



STATE OF
COLORADO

Simmons - DNR, Leigh <leigh.simmons@state.co.us>

Spring 2024 Subsidence and Geologic Field Observations Report

1 message

Jonathan Kelly <jkelly@wrightwater.com>

Mon, Sep 30, 2024 at 6:56 PM

To: "Simmons - DNR, Leigh" <leigh.simmons@state.co.us>

Cc: "Jessica Wilczek (jwilczek@archrsc.com)" <jwilczek@archrsc.com>

Leigh,

Please see the attached Spring 2024 Subsidence and Geologic Field Observations Report.

Sincerely,

Jonathan

JONATHAN KELLY, P.E.

Principal Engineer

Chief Financial Officer

Wright Water Engineers, Inc.

Office: 970.945.7755 | Cell: 970.319.5631

818 Colorado Ave., Ste. 307 | Glenwood Springs, CO 81601



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Spring 2024 Subsidence and Geologic Field Observations

Southern Panels and Sunset Trail Mining Areas

PREPARED FOR:

Mountain Coal Company, LLC
West Elk Mine
P.O. Box 591
Somerset, CO 81434

PREPARED BY:

Jonathan M. Kelly, P.E.
Wright Water Engineers, Inc.



Wright Water Engineers, Inc.

September 2024

831-032.915

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Wright Water Engineers, Inc.

2490 West 26th Ave., Suite 100A
Denver, Colorado 80211
(303) 480-1700 TEL
(303) 480-1020 FAX

www.wrightwater.com
e-mail: jkelly@wrightwater.com

September 30, 2024

Mr. Leigh Simmons
Colorado Division of Reclamation, Mining and Safety
1313 Sherman St., Rm. 215
Denver, CO 80203

Re: Spring 2024 Subsidence Monitoring Report Preparation – Mountain Coal Company, LLC.

Dear Mr. Simmons,

The following report entitled *Spring 2024 Subsidence and Geologic Field Observations – Southern Panels and Sunset Trail Mining Areas*, was prepared by Jonathan M. Kelly (a licensed professional engineer) and employee of Wright Water Engineers, Inc.

Sincerely,

WRIGHT WATER ENGINEERS, INC.

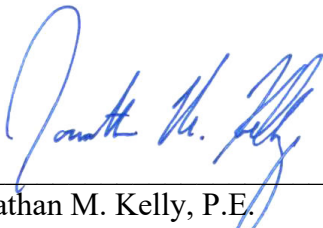
By 
Jonathan M. Kelly, P.E.
Vice President/Project Manager

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- B Monument Dam Inspection Forms
- C Monument Dam Monitoring Data

SPRING 2024 SUBSIDENCE AND GEOLOGIC FIELD OBSERVATIONS SOUTHERN PANELS AND SUNSET TRAIL MINING AREAS¹

1.0 BACKGROUND

This subsidence report is the first of two detailed documents on this subject to be generated based on 2024 calendar year observations. These reports of subsidence-related observations associated with the West Elk Mine have occurred annually between 1996 and 2006, and biannually since spring 2007. In accordance with Mountain Coal Company, LLC's (MCC) Colorado Division of Reclamation, Mining and Safety (CDRMS) permit, these subsidence reports are to be submitted by April 30 (for preceding fall monitoring) and by September 30 (for preceding spring monitoring) of each year.

Prior field observations and experience in the West Elk Mine area over the last twenty-nine years² (1996 to 2024 inclusive) indicate that subsidence-related features (cracks and bulges) are most visible on roads, well pads, and trails, where the ground is compact and free of brush. These areas have been, and will continue to be, the focus of the biannual observations. Other subsidence features such as rockfalls and landslides are generally observable from overview locations along roads or on well pads and have been, and will continue to be, noted when they occur.

Spring 2024 subsidence observations were performed on June 8, 2024, in the Southern Panels Mining Area with specific focus on the E-seam Longwall Panels 14 and 15, in the Sunset Trail Mining Area relative to the E-seam Longwall Panels SS1 through SS4, and over Longwall Panel E12 in the Apache Rocks West Mining Area. Traverse names used in the previous reports may not coincide with those used in this report. Observations associated with E-seam longwall mining of

¹ The Southern Panels Mining Area includes the E-seam Longwall Panels E1 through E8 included in the South of Divide Mining Area, some of which were included in the Dry Fork Mining Area. Also included in the Southern Panels Mining Area are E-seam Longwall Panels E14 through E17. The Southern Panels Mining Area also includes planned B-seam Longwall Panels B26 through B29 that underlie E-seam Longwall Panels E1 through E5. The term Southern Panels Mining Area will be used throughout this report to identify what was formerly referred to as the South of Divide and Dry Fork Mining Areas. The Sunset Trail Mining Area represents four panels (SS1 through SS4) located to the south of E-seam Longwall Panel E8 of the Southern Panels Mining Area.

² Annual subsidence and geologic hazard reports are maintained at Mountain Coal Company, LLC, and at the Colorado Division of Reclamation, Mining and Safety, and are exhibits to the permit document (Exhibits 60, 60A, 60B, 60C, 60D, and 60E).

Panels E1 through E8 can be found in earlier reports. Observations of the Apache Rocks and Box Canyon B-seam Mining Areas are covered in reports prior to 2013.

During the spring 2024 field visit, accessible areas within the Southern Panels, Sunset Trail and Apache Rocks West Mining Areas were visited, examined, and photographed to document subsidence-related features observed since the last field visit and to record newly observed features for future reference (see Maps 1 and 2). Field observations were made from a four-wheel drive vehicle and by foot as needed.

Thirteen photographic observation points with number designations were established and used starting in 2007 to view and assess changes that may occur as a result of mining. In 2016, all references to number designations for these locations were dropped. These historical photographic observation points are now checked only occasionally to assess substantial changes (i.e., no rockfalls or landslides). However, repeated visits and photographic documentation over several site visits are commonly performed once a subsidence feature is observed to track either further exacerbation of the feature or, more typically, ongoing weathering and disappearance.

2.0 GENERAL SUBSIDENCE OBSERVATION AND REPORTING

On June 8, 2024, Wright Water Engineers, Inc. (WWE) observed surface subsidence and geologic field conditions of the Southern Panels, Sunset Trail, and Apache Rocks West Mining Areas (consistent with current Exhibit 60E) for MCC relative to their coal mining activities. Mining in the area is performed below the surface within the West Elk Mine using longwall mining methods. Similar surface observations have been made annually since 1996 and semi-annually since 2007 to assess potential longwall mining effects on the environment.

Based on field observations from 1996 to spring 2024, the effects of longwall mining above the West Elk Mine have been less than initially projected as reported in Exhibit 60 (Dunrud et al., 1998 rev.) and 60E (WWE, 2012). Rockfalls and/or landslides were generally observed only sporadically in the Box Canyon Mining Area since 2006 where the steep, upper reaches of Sylvester Gulch and Box Canyon abut the large geographic feature known as West Flatiron. In the flatter and more rounded topography of the Apache Rocks, Southern Panels, and Sunset Trail Mining Areas, the rockfall and landslide potential is much smaller. However, subsidence-related tension cracks have occurred in these mining areas, particularly above the active longwall mining face.

E-seam longwall mining in the Southern Panels Mining Area was initiated on Panel E1 in December 2008 beginning at the east end and progressing westward. All mining in the Southern Panels Mining Area has been planned to progress from the east to west across the panels. As of 2020, mining was complete in E-seam Longwall Panels E1 through E8. Mining of the E-seam Longwall Panel SS1 in the Sunset Trail Mining Area was initiated in January 2020. Mining of Longwall Panels SS1 through SS4 (as revised) was completed by August 2023 (Map 1).

Beginning with the Spring 2011 Subsidence Report, an effort was made to reduce the size of the semi-annual subsidence reports by eliminating much of the regularly included background and historical information (e.g., subsidence projections). For this reason, specific details associated with subsidence projections and field recognition of subsidence and non-subsidence features were eliminated. Since that time, readers have been directed to Sections 1.0 and 2.0, respectively, of the

Spring 2011 Subsidence Report and to Exhibits 60 and 60E of the West Elk Mine permit for this information.

Also, in keeping with the goal of reducing document size, the reports since 2011 have focused on the identification and discussion of those observations that reflect an obvious change in the conditions overlying the active portion of the mine and on documenting baseline conditions in areas that have yet to be mined. For this reason, observations from our spring 2024 field visit were focused on areas above mined E-seam Longwall Panels E14 and E15 in the Southern Panels Mining Area, on E-seam Longwall Panel SS3 of the Sunset Trail Mining Area, and on E-seam Longwall Panel E12 of the Apache Rocks West Mining Area.

