

STATE OF
COLORADO

Zuber - DNR, Rob <rob.zuber@state.co.us>

Review of 2023 AHR for Bowie #2

1 message

Zuber - DNR, Rob <rob.zuber@state.co.us>

Thu, Oct 10, 2024 at 9:38 AM

To: Basil Bear <basilbear@wolverinefuels.com>, Ryan Wilson <RWilson@wolverinefuels.com>, Tamme Bishop <tammekb@gmail.com>

Hello, All -

Please see the attached review letter. Please try to send a formal response in the next couple months. If it helps, we can discuss some of the items in this letter before you send the response.

You will also note that I am asking you to submit an MR or TR, as necessary. Note that Rule 1.04(136) states that if the monitoring requirements are reduced, then a TR is required (not just an MR).

Thanks,
Rob

Rob Zuber, P.E.
Environmental Protection Specialist
Active Mines Regulatory Program



COLORADO
Division of Reclamation,
Mining and Safety
Department of Natural Resources

I am working remotely and can be reached by cell at 720.601.2276.

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**C1996083_DRMS_review__2023AHR.pdf**

358K



October 10, 2024

Basil Bear
Bowie Resources, LLC
P.O. Box 1488
Paonia, CO 81428

**Re: Bowie No. 2 Mine, Permit C-1996-083,
Review of 2023 AHR**

Dear Mr. Bear:

The Division received the 2023 AHR for the Bowie No. 2 Mine on June 21, 2023. The Division reviewed this AHR in the context of Rules 4.05.1, 4.05.6, 4.05.11, and 4.05.13 (Regulations of the Colorado Mined Land Reclamation Board for Coal Mining).

Table 1 lists important logistical requirements of the Bowie No. 2 Mine water monitoring plan, and indicates if the requirement was met with the 2023 AHR.

Table 1 Requirements of the Bowie No. 2 Mine Water Monitoring Plan

Requirement	Source of Requirement (Rule or Page in PAP)	Requirement met for 2023?
Filing frequency of AHR - annually	Rule 4.05.13(4)(c)	Yes
Timely filing of hydrology report – submitted by April 30th each year	Section 2.05 of the Bowie No. 2 Mine PAP, page 136	No ¹
Sites sampled and sampling frequency at <u>surface</u> water monitoring sites	Section 2.05 of PAP, pages 124 - 131	Not clear²
Parameters sampled at <u>surface</u> water monitoring sites	Section 2.05 of PAP, page 135	Yes
Sites sampled and sampling frequency at <u>groundwater</u> monitoring sites	Section 2.05 of PAP, pages 124 - 131	Not clear²
Parameters sampled at <u>groundwater</u> monitoring sites	Section 2.05 of PAP, page 134	Yes

1. The submittal was late, but this had been agreed upon with the Division.
2. See discussion below.

Table 1 in the AHR states that streams and ditches will be monitored for lab parameters semi-annually. However, for the Deer-low site, lab data was only analyzed for one month (June). **Please explain why lab data was only analyzed for one month instead of two at this site.**

Names of some sites are unclear. The names in Table 5 of the AHR do not all match those in the PAP (e.g., spring monitoring points on page 2.05-128). **Please explain these discrepancies and, as necessary, submit an MR or TR with revised pages in the PAP.**



The discussion of wells DH-15, DH-25, and DH-38 on page 6 of the AHR is not reflected on page 2.05-131 in the PAP. **Please revise this page with a TR.** Also consider if the descriptions for Pond 36-3 and Pond 36-6 need to be revised on this page of the PAP.

Table 1 in the AHR states that lab analyses will be conducted in the second and fourth quarters for drill holes and alluvial monitoring wells. However, none of the data tables for groundwater sites have more than one column of lab data. **Please explain.**

Please explain the situation with well DH-67B. The data sheet says “Plugged,” and the text on pages 6-7 of the AHR says, “The Operator was not able to obtain a sample ...” **If this is a permanent problem, please revise the monitoring plan in the PAP with a TR.**

Key receiving waters at the Bowie No. 2 Mine are the North Fork of the Gunnison River, Deer Trail Ditch, and Hubbard Creek. These receiving waters are key because they contain significant flows (they are not ephemeral) and they are potentially impacted by the mine (CDPS outfalls drain to them). An analysis of water quality data for the downstream sampling locations for these receiving waters were a primary focus of this AHR review. The Division has made the assessment that flow data does not need to be reviewed for the purposes of this AHR, because the operation at the Bowie No. 2 Mine are highly unlikely to have a significant impact on water quantity in the tributaries, and certainly not on the river itself.

