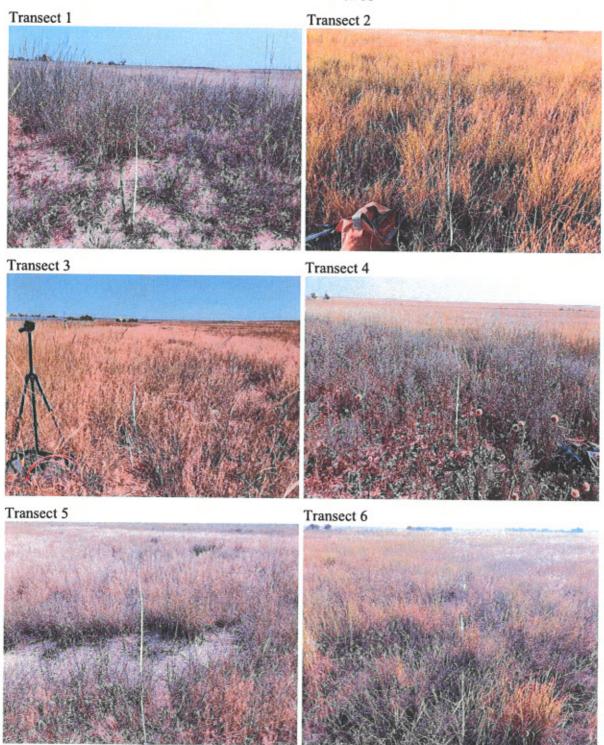


Transect 4



**Reclamation Area 32** 

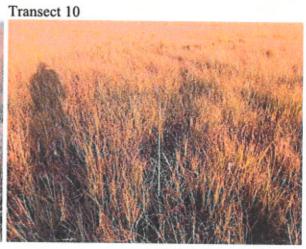








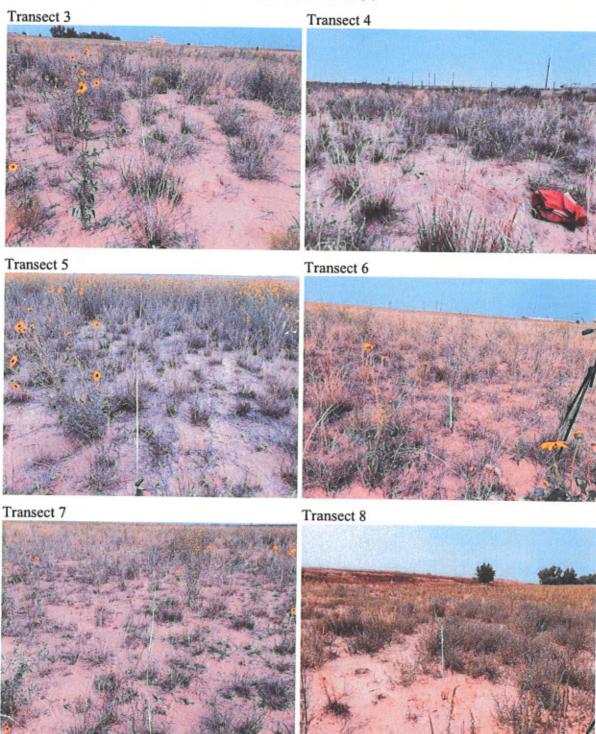
Transect 9

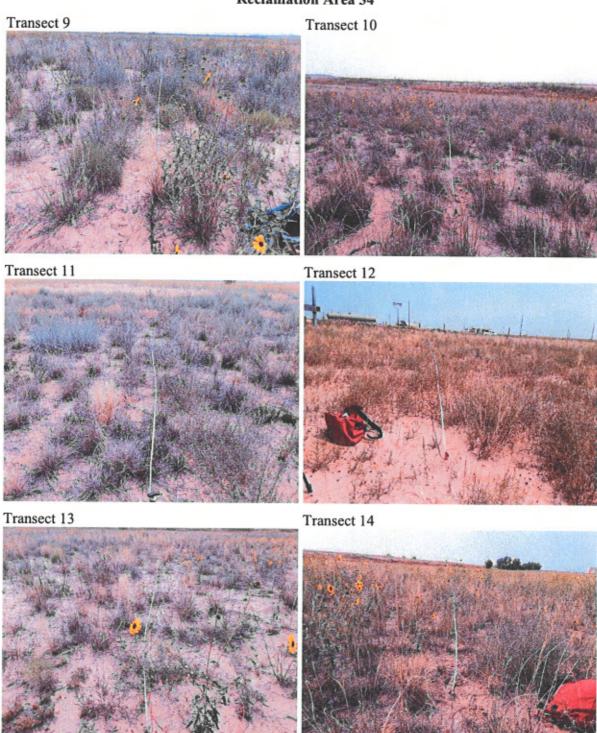


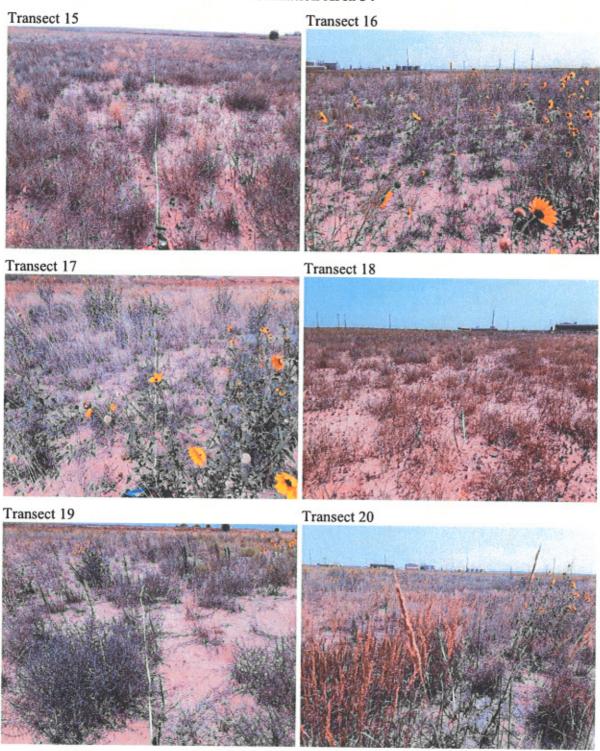
**Reclamation Area 34** 

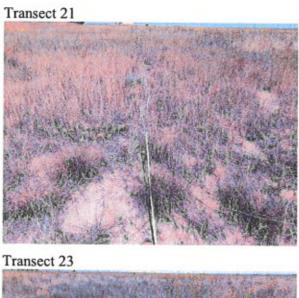






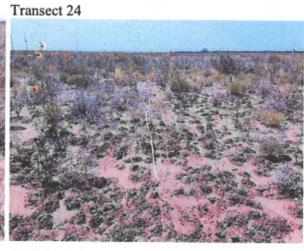








Transect 23



Transect 25

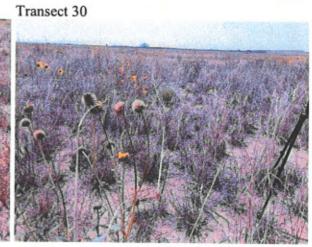


## **Reclamation Area 34**

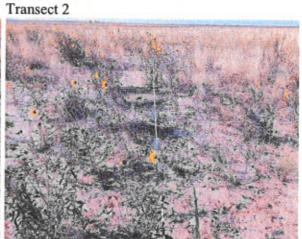




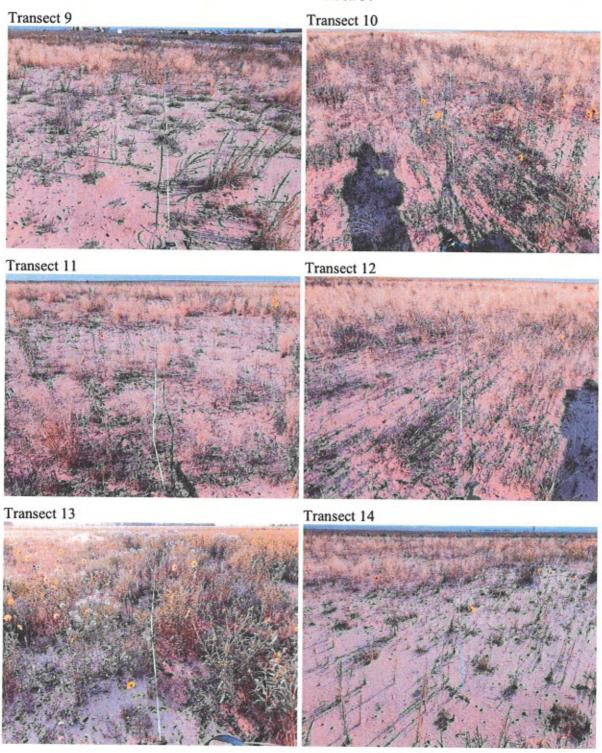
Transect 29



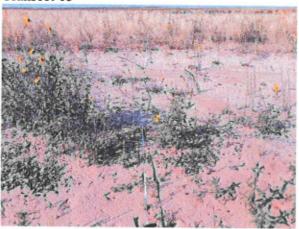