Readers should note that observations are discussed relative to traverses along segments of drill roads providing access to drilling pads containing mine ventilation boreholes (MVBs). Given the dynamic nature of the mining activities (i.e., adding and reclaiming of road segments and MVB pads), future naming of traverses will likely vary from report to report. Specific nomenclature for observed features will be regularly represented on Map 1 of each report.

3.0 SUBSIDENCE MONITORING

MCC has been collecting data from monitoring locations near Minnesota Reservoir and Monument Dam, as well as numerous locations within the mining areas for many years. Ongoing monitoring by MCC personnel includes the U.S. Forest Service (USFS) roads and stock ponds, as well as the Monument Dam and Minnesota Reservoir area. Inspection forms for these areas are provided in Appendices A and B, respectively.

3.1 USFS Roads and Stock Pond Monitoring

Observations by MCC personnel of the USFS roads and stock ponds in the vicinity of active mining activities have occurred for many years. Inspection forms from observations conducted during 2024 are included with this report in Appendix A.

3.2 Monument Dam/Minnesota Reservoir Monitoring

As described in previous subsidence reports, MCC has conducted monitoring of the Monument Dam and strategic locations around Minnesota Reservoir since 2006. Currently, MCC has monitoring and reporting responsibilities for the land survey stations. Dam Inspection Forms for Monument Dam from January 2023 through March 2024 are provided in Appendix B.

Quarterly land surveys of the monuments (monthly when mining is within one mile of the dam) were completed. A summary of height and longitudinal displacement data is obtained by MCC. However, with advancing technology and more stringent regulations, MCC updated the Survey Monitoring System. New base point data, using the new technology that was required for MCC to obtain in order to comply with dam monitoring requirements. Fall 2023 data became the new base point data set for future displacement, as opposed to the 2006 data that was previously used. Appendix C shows the comparison of the spring 2024 survey data with the fall 2023 data for the Monument Dam.

4.0 SPRING 2024 SUBSIDENCE OBSERVATIONS

During WWE's spring 2024 field visit, pre-existing features were observed at various locations along the established traverses above mined E-seam longwall panels in both the Southern Panels and Sunset Trail Mining Areas as accessed by USFS Road 711 (Dry Fork Road) and on MVB pads, particularly where they exist above recent mining activities. However, WWE has ceased visiting historical features over Longwall Panel E7 that had been mined years ago and have been thoroughly documented in previous reports without significant changes. Similarly, previous traverses over Longwall Panels E3 through E8 were replaced with new traverses over active mining or proposed mining areas. Subsidence features previously observed over mined E-seam Longwall Panel SS1 were no longer visible or have been lost due to reclamation; therefore observations over this panel were ceased.

Observations previously made over Longwall Panel SS2 from the northeast were replaced by a new traverse E-E' from the south to observe the area overlying the western portion of the panel that was mined since the fall 2021 field visit. Traverse E-E' also provided access for observations over Longwall Panel SS3. The access road to Longwall Panel SS4 has been reclaimed, so no observations were made over that panel.

No subsidence-related features were observed in alluvium, even above active longwall mining activities.

The remainder of this report provides a detailed discussion of new or recent observations associated with Traverses A-A' through E-E' (see Maps 1 and 2) as observed during the spring 2024 field visit. Details associated with these observations can be found in Sections 4.1 through 4.5 of this report. Map 1 shows the outline of E-seam mine workings along with surface topography and other surface features, including the named traverses. Map 2 shows the same area and detail as Map 1 (minus traverses) along with landslide and rockfall areas as delineated from aerial photo research and field observations.

4.1 Traverse A-A'

This traverse overlies portions of recently-mined E-seam Longwall Panel E12 and previously-mined Longwall Panel B13A in the Apache Rocks West Mining Area. Traverse A-A' originates just south of Monument Dam (and Minnesota Reservoir) and proceeds in a northerly direction across the dam and along Horse Creek, a distance of less than a mile. The southern end of this traverse is adjacent to Minnesota Reservoir and outside the proposed E-seam longwall mining influences. The northern end of this traverse is at the northern edge of Longwall Panel B13A (see Maps 1 and 2).

This traverse was important to observe because it was the area of active mining in the E-seam and an area where B-seam mining had previously occurred. The area was accessed by foot using an existing hiking trail and observations were limited to the trail due to the vegetative cover elsewhere.

4.1.1 Location 6

A series of small cracks were observed along the trail that appeared to be subsidence related due to the frequency and linear nature of the cracks, the location relative to the longwall panel layout, and the fact that mining had recently occurred beneath the trail. Based on the mining progression map, Traverse A-A' was mined under around April 2024, approximately 2 months prior to the spring observations.

Figure 1 shows one of the larger cracks observed along this traverse. Most of the cracks had no discernible width and were very shallow.

WWE has observed similar cracks at locations recently mined under in the E-seam longwall mining panels. Typically, these cracks are due to dynamic subsidence processes and heal/seal within a short timeframe. Subsequent observations will determine whether these cracks follow a similar pattern.



Figure 1: Small subsidence crack on trail along Horse Gulch
overlying Longwall Panel E12.

4.2 Traverse B-B'

Traverse B-B' begins where the Deer Creek drainage meets the Dry Fork Road (Traverse A-A'). It continues southward up the Deer Creek drainage, past a gate located near two manufactured stock watering troughs (fed by a nearby spring), to an intersection with another road located between the E-South Mains and E-seam Longwall Panel E14, a distance of approximately one-and-a-half miles (see Map 1). Two additional stock ponds (P74 and P93) with earthen embankments are located lower in the drainage. Both of these ponds are also fed by nearby springs. This traverse is mostly located between the E-South Mains and the western ends of mined E-seam Longwall Panels E3, E4, E5, E6, and E7. The termination of this traverse (B') is at Traverse C-C', which proceeds both northwest and southeast from the intersection.

No subsidence-related features were observed along this traverse during the spring 2024 field visit.

4.3 Traverse C-C'

Traverse C-C' is intersected by the end of Traverse B-B' and extends from E-Seam Longwall Panel E15 to the northwest to the E-Seam Longwall Panels SS2 through SS4 to the southeast. En route the traverse runs along the north side of E-Seam Longwall Panel E14, which was mined from mid-April through mid-September of 2022. The traverse also crosses Lick Creek and South Prong stream channels, providing an opportunity to observe whether there has been any observable longwall-mining induced subsidence impact to these drainages.

Traverse C-C' extends to the northwest over the E-seam Longwall Panel E15. The road was passible for the initial stretch in our four-wheel drive vehicle, after which the rest of the observations had to occur on foot.

The traverse provided the best opportunity to observe areas that had most recently been mined beneath. The segment southeast of the intersection with Traverse B-B' was immediately adjacent to the recently mined Longwall Panel E14. Locations 1 and 2 are located over the E14 Headgate as shown in Map 1.

In addition to the observations made on the traverses along the access roads, WWE made considerable effort to make observations over the Sunset Mains South, where robbing of the pillars occurred. Traverse C-C' crossed over the northern portion of the mains where the pillars were robbed; however, game trails that provided access to the southern areas were identified for additional observations where the overburden was at the minimum. No subsidence features were observed either along the roadway or along trails where the pillars were robbed.

4.3.1 Location 1

Cracks were observed along the existing road over the E14 Headgate between Crosscuts 23 and 22 during our spring 2022 site visit. No cracks had been observed along this traverse prior to mining in Longwall Panel E14. Therefore, the cracks were deemed to be subsidence-related features. The E-seam overburden thickness at this location is approximately 650 to 700 feet.

During the spring 2024 site visit, no new cracks were observed, and previously observed cracks were no longer discernable. The road has been subject to heavy truck traffic and routine grading making the observations along the road difficult. This location will no longer be specifically identified unless new features are observed.

4.3.2 Location 2

New cracks were first observed south of the access road overlying the north end of E-seam Longwall Panel E14 during the fall 2022 site visit. As shown on Map 1, the cracks were observed at Location 2 adjacent to cross cut 17 of the E14 Headgate. A series of parallel cracks were observed roughly parallel to the E14 Headgate with an orientation of South 40° East. The largest of the observed cracks followed the topographic contour for approximately 100 feet (Figure 2).



Figure 2: The largest of the cracks observed at Location 2 in fall 2022, south of the across road on Traverse C-C'.

The location of these cracks is consistent with locations where the tilt and horizontal displacement are largest near the edge of the panel as shown in Figure 3 of Exhibit 60E (WWE 2018). The existence of the series of parallel cracks was likely a combination of these horizontal strains in combination with the natural sloped hillside. In total, there were 5 cracks observed with the dimensions of the cracks generally decreasing in the downhill direction towards the center of the longwall panel.