Analysis of Surface Water Data – North Fork of the Gunnison River

Data for the downstream sampling site, NFG-low, was reviewed to identify any potential water quality issues by comparing the data to CDPHE standards. The following table includes a comparison of 2023 AHR data and standards from Regulation No. 35 (Segment 2. for the North Fork of the Gunnison River Basin) of the CDPHE Water Quality Standards. For the sake of brevity, the table includes only parameters with data above the detection limit in 2023 that also have CDPHE standards.

Table 2. 2023 AHR Data from NFG-low Sampling Site in the River

Parameter	Units	Worst Concentration in 2023 AHR ¹	CDPHE Standard	Comments
pH	su	7.7	6.5 - 9.0	Standard includes low limit and high limit. No values above 9.0 in 2023 data.
Temperature	deg C	16.3	18.3	Standard for non-winter months. Winter standard of 9.0 only exceeded in June and August.
Dissolved Oxygen	mg/L	3.01	6.0	Standard is low limit. Worst concentration in March 2023. Three other recorded values well above limit.
Chloride	mg/L	3.53	250	
Nitrate	mg/L	0.026	10	
Sulfate	mg/L	15.9	250	
Arsenic, TREC	mg/L	0.00111	0.00002	Maximum in August.
Iron, TREC	mg/L	4.17	1.0	Maximum in August.
Lead, TREC	mg/L	0.00691	0.05	

1. Maximum for most parameters. Minimum for pH and Dissolved Oxygen.

Because of the exceedances, further analysis was required.

To determine if the exceedances were possibly the result of activities at the Bowie No. 2 Mine, concentrations upstream of the mine on the North Fork of the Gunnison River (where Bowie No. 2 Mine impacts are unlikely) were reviewed. Site NFG-up is above the mine, approximately three miles northeast and 200 feet in elevation above NFG-low. For Dissolved Oxygen, the March value is 3.4 mg/L at NFG-up, which is very similar to the value for NFG-low and below the standard, suggesting that the low value was not caused by activities at the Bowie No. 2 Mine.

For TREC arsenic, the concentration recorded for August in the 2023 AHR is 0.011 mg/L at NFG-up, which is an order of magnitude higher than the maximum concentration at NFG-low in 2023 (0.00111 mg/L), suggesting that the exceedance is not caused by the Bowie No. 2 Mine.

For TREC iron, the concentration recorded for August in the 2023 AHR is 66.6 mg/L at NFG-up, which is approximately an order of magnitude higher than the maximum concentration at NFG-low in 2023 (4.17 mg/L), suggesting that the exceedance is not caused by the Bowie No. 2 Mine.

The TDS values for the NFG-low samples from 2023 (maximum of 144 mg/L) are well below the guideline of 750 mg/L.

The Division finds no concerns with any of the water quality concentrations in the North Fork of the Gunnison River.

Analysis of Surface Water Data – Deer Trail Ditch

Data for the downstream sampling site, Deer-low, was reviewed to identify any potential water quality issues. The data for this site was compared to CDPHE standards. Because Deer Trail is an irrigation ditch, rather than a natural receiving water, the emphasis is on agricultural standards rather than standards for fish, other aquatic life, recreation, or domestic water.

The following table includes a comparison of 2023 AHR data and standards from Regulation No. 31 of the CDPHE Water Quality Standards.

Table 3. 2023 AHR Data from Deer-low Sampling Site in Deer Trail Ditch

Parameter	Units	Maximum Concentration in 2023 AHR ¹	CDPHE Agricultural Standard	Comments
Dissolved Oxygen	mg/L	13.4	3.0	Minimum concentration is 13.4 mg/L.
Arsenic, TREC	mg/L	0.00066	0.1	
Cadmium, TREC	mg/L	< DL	0.01	
Copper, TREC	mg/L	< DL	0.2	
Lead, TREC	mg/L	0.0013	0.1	
Manganese, TREC	mg/L	0.022	0.2	
Selenium, TREC	mg/L	0.00023	0.02	
Zinc, TREC	mg/L	< DL	2.0	

1. Standard for dissolved oxygen is minimum, not maximum.
2. “DL” equals detection limit.
3. “TREC” equals total recoverable.