Transect 15



**Reclamation Area 44** 

Transect 1



Transect 2



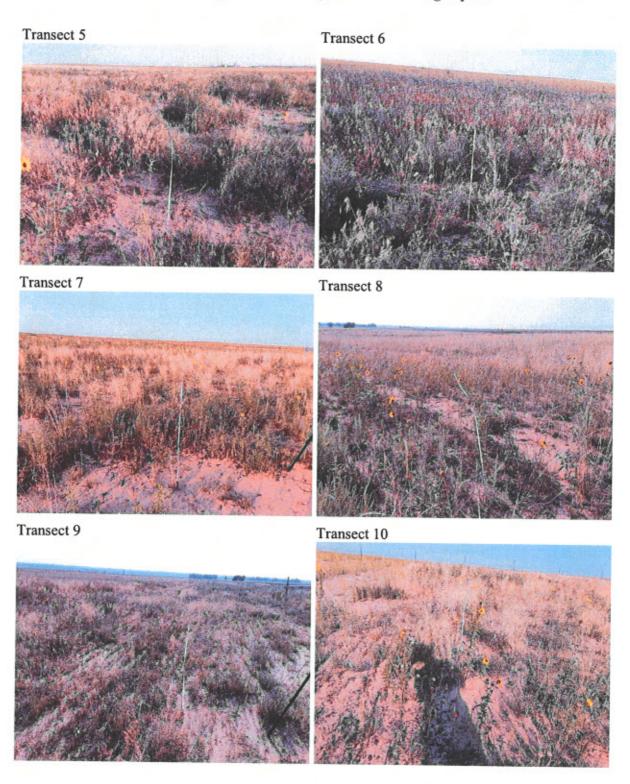
Transect 3



Transect 4



Reclamation Area 44



**Reclamation Area 44** 



Transect 12



Transect 13



Transect 14



Transect 15



Appendix F: Pest & Disease Inspection Reports



April 5, 2021

Benjamin Moline Senior Manager, Water Resources & Environment Compliance Molson Coors Beverage Company PO Box 4030 Golden, CO 80402

## RE: Keenesburg Mine-1st Quarter 2021 Pest & Disease Inspection

Dear Benjamin:

Enclosed is the first quarter 2021 Pest & Disease Inspection Report for the Keenesburg Mine.

Please contact me at your convenience with any questions you may have regarding this report.

Sincerely,

Matthew T. Clark

Millow

Principal Reclamation Specialist

w/attachment

#### Keenesburg Mine First Quarter 2021 Pest & Disease Inspection



On March 31, 2021 Habitat Management inspected the operational, bonded reclaimed, and shop areas at the Keenesburg Mine for plant pests, plant diseases, and noxious weeds that could or have affected establishment of vegetation on reclaimed lands. The following areas were inspected:

- · Office/shop/facility area;
- Bonded reclamation;
- Permanent sediment ponds; and
- Undisturbed land within the permit boundary.