During the spring 2024 site visit, these cracks were still evident but were much less prominent. The smaller cracks had largely healed/sealed, especially where cattle or large game trails occurred. The larger cracks continue to heal; however, the sealing process appears to have stopped as some of the largest cracks remain open (Figure 3).



Figure 3: One of the largest of the cracks at Location 2, south of the across road on Traverse C-C' during spring 2024 visit showing continued healing.

4.3.3 Location 5

Newly-observed crack was documented along the path overlying E-seam Longwall Panel E15 as shown in Figure 4.



Figure 4: New crack observed over Longwall Panel E15
during spring 2024 site visit

The location of the crack was at a location that indicates mining occurred shortly after the fall 2023 site visit, at which time no subsidence features were observed. The crack appeared fresh, consistent with the timing of mining occurring beneath the location. The crack was approximately 15 to 20 feet in length with an east-west orientation. The maximum width of the crack was 2 to 3 inches with a maximum observed depth of 1.5 feet.

4.4 Traverse D-D'

This traverse branches off Traverse C-C' to the southwest across E-seam Longwall Panel E14. We were able to drive the initial portion of this traverse across Panel E14 and then proceeded on foot to the end of the traverse as shown in Map 1.

The mining of Panel E14 occurred from mid-April to mid-October with the longwall passing underneath this traverse during June 2022. While no discernable subsidence features were observed along this traverse during either our fall 2022 or spring 2023 site visits, cracks were observed during the fall 2023 site visit.

4.4.1 Location 4

The newly observed cracks were located on both sides of the access road but were not seen on the road itself. This fact may indicate that the cracks were present, but not observed, prior to the fall 2023 site visit. The majority of the observed cracks were located on the eastern side of the road with E-seam overburden depth of roughly 500 to 600 feet. In general, the orientation of the cracks was north-south along the downslope of the topography away from the road that follows a ridgeline over Panel E14. The maximum depth of the cracks was 1.5 to 2.0 feet with a maximum width of approximately 4 inches. Figure 4 shows the largest of the cracks observed at Location 4 in the fall 2023.

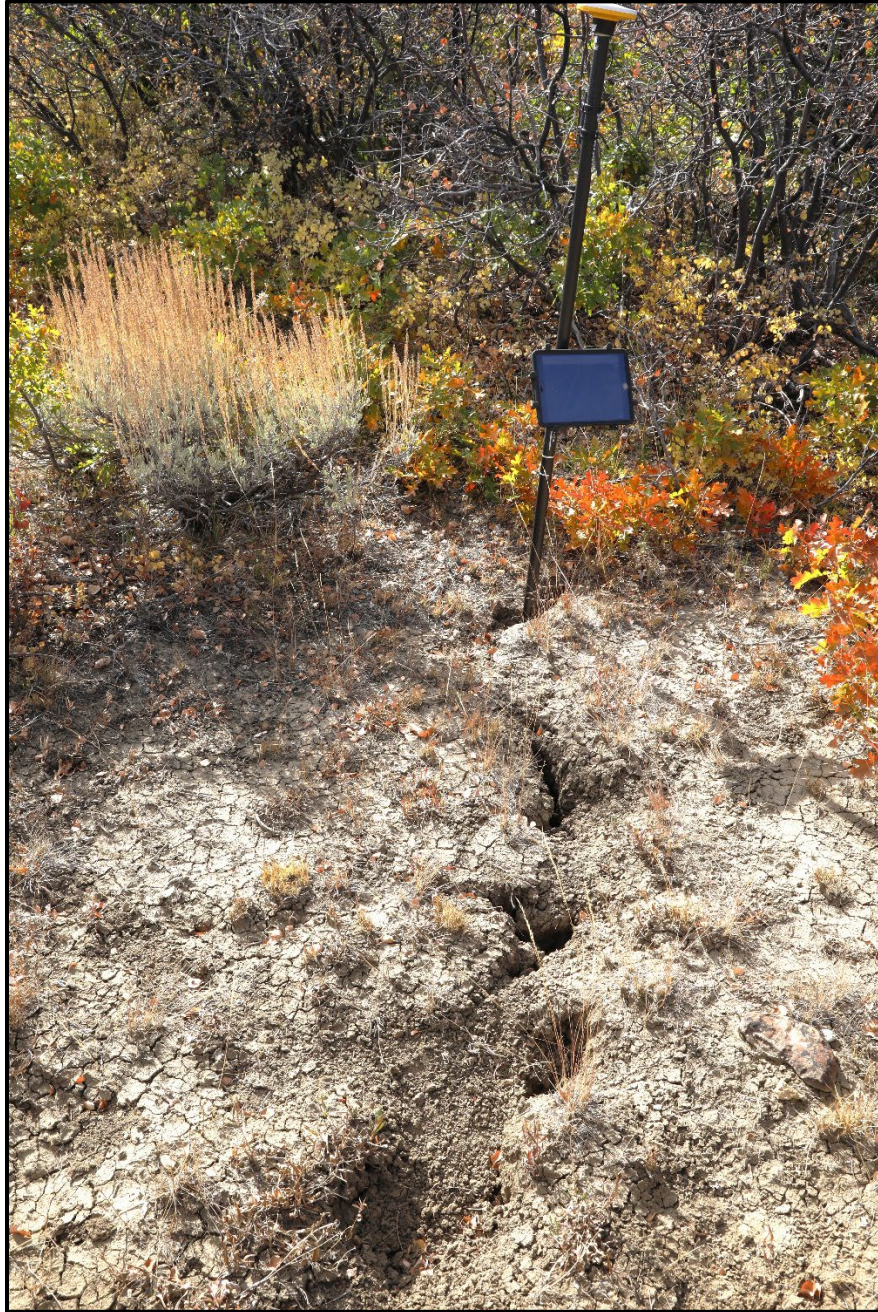


Figure 5: Crack observed along D-D' over Longwall
Panel E14 during fall 2023 site visit.



Figure 6: One of the larger cracks at Location 4 showing signs of healing/sealing in Spring 2024

4.5 Traverse E-E'

This new traverse begins at Traverse C-C' and continues north toward mined E-seam Longwall Panel SS2 before turning southeast toward E-seam Longwall Panel SS3 and terminating at MVB SS3-2 (see Map 1). Overburden along this traverse varies from about 250 feet over the mains up to just under 1,000 feet at the drill pad.

Cracks were observed along the access road to MBV SS3-2 overlying E-seam Longwall Panel SS3 in between Locations 3a and 3b as shown in Map 1 during the spring 2023 field visit.

4.5.1 Locations 3a to 3b

New cracks were observed along the north side of the access road overlying the north end of E-seam Longwall Panel SS3 during the spring 2023 site visit. As shown on Map 1, the cracks were observed between Location 3a and 3b. A series of parallel cracks were observed roughly parallel each other with an orientation of South 37° East. The cracks had no discernable depth or width and were not perpendicular to the road (Figure 6). It is unclear whether these observed cracks were related to mining subsidence; however, their consistent orientation was noteworthy and merited documentation. Longwall mining occurred under Locations 3a to 3b during the months of December 2022 and January 2023.



Figure 7: Example of an observed crack along the north side of E-seam Longwall Panel SS3 during spring 2023 site visit

During the fall 2023 site visit, the access road for Traverse E-E' had undergone significant work to install water bars prior to winter. The location could not be accessed by our vehicle, so the traverse was observed on foot. The roadwork made observations challenging and, for the most part, the previous cracks were not observed with the exception of one small crack observed on the north side of the road. During the spring 2024 site visit, no cracks were observed in between Locations 3a and 3b.

5.0 CONCLUSIONS

1. The conceptual B- and E-seam mining model presented in the Exhibit 60 series of the mining permit has been verified by annual field observations in the various West Elk Mine mining areas. With the use of longwall mining methods in which the uniform downwarping of the overburden rocks and unconsolidated material act as laterally constrained plates, cracks in zones under tensile stress narrow with depth and close at the neutral surface. Below the neutral surface, the materials are therefore in compression. This has an important bearing on the hydrologic consequences of longwall mining. Any groundwater or surface water in contact with a given subsidence crack is prevented from traveling downward beyond the neutral surface of the deformed plate. Annual field observations from 1996 through spring 2024 verify this conceptual model in bedrock and surficial material (colluvium, alluvium, mudflow, and debris flow deposits) where the overburden is laterally constrained.
2. Typically, uniform downwarping occurs in association with longwall mining when there is lateral constraint. Where there are steep slopes and cliffs, there is little lateral support in at least one direction, which causes the associated rocks and unconsolidated materials to deform like unconstrained beams, plates, or cantilevers as the longwall mining faces move beneath them. This lack of lateral constraint allows subsidence cracks to commonly extend completely through sandstones and other brittle units, and groundwater or surface water present near or within these cracks will likely flow through and exit into existing surface drainages. The relatively few cliffs and over-steepened slopes in the Southern Panels and Sunset Trail Mining Areas tend to provide the lateral constraint needed to produce a more uniform downwarping with fewer significant subsidence cracks observable at the surface.
3. To date, there have been no reported impacts on surface flow or induced inflows to the underground mine workings even while longwall mining directly beneath surface water features including those associated with the Southern Panels and Sunset Trail Mining Areas. A roof failure that happened while driving the E Mains southward in 2020 (temporarily capturing flow from South Prong Creek) did not occur as a result of

subsidence. Details surrounding this occurrence are discussed in TR-149 and resulted in revisions to Exhibit 60E regarding main entry development.