Table 3 does not indicate any water quality problems in Deer Trail Ditch in 2023. **However, it is unclear why lab parameters were only recorded for one month (June 2023), and BRL should explain this possible omission.**

The Total Dissolved Solids (TDS) value for Deer-low in 2023 is 110 mg/L. This value is well below the commonly-used guideline of 750 mg/L (Banta, 1988).

Analysis of Surface Water Data – Hubbard Creek

Data for the downstream sampling site, HUB-low, was reviewed to identify any potential water quality issues by comparing the data to CDPHE standards. The following table includes a comparison of 2023 AHR data and standards from Regulation No. 35 (Segment 5a.) of the CDPHE Water Quality Standards. The table for Hubbard Creek includes only parameters with data above the detection limit in 2023 that also have CDPHE standards.

Table 4. 2023 AHR Data from HUB-low Sampling Site in Hubbard Creek

Parameter	Units	Maximum Concentration in 2023 AHR	CDPHE Standard	Comments
pH	su	8.5	6.5 - 9.0	Standard includes low limit and high limit. No values below 6.5 in 2023.
Winter Temp.	deg C	6.6	9.0	Acute standard Oct - May
Summer Temp.	deg C	15.8	17.0	Acute standard June – Sept
Chloride	mg/L	1.81	250	
Sulfate	mg/L	25.6	250	
Arsenic, TREC	mg/L	0.00048	0.34	
Iron, dissolved	mg/L	0.1	0.30	Domestic Water Supply standard from CDPHE Regulation 31.
Iron, TREC	mg/L	1.81	1.0	
Lead, TREC	mg/L	0.00103	0.05	
Selenium, TREC	mg/L	0.0002	0.0046	

Because of the exceedance for iron, further analysis was required. To determine if the high concentration was possibly the result of activities at the Bowie No. 2 Mine, concentrations upstream of the mine on Hubbard Creek (where mine impacts are unlikely) were reviewed. Site D34-14 is above the mine, four to five miles north and 680 feet in elevation above HUB-low. For TREC iron, the 2023 concentrations for D34-14 are lower than the maximum concentration at HUB-low.

Further analysis of TREC iron entailed a comparison to baseline data for HUB-low. The June 2023 concentration of 1.81 mg/L is the highest concentration for TREC iron ever recorded at this site. However, the average operation concentration (0.38 mg/L) is lower than the average baseline concentration of 0.54 mg/L, and the Division does not consider TREC iron in Hubbard Creek to be a problem at this time. **This parameter should be closely watched in future sampling data by BRL and the Division.**

The highest TDS value for the HUB-low samples from 2023 was 188 mg/L, well below the guideline of 750 mg/L.

The Division finds no current concerns with the water quality concentrations in Hubbard Creek.

Analysis of Groundwater Data

The Division review of alluvial groundwater data focused on three down-gradient sites: AW-1, AW-11, and AW-14, which are downgradient of a large portion of the site. The data were compared to standards in Regulation No. 41 of the CDPHE Water Quality Standards. For the sake of brevity, the following table includes only parameters with data above the detection limit in 2023 that also have CDPHE standards.

Dissolved manganese values were not assessed because the standard is only applicable when irrigation water is applied to soils with pH values lower than 6.0, and it has been determined that soils adjacent to the North Fork of the Gunnison River typically have higher pH values, often over 7.0. This was based on an assessment of the Natural Resources Conservation Service (NRCS) Web Soil Survey.