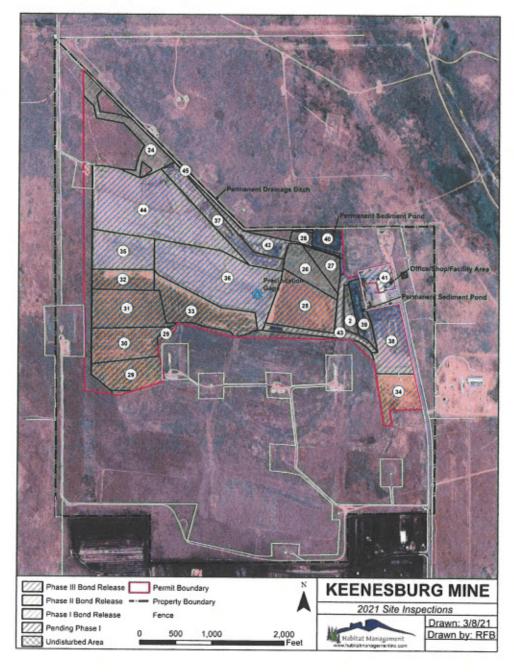
These areas are depicted on Map 1.

Plant pests or diseases were not observed within the areas inspected. The vegetation has not been adversely affected by plant pests. Areas affected by infestation or blight were not identified during this inspection. No areas were observed where noxious weeds, plant pests or plant disease had adversely impacted the normal growth and establishment of vegetation on reclaimed lands.

w/attachment



Map 1: Coors Energy Company-Keenesburg Mine





June 30, 2021

Benjamin Moline Senior Manager, Water Resources & Environment Compliance Molson Coors Beverage Company PO Box 4030 Golden, CO 80402

## RE: Keenesburg Mine-2nd Quarter 2021 Pest & Disease Inspection

Dear Benjamin:

Please see attached 2<sup>nd</sup> Quarter 2021 Pest & Disease Inspection Report for the Keenesburg Mine.

Please contact me at your convenience with any questions you may have regarding this report.

Sincerely,

Matthew T. Clark

Mille

Principal Reclamation Specialist

w/attachment

## Keenesburg Mine -2nd Quarter 2021 Pest & Disease Inspection



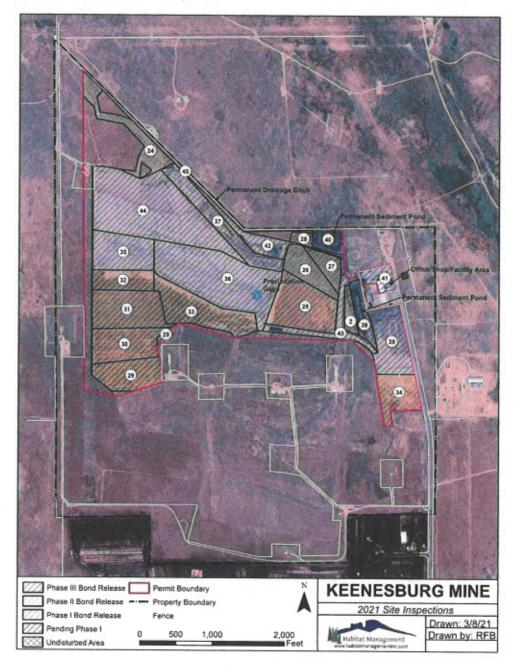
On June 23, 2021 Habitat Management inspected the operational, bonded reclaimed, and shop areas at the Keenesburg Mine for plant pests, plant diseases, and noxious weeds that could or have affected establishment of vegetation on reclaimed lands. The following areas were inspected and are depicted on Map 1:

- Office/shop/facility area;
- Bonded reclamation;
- Permanent sediment ponds; and,
- · Undisturbed land within the permit boundary.