4. Continuous annual observations find substantial weathering of previously observed subsidence cracks with edges rounding, widths reducing, and depths filling with eroded material. The only exception to these observations has been those cracks in thick, exposed, brittle sandstone units above previously mined B-seam panels (i.e., Apache Rocks) where rounding of edges and filling of cracks have occurred over time, but widths have remained relatively constant.
5. The length of time that tension cracks are expected to be visible before the effects of erosion and deposition, mass wasting, infilling, and revegetation obliterate them (duration of cracks), is a function of their location with respect to the mine geometry and type of material in which the cracks formed. Crack duration in zones of permanent tensile stress, such as above mine boundaries and unmined pillars between longwall panels, commonly last: 1) from one to three years in colluvium, 2) from three to six years in soft, friable sandstone, and 3) many decades in hard, durable sandstone. However, cracks that form in the zone of temporary tensile stress, such as above moving longwall faces, commonly close again when the longwall moves out of their area of influence.
6. Observed mine-induced subsidence effects have been less in the Southern Panels and Sunset Trail Mining Areas than were observed annually in the Box Canyon and Apache Rocks B-seam Mining Areas dating back to 1996. The more subdued topography and the fewer cliffs and ledges of the Southern Panels and Sunset Train Mining Areas reduce the potential for rockfall/landslide areas where E-seam mining has been underway since December 2008.
7. Field visits have revealed the healing and sealing capacity of cracks in surficial material by weathering, mass wasting, and crack infilling over time. This is particularly true in the colluvium that covers much of the surface of the Southern Panels and Sunset Trail Mining Areas. The healing and sealing capacity of these materials causes softening and rounding

of the crack edges as well as reduction of crack continuity and depth to a point of being nearly imperceptible within a year or two.

8. Subsidence-related effects were observed during the spring 2024 field visit at the following location(s):

- Just south of the access road near the chain pillars on the north side of E-seam Longwall Panel E14. While the cracks showed evidence of healing and/or sealing since the fall 2022 site visit, the larger cracks were still noticeable features within the brush.
- Newly observed cracks in fall 2023 over the center of Longwall Panel E14 were not previously observed even though longwall mining occurred at this location in June 2022. These features showed evidence of healing and sealing processes with no new subsidence features observed.
- A new crack was observed over the center of Longwall Panel E15, which had been mined under immediately following the fall 2023 site visit. The crack appeared fresh and subsequent site visits will monitor the feature.

Previously observed subsidence effects were not observed during the spring 2024 field visit at the following locations:

- Along the access road over the chain pillars on the north side of E-seam Longwall Panel E14 in between Crosscuts 21 and 23. With one exception, the cracks along the access road on the north side of E-seam Longwall Panel SS3 were no longer evident.

All subsidence-related features were within the expected angle of draw for the E-seam and were generally focused in areas of maximum temporary tensile stress, such as above current or recent longwall mining activities.

6.0 BIBLIOGRAPHY

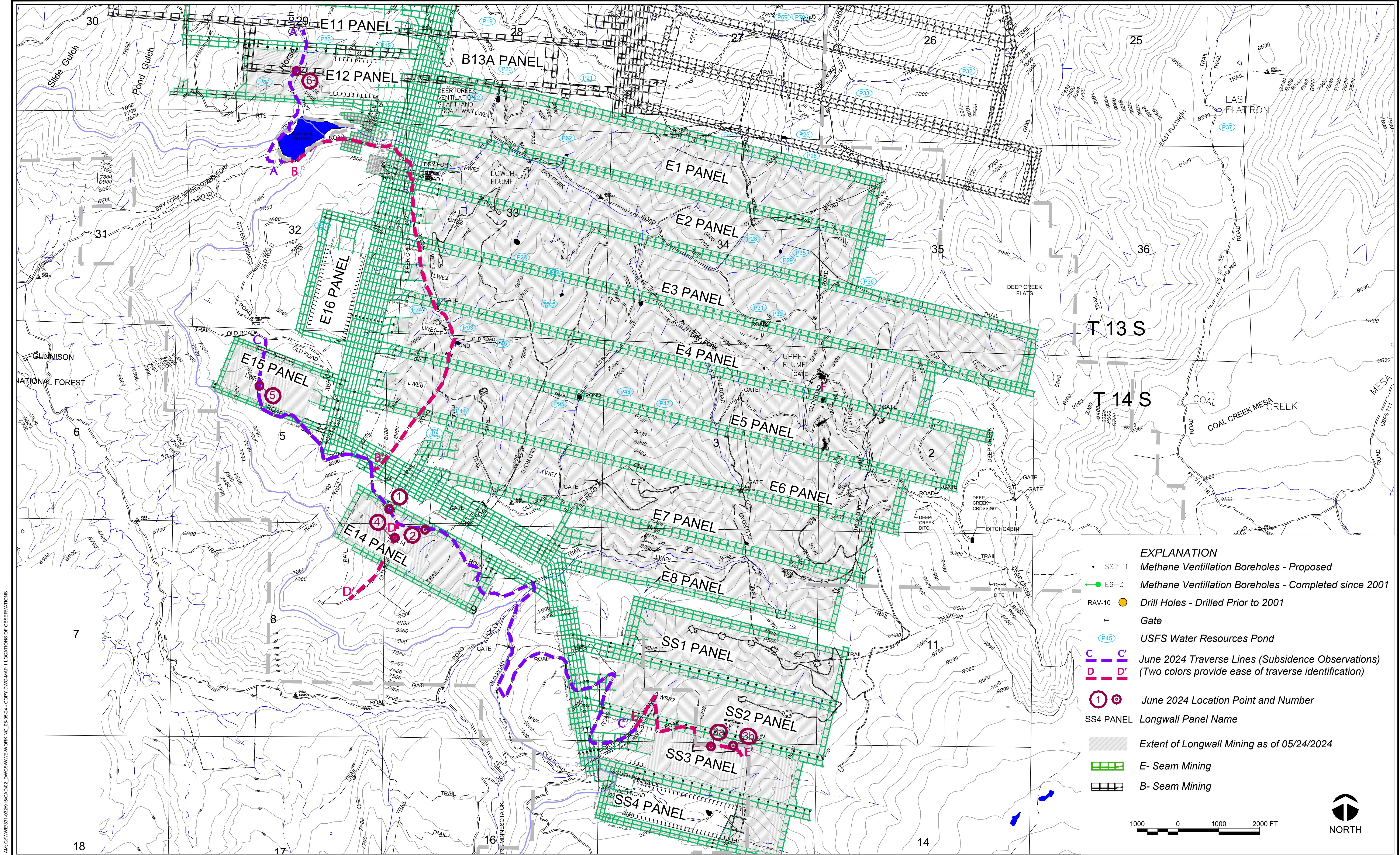
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 - _____. 2010b. *Fall 2010 Subsidence and Geologic Field Observations Box Canyon, Apache Rocks, and South of Divide Mining Areas*. Denver, CO: Wright Water Engineers, Inc.
 - _____. 2011a. *Spring 2011 Subsidence and Geologic Field Observations Box Canyon, Apache Rocks, and South of Divide Mining Areas*. Denver, CO: Wright Water Engineers, Inc.
 - _____. 2011b. *Fall 2011 Subsidence and Geologic Field Observations Box Canyon, Apache Rocks, and South of Divide Mining Areas*. Denver, CO: Wright Water Engineers, Inc.
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 - _____. 2012b. *Fall 2012 Subsidence and Geologic Field Observations Box Canyon, Apache Rocks, and South of Divide Mining Areas*. Denver, CO: Wright Water Engineers, Inc.
 - _____. 2013a. *Spring 2013 Subsidence and Geologic Field Observations South of Divide and Dry Fork Mining Areas (E-Seam)*. Denver, CO: Wright Water Engineers, Inc.
 - _____. 2013b. *Fall 2013 Subsidence and Geologic Field Observations South of Divide and Dry Fork Mining Areas*. Denver, CO: Wright Water Engineers, Inc.
 - _____. 2014a. *Spring 2014 Subsidence and Geologic Field Observations South of Divide and Dry Fork Mining Areas (E-Seam)*. Denver, CO: Wright Water Engineers, Inc.
 - _____. 2014b. *Fall 2014 Subsidence and Geologic Field Observations South of Divide and Dry Fork Mining Areas*. Denver, CO: Wright Water Engineers, Inc.
 - _____. 2015a. *Spring 2015 Subsidence and Geologic Field Observations South of Divide and Dry Fork Mining Areas (E-Seam)*. Denver, CO: Wright Water Engineers, Inc.
 - _____. 2015b. *Fall 2015 Subsidence and Geologic Field Observations South of Divide and Dry Fork Mining Areas*. Denver, CO: Wright Water Engineers, Inc.
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- _____. 2017b. *Fall 2017 Subsidence and Geologic Field Observations South of Divide and Dry Fork Mining Areas (E-Seam)*. Denver, CO: Wright Water Engineers, Inc.
- _____. 2018a. *Spring 2018 Subsidence and Geologic Field Observations South of Divide and Dry Fork Mining Areas (E-Seam)*. Denver, CO: Wright Water Engineers, Inc.
- _____. 2018b. *Fall 2018 Subsidence and Geologic Field Observations Southern Panels Mining Area (E-Seam)*. Denver, CO: Wright Water Engineers, Inc.
- _____. 2019a. *Spring 2019 Subsidence and Geologic Field Observations Southern Panels Mining Area (E-Seam)*. Denver, CO: Wright Water Engineers, Inc.
- _____. 2019b. *Fall 2019 Subsidence and Geologic Field Observations Southern Panels Mining Area (E-Seam)*. Denver, CO: Wright Water Engineers, Inc.
- _____. 2020a. *Spring 2020 Subsidence and Geologic Field Observations Southern Panels and Sunset Trail Mining Areas (E-Seam)*. Denver, CO: Wright Water Engineers, Inc.
- _____. 2020b. *Fall 2020 Subsidence and Geologic Field Observations Southern Panels and Sunset Trail Mining Areas (E-Seam)*. Denver, CO: Wright Water Engineers, Inc.
- _____. 2021a. *Spring 2021 Subsidence and Geologic Field Observations Southern Panels and Sunset Trail Mining Areas (E-Seam)*. Denver, CO: Wright Water Engineers, Inc.
- _____. 2021b. *Fall 2021 Subsidence and Geologic Field Observations Southern Panels and Sunset Trail Mining Areas (E-Seam)*. Denver, CO: Wright Water Engineers, Inc.
- _____. 2022a. *Spring 2022 Subsidence and Geologic Field Observations Southern Panels and Sunset Trail Mining Areas*. Glenwood Springs, CO: Wright Water Engineers, Inc.
- _____. 2023b. *Fall 2022 Subsidence and Geologic Field Observations Southern Panels and Sunset Trail Mining Areas*. Glenwood Springs, CO: Wright Water Engineers, Inc.
- _____. 2023a. *Spring 2023 Subsidence and Geologic Field Observations Southern Panels and Sunset Trail Mining Areas*. Glenwood Springs, CO: Wright Water Engineers, Inc.
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- _____. 2021. *Exhibit 60E: Subsidence Evaluation for the Southern Panels, Apache Rocks West, & Sunset Trail Mining Areas*. Glenwood Springs, CO: Wright Water Engineers, Inc.