Table 5. 2023 AHR Data from Key Down-Gradient Alluvial Wells

Parameter	Units	AW-1 ¹	AW-11 ¹	AW-14 ¹	CDPHE Standard	Comments
pH	su	7.65	7.86	7.86	6.5 - 8.5	Standard includes low limit and high limit. No values below 6.5 in 2023.
Chloride	mg/L	145	56.4	< DL	250	Drinking water standard
Nitrate-Nitrite	mg/L	2.11	1.92	0.434	10.0	
Sulfate	mg/L	1,830	293	356	250	
Cadmium, dissolved	mg/L	< DL	< DL	0.000116	0.005	
Iron, dissolved	mg/L	< DL	< DL	0.108	0.3	
Manganese, dissolved	mg/L	< DL	< DL	0.165	0.2	
Selenium, dissolved	mg/L	0.0167	0.0141	0.00394	0.02	
Zinc, dissolved	mg/L	< DL	< DL	0.131	2.0	

1. Maximum concentrations from 2023 data in AHR.

High sulfate values (above the standard of 250 mg/L) were detected for AW-1, AW-11, and AW-14. However, the baseline data for AW-1 indicates extremely high sulfate values (average of 5,220 mg/L), and the sulfate value for AW-17, upgradient of mining activity, is 983 mg/L, well above the standard. These data indicate that high concentrations in AW-1, AW-11, and AW-14 are not likely the result of mining.

Regarding Total Dissolved Solids (TDS), baseline concentrations were very high in some alluvial wells. For AW-1, the baseline average is 8,200 mg/L, much higher than the value measured for the September 2023 sample, 3,350 mg/L. Given the high baseline concentrations, it is not likely that mining has caused an increase in TDS concentrations.

The Division review of deeper wells (in the Mesaverde formation), focused on two down-gradient sites: DH-67D and DH2010-1B, which are along the north end of the mine permit boundary. The data were compared to standards in Regulation No. 41 of the CDPHE Water Quality Standards. For the sake of

brevity, the following table includes only parameters with data above the detection limit in 2023 that also have CDPHE standards.

Table 6. 2023 AHR Data from Key Down-Gradient Deep Wells

Parameter	Units	DH-67D ¹	DH-2010-1B ¹	CDPHE Standard	Comments
pH	su	8.39	7.7	6.5 - 8.5	Standard includes low limit and high limit. No values below 6.5 in 2023.
Chloride	mg/L	417	203	250	Drinking water standard
Sulfate	mg/L	< DL	154	250	
Arsenic, dissolved	mg/L	0.00641	0.0141	0.01	
Cadmium, dissolved	mg/L	0.000204	< DL	0.005	
Iron, dissolved	mg/L	0.378	0.087	0.3	
Manganese, dissolved	mg/L	< DL	< DL	0.2	
Selenium, dissolved	mg/L	< DL	0.0278	0.02	
Zinc, dissolved	mg/L	< DL	0.209	2.0	

1. Maximum concentrations from 2023 data in AHR.

The exceedances for chloride, arsenic, iron, and selenium are not considered problematic. Comparisons were made to baseline data and the following observations were made by the Division:

- The baseline chloride concentrations at DH-67D are comparable to the 2023 data (417 mg/L), including an average of 396 mg/L and a baseline maximum of 610 mg/L.
- The baseline arsenic concentrations at DH-2010-1B are higher than the 2023 data (0.0141 mg/L), including an average of 0.0438 mg/L.
- The baseline iron concentrations at DH-67D are comparable to the 2023 data (0.378 mg/L), including an average of 0.40 mg/L.
- The baseline selenium concentrations at DH-67D are higher than the 2023 data at both wells, including an average of 0.15 mg/L and a maximum of 1.06 mg/L.

The deeper wells (DH-67D and DH2010-1B) were also reviewed for water levels. Recorded water elevations in 2023 were within the range of the baseline data for each of the wells, and no problems were identified.

References

- Banta, 1988, "A Description of the Material Damage Assessment Process Pertaining to Alluvial Valley Floors, Surface Water, Ground Water and Subsidence at Coal Mines."
- CDPHE, Regulation No. 31 – The Basic Standards and Methodologies for Surface Water.
- CDPHE, Regulation No. 35 - Classifications and Numeric Standards for Gunnison and Lower Dolores River Basins.
- CDPHE, Regulation No. 41 - The Basic Standards for Groundwater.

Please respond to this report by December 13, 2024. This will help us move forward in addressing potential water quality issues and with adjusting your monitoring program, as necessary. If you, Tamme Bishop, or Ryan Wilson want to discuss this review letter, please do not hesitate to call (720-601-2276) or email me (rob.zuber@state.co.us).

Thank you,



Robert D. Zuber, P.E.
Environmental Protection Specialist

Copied via email: Ryan Wilson, Wolverine Fuels; Tamme Bishop, J.E. Stover & Associates, Inc.