Plant pests or diseases were not observed within the areas inspected. The vegetation has not been adversely affected by plant pests. Areas affected by infestation or blight were not identified during this inspection. No areas were observed where noxious weed species were impacting normal growth and establishment of vegetation on reclaimed lands. w/attachment



Map 1: Coors Energy Company-Keenesburg Mine





October 29, 2021

Benjamin Moline Senior Manager, Water Resources & Environment Compliance Molson Coors Beverage Company PO Box 4030 Golden, CO 80402

## RE: Keenesburg Mine-3rd Quarter 2021 Pest & Disease Inspection

Dear Benjamin:

Please see attached 3rd Quarter 2021 Pest & Disease Inspection Report for the Keenesburg Mine.

Please contact me at your convenience with any questions you may have regarding this report.

Sincerely,

Matthew T. Clark

Miller

Principal Reclamation Specialist

w/attachment

## Keenesburg Mine -3rd Quarter 2021 Pest & Disease Inspection



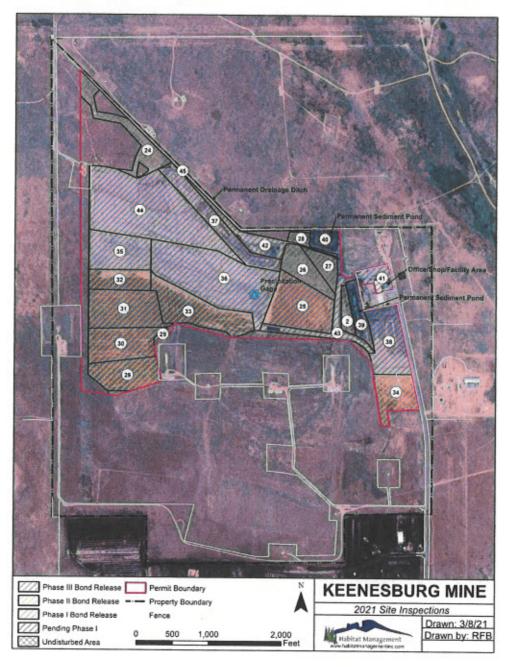
On October 8, 2021 Habitat Management inspected the operational, bonded reclaimed, and shop areas at the Keenesburg Mine for plant pests, plant diseases, and noxious weeds that could or have affected establishment of vegetation on reclaimed lands. The following areas were inspected and are depicted on Map 1:

- Office/shop/facility area;
- Bonded reclamation;
- Permanent sediment ponds; and,
- · Undisturbed land within the permit boundary.

Plant pests or diseases were not observed within the areas inspected. The vegetation has not been adversely affected by plant pests. Areas affected by infestation or blight were not identified during this inspection. No areas were observed where noxious weed species were impacting normal growth and establishment of vegetation on reclaimed lands. w/attachment



Map 1: Coors Energy Company-Keenesburg Mine



# WATER QUALITY SAMPLING 2021

## WATER QUALITY SAMPLING PROTOCOL

## **Procedure**

The ground water sampling procedure used at the Keenesburg Mine site during 2021 was originally approved as part of the Coors Energy Company (CEC) Application for Permit Renewal (1997), filed with the then Colorado Division of Minerals and Geology (CDMG). CEC has consistently used this procedure beginning with the fourth quarter, 1997 sample collections. Consent to dispose of Mine Waste Rock at the Keenesburg site (MR #34, 8/98) resulted in minor changes to the approved ground water monitoring plan, pursuant to requests from the Colorado Department of Public Health and Environment (CDPHE). However, field collection procedures, the order of sampling, field measurements and sampling frequency protocols, remain essentially unchanged since 1997. In 2013, CEC applied for and was granted Technical Revision #44 which changed sampling frequency from quarterly to semi-annually. Specifically, sampling was to occur in April and September. This procedure will be under review, with changes contemplated prior to the first sampling event of 2018.

In 2019, AEC took over the water sampling work. They have combined this sampling process with the process approved by CDPHE to more efficiently collect samples that are needed for both DRMS and CDPHE. The full water sampling report, prepared for CDPHE, is included.