MAPS



Plot Date/Time: 09/27/2024, 11:12:21 AM, C:\WWE\831-032915\CAD\02, DWG\WWE\WORKING, 06-05-24, COPY DWG-MAP, 1 LOCATIONS OF OBSERVATIONS

WWE WRIGHT WATER ENGINEERS, INC.
2490 W. 26TH AVE. SUITE 100A
DENVER, CO 80211
(303)480-1700 FAX(303)480-1020

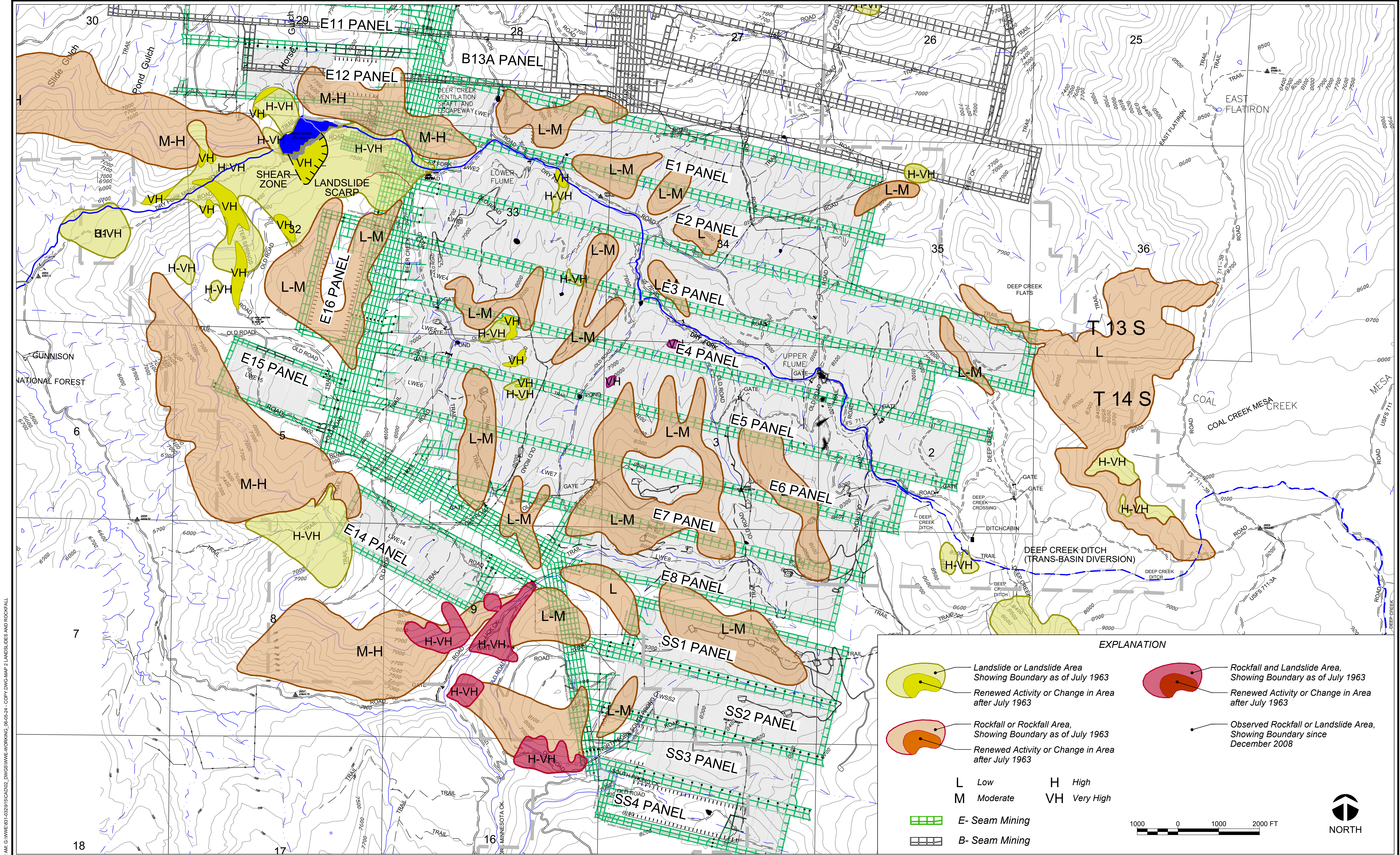
MOUNTAIN COAL COMPANY WEST ELK MINE
LOCATIONS OF OBSERVATIONS - JUNE 2024

DESIGN JMK
DETAIL LMC
CHECK JMK
DATE 09/27/24
SCALE 1"=1000'

PROJECT NUMBER
831-032.915

DATE
09/27/24

MAP
1



WRIGHT WATER ENGINEERS, INC.
2490 W. 26TH AVE. SUITE 100A
DENVER, CO 80211
(303)480-1700 FAX(303)480-1020

MOUNTAIN COAL COMPANY WEST ELK MINE
LANDSLIDES AND ROCKFALLS - JUNE 2024

DESIGN JMK
DETAIL LMC
CHECK JMK
DATE 09/27/24
SCALE 1"=1000'

PROJECT NUMBER
831-032.915

DATE
9/27/24

MAP
2

APPENDIX A

U.S. Forest Service Road and Stock Pond Inspection Forms

Forest Service Roads
Inspection Form

Date: 1/15/2024

Time: 7:30am

Name of Inspector: Chase Hiett

Current Panel and XC Being Mined: LW E12

Road(s) Being Inspected:

Yes No

☐ ☒ Is the Forest Service road within the projected angle of draw of subsidence? If yes, which road(s):

☐ ☐ Are there visible surface cracks on the road? If yes, describe (location, width, length, etc.):

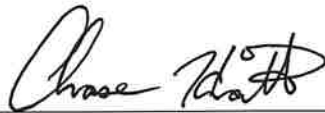
☐ ☐ Is there any recent evidence of potential subsidence induced slope failure? If yes, describe:

☐ ☐ Are there any other potentially damaging, subsidence induced features on or near the road? If yes, describe:

☐ ☐ Is mitigation needed? If yes, list suggestions:

Notes: No access due to weather

Signature of Inspector:



* If any potential subsidence induced features are observed that could cause harm to the public or operations, notify Jessica Wilczek immediately.

Forest Service Roads
Inspection Form

Date: *2/12/24*

Time: *8:30am*

Name of Inspector: *Chase Liatt*

Current Panel and XC Being Mined: *LWE12*

Road(s) Being Inspected:

Yes No

☐ ☒ Is the Forest Service road within the projected angle of draw of subsidence? If yes, which road(s):

☐ ☐ Are there visible surface cracks on the road? If yes, describe (location, width, length, etc.):

☐ ☐ Is there any recent evidence of potential subsidence induced slope failure? If yes, describe:

☐ ☐ Are there any other potentially damaging, subsidence induced features on or near the road? If yes, describe:

☐ ☐ Is mitigation needed? If yes, list suggestions:

Notes:

No access due to weather

Signature of Inspector: _____

Chase Liatt

* If any potential subsidence induced features are observed that could cause harm to the public or operations, notify Jessica Wilczek immediately.

Forest Service Roads
Inspection Form

Date: 3/15/24

Time: 8:00am

Name of Inspector: Chase Hiatt

Current Panel and XC Being Mined: LWE12

Road(s) Being Inspected:

Yes No

☐ ☒ Is the Forest Service road within the projected angle of draw of subsidence? If yes, which road(s):

☐ ☐ Are there visible surface cracks on the road? If yes, describe (location, width, length, etc.):

☐ ☐ Is there any recent evidence of potential subsidence induced slope failure? If yes, describe:

☐ ☐ Are there any other potentially damaging, subsidence induced features on or near the road? If yes, describe:

☐ ☐ Is mitigation needed? If yes, list suggestions:

Notes:

No access due to weather

Signature of Inspector: _____

Chase Hiatt

* If any potential subsidence induced features are observed that could cause harm to the public or operations, notify Jessica Wilczek immediately.

Forest Service Roads
Inspection Form

Date: 4/30/24

Time: 1:45 PM

Name of Inspector: Chase Liatt

Current Panel and XC Being Mined: E12

Road(s) Being Inspected: N/A

Yes No

☐☒

Is the Forest Service road within the projected angle of draw of subsidence? If yes, which road(s):

☐☐

Are there visible surface cracks on the road? If yes, describe (location, width, length, etc.):

☐☐

Is there any recent evidence of potential subsidence induced slope failure? If yes, describe:

☐☐

Are there any other potentially damaging, subsidence induced features on or near the road? If yes, describe:

☐☐

Is mitigation needed? If yes, list suggestions:

Notes:

Signature of Inspector:



* If any potential subsidence induced features are observed that could cause harm to the public or operations, notify Jessica Wilczek immediately.

Forest Service Roads
Inspection Form

Date: 5/16/24

Time: 1:30p

Name of Inspector: CH

Current Panel and XC Being Mined: E12

Road(s) Being Inspected: West Flat Iron RD

Yes No

☒ ☐ Is the Forest Service road within the projected angle of draw of subsidence? If yes, which road(s):

☐ ☒ Are there visible surface cracks on the road? If yes, describe (location, width, length, etc.):

☐ ☒ Is there any recent evidence of potential subsidence induced slope failure? If yes, describe:

☐ ☒ Are there any other potentially damaging, subsidence induced features on or near the road? If yes, describe:

☐ ☒ Is mitigation needed? If yes, list suggestions:

Notes:

Everything looked good at time of inspection

Signature of Inspector: 

* If any potential subsidence induced features are observed that could cause harm to the public or operations, notify Jessica Wilczek immediately.

Forest Service Roads
Inspection Form

Date: 6/18/24

Time: 12:30

Name of Inspector: CH

Current Panel and XC Being Mined: E12

Road(s) Being Inspected: west Flat Iron RD

Yes No



Is the Forest Service road within the projected angle of draw of subsidence? If yes, which road(s):



Are there visible surface cracks on the road? If yes, describe (location, width, length, etc.):



Is there any recent evidence of potential subsidence induced slope failure? If yes, describe:



Are there any other potentially damaging, subsidence induced features on or near the road? If yes, describe:

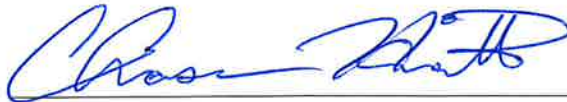


Is mitigation needed? If yes, list suggestions:

Notes:

Everything looked good at time of inspection

Signature of Inspector:



* If any potential subsidence induced features are observed that could cause harm to the public or operations, notify Jessica Wilczek immediately.

Forest Service Roads
Inspection Form

Date: 7/12/24
Time: 2:00p
Name of Inspector: Chase
Current Panel and XC Being Mined: LWE12
Road(s) Being Inspected: Dry Fork RD

Yes No

☒ ☐ Is the Forest Service road within the projected angle of draw of subsidence? If yes, which road(s):

Dry Fork RD

☐ ☒ Are there visible surface cracks on the road? If yes, describe (location, width, length, etc.):

☐ ☒ Is there any recent evidence of potential subsidence induced slope failure? If yes, describe:

☐ ☒ Are there any other potentially damaging, subsidence induced features on or near the road? If yes, describe:

☐ ☒ Is mitigation needed? If yes, list suggestions:

Notes:

Roads looked good at time of inspection

Signature of Inspector: Chase

* If any potential subsidence induced features are observed that could cause harm to the public or operations, notify Jessica Wilczek immediately.

Forest Service Roads
Inspection Form

Date: 8/15/24
Time: 2:00p
Name of Inspector: Chase
Current Panel and XC Being Mined: LWE 12
Road(s) Being Inspected: Dry Fork RD

Yes No

☒ ☐ Is the Forest Service road within the projected angle of draw of subsidence? If yes, which road(s):

Dry Fork RD

☐ ☒ Are there visible surface cracks on the road? If yes, describe (location, width, length, etc.):

☐ ☒ Is there any recent evidence of potential subsidence induced slope failure? If yes, describe:

☐ ☒ Are there any other potentially damaging, subsidence induced features on or near the road? If yes, describe:

☐ ☒ Is mitigation needed? If yes, list suggestions:

Notes:

Roads looked good at time of inspection

Signature of Inspector: Chase

* If any potential subsidence induced features are observed that could cause harm to the public or operations, notify Jessica Wilczek immediately.

Stock Pond
Inspection Form

Date: 1/15/24

Time: 7:30am

Name of Inspector: Chase Hiatt

Current Panel and XC Being Mined: LWE12

Stock Pond(s) Being Inspected:

Yes No

☐ ☒ Is the stock pond within twice the projected angle of draw of subsidence? If yes, which pond(s):

☐ ☐ Are there visible surface cracks in or near the stock pond? If yes, describe (location, width, length, etc.):

☐ ☐ Is there any evidence of potential subsidence induced water loss? If yes, describe:

☐ ☐ Is there water in the pond? If yes, describe:

☐ ☐ Is mitigation needed? If yes, list suggestions:

Notes: No access due to weather

Signature of Inspector: Chase Hiatt

* If any potential subsidence induced features are observed that could cause harm to the pond, notify Jessica Wilczek immediately.

Stock Pond
Inspection Form

Date: 2/12/24

Time: 8:00

Name of Inspector: Chase Hiett

Current Panel and XC Being Mined: LWE12

Stock Pond(s) Being Inspected:

Yes No

☐ ☒ Is the stock pond within twice the projected angle of draw of subsidence? If yes, which pond(s):

☐ ☐ Are there visible surface cracks in or near the stock pond? If yes, describe (location, width, length, etc.):

☐ ☐ Is there any evidence of potential subsidence induced water loss? If yes, describe:

☐ ☐ Is there water in the pond? If yes, describe:

☐ ☐ Is mitigation needed? If yes, list suggestions:

Notes:

No access due to weather

Signature of Inspector:



* If any potential subsidence induced features are observed that could cause harm to the pond, notify Jessica Wilczek immediately.