## **Ground Water Monitoring and Quality Analysis**

The formal ground water sampling program for the Keenesburg Mine was initiated in 1992. Ground water quality information has consistently been obtained from monitor wells located: 1) upgradient, 2) within the disturbance area, and 3) downgradient from the mine site. The monitoring program provides a basis for comparison of information between a baseline and the existing site conditions relative to ground water flow and water quality at the site.

The water quality test results, obtained from the data collected in the field and from the analytical ground water quality reports, support the contention that the overall groundwater quality in the area has not been adversely affected by; 1) the earlier Keenesburg Coal Strip Mine operations, or 2) the subsequent reclamation activities (which include both the ash and the mine waste rock disposal operations). While questions may have arisen with respect to specific analytes in certain wells

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(manganese in the SMW-2 well, for example), overall parameters are within the scope of what should be considered acceptable. Any results that are at issue likely reflect recharge of the groundwater through the disturbed soils/spoils from previous operations, as opposed to one of the aforementioned activities.

While they have been altered within the Keenesburg Mine site itself, general ground water flow patterns in the vicinity of the mine appear not to have been significantly changed (or interrupted) by the past mining activities, or by the ongoing ash disposal and mine reclamation.

The six ground water monitoring wells were sampled by CEC on a semi-annual basis in 2018. These wells are designated: AMW-1, AMW-2, DH-96, DH-122, FPW and SMW-2. Water quality analysis incorporates both the fieldwork and the analytical laboratory testing of water samples collected from these wells.

## Field Measurement Protocol:

Static water level is a tape measurement from the top of the well casing (a known ground elevation) to the current water level in the well. This measurement is taken following a visual inspection of the area surrounding the well casing, and precedes any sampling activity. Water sample temperature, specific conductance and pH are determined using a probe placed in each sample as soon as it is collected. Samples are collected and analyzed both before and after the appropriate well purge procedures are conducted.

## Laboratory analysis:

The wells are sampled in a sequence that follows the order of least to greatest level of salinity. At the end of 2016 this sequence continued to be: (1) FPW, (2) AMW-1, (3) DH-96, (4) DH-122, (5) SMW-2 and (6) AMW-2. Ash Monitor Well No. 2 (AMW-2) still continues to recharge following the conclusion of the A-Pit reclamation activity. This process has been ongoing since the end of 1999 when A-Pit reclamation was completed, but only since 2004 has it resulted in volumes sufficient to allow sampling. Adequate water volumes were found in this well during each of the samplings for 2017, making it possible to obtain samples following the standard three-well volume purge procedure. While the well bore water level recovery following testing remains slower, higher static water levels provide evidence that the highly disturbed zone in the reclaimed overburden area is recharging. The timeline for this recharge is consistent with previous predictions.

Copies of the analytical laboratory test results are found in the pages following this text. Each ground water monitoring well was sampled in accordance with the "permit procedure". The "B" designation following the well identification confirms that the laboratory sample was obtained after initial field sampling, well purging and a subsequent (second) field sampling. The 2019 ground water monitoring test results remain consistent with results from previous year's analyses in that there have been no confirmed statistical exceedences, with but one exception, the samples obtained from the SMW-2 well during 2004. The SMW-2 well is completed in the disturbed spoil material which is being subjected to slow re-saturation by ground water, and appears to be leaching dissolved minerals as the water table rises. This has caused manganese concentrations to somewhat exceed the calculated tolerance limit. CEC addressed this tolerance limit exceedence with CDPHE during 2005, and was granted permission to continue the current detection monitoring program [Doty & Associates letter dated 04/08/05, "Alternate Source Demonstration, Statistically Significant Increase Over Background Manganese in SMW-2, Fourth Quarter 2004, Keenesburg Disposal Facility"].

The direction of ground water flow, to the extent that it has been documented in the area of the Keenesburg Mine property, trends downgradient to the northeast. Recharge of the aquifer in the "spoil area" continues to be limited to a single source, the localized infiltration of precipitation to the subsurface. There is no evidence of any significant ground water recharge to the site from the Ennis Draw fluvial ground water system. Ground water elevations in the sampled Ennis Draw wells close to the Keenesburg Mine site are significantly higher than in either the spoil monitoring well (SMW-2) or in the ash monitoring wells (AMW-1 or AMW-2).