Stock Pond
Inspection Form

Date: 3/15/24

Time: 8:15am

Name of Inspector: Chase Klint

Current Panel and XC Being Mined: LWE12

Stock Pond(s) Being Inspected:

Yes No

☐ ☒ Is the stock pond within twice the projected angle of draw of subsidence? If yes, which pond(s):

☐ ☐ Are there visible surface cracks in or near the stock pond? If yes, describe (location, width, length, etc.):

☐ ☐ Is there any evidence of potential subsidence induced water loss? If yes, describe:

☐ ☐ Is there water in the pond? If yes, describe:

☐ ☐ Is mitigation needed? If yes, list suggestions:

Notes: No access due to weather

Signature of Inspector: Chase Klint

* If any potential subsidence induced features are observed that could cause harm to the pond, notify Jessica Wilczek immediately.

Stock Pond
Inspection Form

Date: 4/30/24

Time: 1:30pm

Name of Inspector: Chase Hiatt

Current Panel and XC Being Mined: E12

Stock Pond(s) Being Inspected: N/A

Yes No

☐☒

Is the stock pond within twice the projected angle of draw of subsidence? If yes, which pond(s):

☐☐

Are there visible surface cracks in or near the stock pond? If yes, describe (location, width, length, etc.):

☐☐

Is there any evidence of potential subsidence induced water loss? If yes, describe:

☐☐

Is there water in the pond? If yes, describe:

☐☐

Is mitigation needed? If yes, list suggestions:

Notes:

Signature of Inspector: _____



* If any potential subsidence induced features are observed that could cause harm to the pond, notify Jessica Wilczek immediately.

Stock Pond
Inspection Form

Date: 5/16/24

Time: 12:30p

Name of Inspector: CH

Current Panel and XC Being Mined: E12

Stock Pond(s) Being Inspected: none

Yes No

☐ ☒ Is the stock pond within twice the projected angle of draw of subsidence? If yes, which pond(s):

☐ ☒ Are there visible surface cracks in or near the stock pond? If yes, describe (location, width, length, etc.):

☐ ☒ Is there any evidence of potential subsidence induced water loss? If yes, describe:

☐ ☒ Is there water in the pond? If yes, describe:

☐ ☒ Is mitigation needed? If yes, list suggestions:

Notes:

Everything looked good at time of inspection

Signature of Inspector: Chris Kuntz

* If any potential subsidence induced features are observed that could cause harm to the pond, notify Jessica Wilczek immediately.

Stock Pond
Inspection Form

Date: 6/18/24

Time: 1:30

Name of Inspector: CH

Current Panel and XC Being Mined: E12

Stock Pond(s) Being Inspected: none

Yes No

☐

Is the stock pond within twice the projected angle of draw of subsidence? If yes, which pond(s):

☐☐

Are there visible surface cracks in or near the stock pond? If yes, describe (location, width, length, etc.):

☐☐

Is there any evidence of potential subsidence induced water loss? If yes, describe:

☐☐

Is there water in the pond? If yes, describe:

☐☐

Is mitigation needed? If yes, list suggestions:

Notes:

Everything looked good around mon Dam

Signature of Inspector: Chris White

* If any potential subsidence induced features are observed that could cause harm to the pond, notify Jessica Wilczek immediately.

Stock Pond
Inspection Form

Date: 7/12/24

Time: 2:30p

Name of Inspector: CH

Current Panel and XC Being Mined: LWE12

Stock Pond(s) Being Inspected: SW-3

Yes No

☒ ☐ Is the stock pond within twice the projected angle of draw of subsidence? If yes, which pond(s):

SW-3

☐ ☒ Are there visible surface cracks in or near the stock pond? If yes, describe (location, width, length, etc.):

☐ ☒ Is there any evidence of potential subsidence induced water loss? If yes, describe:

☐ ☒ Is there water in the pond? If yes, describe:

☐ ☒ Is mitigation needed? If yes, list suggestions:

Notes:

Pond was empty, Everything looked good at time of inspection

Signature of Inspector: Chao Huith

* If any potential subsidence induced features are observed that could cause harm to the pond, notify Jessica Wilczek immediately.

Stock Pond
Inspection Form

Date: 8/15/24

Time: 2:30p

Name of Inspector: CH

Current Panel and XC Being Mined: LWE12

Stock Pond(s) Being Inspected: SW-3

Yes No



Is the stock pond within twice the projected angle of draw of subsidence? If yes, which pond(s):

SW-3



Are there visible surface cracks in or near the stock pond? If yes, describe (location, width, length, etc.):



Is there any evidence of potential subsidence induced water loss? If yes, describe:



Is there water in the pond? If yes, describe:



Is mitigation needed? If yes, list suggestions:

Notes:

Pond was empty, everything looked good at time of inspection

Signature of Inspector:

Chao Huith

* If any potential subsidence induced features are observed that could cause harm to the pond, notify Jessica Wilczek immediately.

APPENDIX B

Monument Dam Inspection Forms

Monument Dam Inspection Form

Date: 1/15/24

Time: 8:00 am

Name of Inspector: Chase Hinitt

Current Panel Being Mined: CWE12

☐ Weekly Inspection ☒ Monthly Inspection

Yes No

☒ ☐ Is mining within 1 mile of Monument Dam?

☐ ☐ Are there visible surface cracks on the dam?
If yes, indicate length and size of crack. _____

☐ ☐ Is there evidence of subsided areas on or around the dam?
If yes, indicate where and degree. _____

☐ ☐ Are there bulges on the dam?
If yes, indicate where and degree. _____

☐ ☐ Are there signs of seeps on the dam?
If yes, indicate where and estimated flow. _____

☐ ☐ Are there any other potentially damaging features on the dam?
If yes, describe. _____

☐ ☐ Are there any recent evidences of slope failure on the landside south of the dam (perform visual inspection and data analysis of inclinometers)?
If yes, describe. _____

Notes: NO access due to weather

Weekly Survey Monitoring is taking place

Signature of Inspector: Chase Hinitt

Inspections are performed under the direction of Mike Peacock, P.E.

If cracks or other potentially damaging features occur, notify Mike Peacock or Kathy Welt immediately.

Monument Dam Inspection Form

Date: 2/12/24

Time: 7:30am

Name of Inspector: Chase Hiatt

Current Panel Being Mined: LWE12

☐ Weekly Inspection ☒ Monthly Inspection

Yes No

☒ ☐ Is mining within 1 mile of Monument Dam?

☐ ☐ Are there visible surface cracks on the dam?
If yes, indicate length and size of crack. _____

☐ ☐ Is there evidence of subsided areas on or around the dam?
If yes, indicate where and degree. _____

☐ ☐ Are there bulges on the dam?
If yes, indicate where and degree. _____

☐ ☐ Are there signs of seeps on the dam?
If yes, indicate where and estimated flow. _____

☐ ☐ Are there any other potentially damaging features on the dam?
If yes, describe. _____

☐ ☐ Are there any recent evidences of slope failure on the landside south of the dam (perform visual inspection and data analysis of inclinometers)?
If yes, describe. _____

Notes: No access due to weather
Weekly Survey Monitoring is taking place

Signature of Inspector: Chase Hiatt

Inspections are performed under the direction of Mike Peacock, P.E.

If cracks or other potentially damaging features occur, notify Mike Peacock or Kathy Welt immediately.

Monument Dam Inspection Form

Date: 3/15/24

Time: 8:30am

Name of Inspector: Chase Liatt

Current Panel Being Mined: LW512

☐ Weekly Inspection ☒ Monthly Inspection

Yes No

- ☒ ☐ Is mining within 1 mile of Monument Dam?
- ☐ ☐ Are there visible surface cracks on the dam?
If yes, indicate length and size of crack. _____.
- ☐ ☐ Is there evidence of subsided areas on or around the dam?
If yes, indicate where and degree. _____.
- ☐ ☐ Are there bulges on the dam?
If yes, indicate where and degree. _____.
- ☐ ☐ Are there signs of seeps on the dam?
If yes, indicate where and estimated flow. _____.
- ☐ ☐ Are there any other potentially damaging features on the dam?
If yes, describe. _____.
- ☐ ☐ Are there any recent evidences of slope failure on the landside south of the dam (perform visual inspection and data analysis of inclinometers)?
If yes, describe. _____.

Notes:

No access due to weather
Surveying for monument dam looks good

Signature of Inspector: Chase Liatt

Inspections are performed under the direction of Mike Peacock, P.E.

If cracks or other potentially damaging features occur, notify Mike Peacock or Kathy Welt immediately.

Monument Dam Inspection Form

Date: 4/30/24

Time: 2:30 PM

Name of Inspector: Mark Perce

Current Panel Being Mined: E12

☐ Weekly Inspection ☐ Monthly Inspection

Yes No

☒ ☐ Is mining within 1 mile of Monument Dam?

☐ ☒ Are there visible surface cracks on the dam?
If yes, indicate length and size of crack. _____.