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It is CEC's position that no adverse affect on the overall hydrologic balance of the Keenesburg Mine site will result from, a continuation of the ash disposal operation, from the limited addition of mine waste rock to the B-Pit ash disposal, or from the continuing reclamation operations. Ground water levels in the former coal extraction areas should be expected to recover to their approximate pre-mining levels following the conclusion of all CEC operations (see McWhorter report, Appendix I-1 to Permit C-81-028). Treatment of either the ground water or the surface waters at the Keenesburg Mine site is not anticipated to be necessary.

**Notice:** In the course of applying for, and obtaining approval to dispose of mine waste rock in the ash disposal pit (B-Pit) at the Keenesburg Mine site, CEC submitted, and received CDPHE approval for, a Ground-Water Monitoring Plan. As a requirement of the approval, CEC is providing notice that the data developed under the Monitoring Plan for 2011 has been placed in the operating records at the site office. This is the fifteenth such notice relative to the Ground-Water Monitoring Plan.

#### LIST OF MONITOR WELLS

This table summarizes monitor well information, to include: well designation, top of casing elevation, location, and aquifer monitored. The wells monitored during 2019 were:

Well	Elevation	<u>Aquifer</u>	Location
AMW-1	4804'	Alluvial, in Undisturbed Overburden	Mine Site, Down gradient from B-Pit
AMW-2	4811'	Alluvial, in Reclaimed Spoil	Mine Site, Down gradient
DH-96	4764'	Alluvial, in Ennis Draw	Down gradient from Mine Site
DH-122	4814'	Alluvial, in Ennis Draw	Up gradient from Mine Site, from A-Pit

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FPW 4780' Alluvial, in Ennis Draw Mine Site SMW-2 4803' Alluvial, in Reclaimed Spoil Mine Site

Well locations can be found on the Existing Surface Features and Utilities Map.

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## WATER QUALITY PARAMETERS ANALYZED

Report Key	Parameter
a	Calcium - dissolved
b	Iron - dissolved
b	Magnesium - dissolved
b	Manganese - dissolved
b	Molybdenum - dissolved
a	Sodium - dissolved
a	Alkalinity - total (as CaCO3)
a	Carbonate - (as CO3)
a	Hardness - (as CaCO3)
a	Bicarbonate - (as HCO3)
a	pH - (pH units)
a	Specific conductance - (µmhos/cm)
b	Lead - dissolved
b	Selenium - dissolved
a	Total dissolved solids - at 180°C (TDS)
a	Chloride
a	Sulfate (as SO4)
a	Sodium absorption ratio (SAR)
a	Hydroxide (as OH)
b	Barium – [added in 1998 for mine waste rock]
b	Arsenic – [added in 2000]
b	Cadmium – [added in 2000]

a = General Chemistry Lab Report

b = Metals Lab Report



February 11, 2022

Jerry Henderson
Colorado Department of Public Health and Environment
HMWMD
4300 Cherry Creek Drive South
Denver, Colorado 80246-1530

Re: 2021 Annual Groundwater Monitoring Report Keenesburg Ash Disposal Site

Weld County, Colorado

Dear Mr. Henderson

This groundwater monitoring report describes the groundwater monitoring activities performed at the Keenesburg Ash Disposal Site (the facility) in 2021. Sampling was conducted by American Environmental Consulting, LLC (AEC) in accordance with the August 5, 2018 Post-Closure Care Plan (PCCP) and the August 5, 2018 Post-Closure Groundwater Monitoring Plan (GMP).

Please feel free to call of email me with any questions.

Respectfully,

AMERICAN ENVIRONMENTAL CONSULTING, LLC

Reviewed by:

Curtis Ahrendsen Project Manager

Michael Bucari-Tovo, P.G. Senior Geologist

cc: Ben Moline, Molson Coors Beverage Co.