☐ ☒ Is there evidence of subsided areas on or around the dam?
If yes, indicate where and degree. _____.

☐ ☒ Are there bulges on the dam?
If yes, indicate where and degree. _____.

☐ ☒ Are there signs of seeps on the dam?
If yes, indicate where and estimated flow. _____.

☐ ☒ Are there any other potentially damaging features on the dam?
If yes, describe. _____.

☐ ☒ Are there any recent evidences of slope failure on the landside south of the dam (perform visual inspection and data analysis of inclinometers)?
If yes, describe. _____.

Notes: Everything looked good.

Signature of Inspector: Mark Perce

Inspections are performed under the direction of Jessica Wilczek, P.E.

If cracks or other potentially damaging features occur, notify Jessica Wilczek immediately.

Monument Dam Inspection Form

Date: 5/16/24

Time: 1:00p

Name of Inspector: Chase Henth

Current Panel Being Mined: E12

☐ Weekly Inspection ☒ Monthly Inspection

Yes No

☒ ☐ Is mining within 1 mile of Monument Dam?

☐ ☒ Are there visible surface cracks on the dam?
If yes, indicate length and size of crack. _____

☐ ☒ Is there evidence of subsided areas on or around the dam?
If yes, indicate where and degree. _____

☐ ☒ Are there bulges on the dam?
If yes, indicate where and degree. _____

☐ ☒ Are there signs of seeps on the dam?
If yes, indicate where and estimated flow. _____

☐ ☒ Are there any other potentially damaging features on the dam?
If yes, describe. _____

☐ ☒ Are there any recent evidences of slope failure on the landside south of the dam (perform visual inspection and data analysis of inclinometers)?
If yes, describe. _____

Notes:

Everything looked good

Signature of Inspector:



Inspections are performed under the direction of Mike Peacock, P.E.

If cracks or other potentially damaging features occur, notify Mike Peacock or Kathy Welt immediately.

Monument Dam Inspection Form

Date: 6/18/24

Time: 2:00p

Name of Inspector: Chase Hiatt

Current Panel Being Mined: E12

☐ Weekly Inspection ☒ Monthly Inspection

Yes No

☒ ☐ Is mining within 1 mile of Monument Dam?

☐ ☒ Are there visible surface cracks on the dam?
If yes, indicate length and size of crack. _____

☐ ☒ Is there evidence of subsided areas on or around the dam?
If yes, indicate where and degree. _____

☐ ☒ Are there bulges on the dam?
If yes, indicate where and degree. _____

☐ ☒ Are there signs of seeps on the dam?
If yes, indicate where and estimated flow. _____

☐ ☒ Are there any other potentially damaging features on the dam?
If yes, describe. _____

☐ ☒ Are there any recent evidences of slope failure on the landside south of the dam (perform visual inspection and data analysis of inclinometers)?
If yes, describe. _____

Notes: Everything looked good

Signature of Inspector: Chase Hiatt

Inspections are performed under the direction of Mike Peacock, P.E.

If cracks or other potentially damaging features occur, notify Mike Peacock or Kathy Welt immediately.

Monument Dam Inspection Form

Date: 7-12-24

Time: 1:00p

Name of Inspector: CH

Current Panel Being Mined: LWE 12

☐ Weekly Inspection ☒ Monthly Inspection

Yes No

☒ ☐ Is mining within 1 mile of Monument Dam?

☐ ☒ Are there visible surface cracks on the dam?
If yes, indicate length and size of crack. _____

☐ ☒ Is there evidence of subsided areas on or around the dam?
If yes, indicate where and degree. _____

☐ ☒ Are there bulges on the dam?
If yes, indicate where and degree. _____

☐ ☒ Are there signs of seeps on the dam?
If yes, indicate where and estimated flow. _____

☐ ☒ Are there any other potentially damaging features on the dam?
If yes, describe. _____

☐ ☒ Are there any recent evidences of slope failure on the landside south of the dam (perform visual inspection and data analysis of inclinometers)?
If yes, describe. _____

Notes: Walked Dam, Looked good at time of Inspection

Signature of Inspector: Chase Katt

Inspections are performed under the direction of Mike Peacock, P.E.

If cracks or other potentially damaging features occur, notify Mike Peacock or Kathy Welt immediately.

Monument Dam Inspection Form

Date: 8/15/24

Time: 1:30P

Name of Inspector: Chase

Current Panel Being Mined: CWER

☒ Weekly Inspection ☐ Monthly Inspection

Yes No

☒ ☐ Is mining within 1 mile of Monument Dam?

☐ ☒ Are there visible surface cracks on the dam?
If yes, indicate length and size of crack. _____.

☐ ☒ Is there evidence of subsided areas on or around the dam?
If yes, indicate where and degree. _____.

☐ ☒ Are there bulges on the dam?
If yes, indicate where and degree. _____.

☐ ☒ Are there signs of seeps on the dam?
If yes, indicate where and estimated flow. _____.

☐ ☒ Are there any other potentially damaging features on the dam?
If yes, describe. _____.

☐ ☒ Are there any recent evidences of slope failure on the landside south of the dam (perform visual inspection and data analysis of inclinometers)?
If yes, describe. _____.

Notes: Walked Dam, looked good at time of inspection

Signature of Inspector: Chase

Inspections are performed under the direction of Jessica Wilczek, P.E.

If cracks or other potentially damaging features occur, notify Jessica Wilczek immediately.

APPENDIX C

Monument Dam Monitoring Data

Name	Easting 9/28/23	Northing 9/28/23	Elevation 9/28/23	Easting 3/4/2024	Northing 3/4/2024	Elevation 3/4/2024	Δ Easting	Δ Northing	Δ Elevation
6001	1438801.1	387917.9	7338.0	1438801.2	387917.9	7338.2	-0.1	0.0	-0.2
6002	1438840.9	387802.6	7338.6	1438840.7	387802.7	7338.7	0.2	-0.1	-0.1
6003	1438781.1	387855.6	7323.5	1438781.1	387855.6	7323.6	0.0	0.0	-0.1
6004	1438735.0	387773.3	7305.9	1438735.0	387773.3	7306.0	0.0	0.0	-0.1
6005	1438584.5	387703.8	7290.6	1438584.6	387703.8	7290.7	0.0	0.0	-0.1
6006	1438479.8	387648.6	7257.4	1438479.8	387648.6	7257.5	-0.1	0.0	-0.1
6007	1439013.4	387697.3	7337.8	1439013.5	387697.3	7337.9	-0.1	0.0	-0.1
6008	1438922.3	387687.5	7340.4	1438922.4	387687.4	7340.5	0.0	0.0	-0.1
6009	1438807.3	387652.8	7329.9	1438807.4	387652.8	7330.0	-0.1	0.0	-0.1
6010	1438656.8	387652.3	7291.3	1438656.9	387652.3	7291.5	0.0	0.0	-0.1
6011	1438566.2	387543.9	7265.5	1438566.2	387543.9	7265.6	0.0	0.0	-0.1
6012	1438847.0	387563.9	7335.1	1438847.1	387563.8	7335.2	-0.1	0.0	-0.1
6501	1441367.1	387525.0	7499.4	1441367.1	387525.1	7499.5	0.0	-0.1	-0.1
6502	1439617.8	388740.5	7387.9	1439617.8	388740.5	7388.1	-0.1	0.0	-0.2
6503	1440269.2	388520.5	7332.5	1440269.2	388520.6	7332.5	0.0	0.0	-0.1
6504	1438363.8	385924.5	7627.2	1438363.7	385924.5	7627.0	0.0	0.0	0.1
7000	1438587.1	387402.4	7324.0	1438587.2	387402.4	7324.1	-0.1	0.0	-0.1
7001	1438836.2	387316.8	7361.5	1438836.3	387316.8	7361.5	0.0	0.0	-0.1
7002	1438987.0	387197.8	7399.6	1438987.0	387197.8	7399.7	0.0	0.0	-0.1
7003	1439086.0	387351.5	7381.9	1439086.1	387351.5	7382.0	0.0	0.0	-0.1
7004	1439265.2	387577.9	7351.5	1439265.2	387578.0	7351.6	0.0	0.0	-0.1
7005	1439353.5	387712.0	7349.8	1439353.5	387712.1	7349.9	0.0	-0.1	-0.1
7006	1439509.0	387790.6	7343.5	1439509.0	387790.6	7343.5	0.0	0.0	-0.1
7007	1439682.0	387965.8	7358.7	1439682.0	387965.8	7358.8	0.0	0.0	-0.1
7008	1439833.8	388031.0	7367.5	1439833.8	388031.0	7367.6	0.0	-0.1	-0.1
7009	1439781.5	387822.5	7402.5	1439781.5	387822.5	7402.6	0.0	-0.1	-0.1
7010	1439961.3	388080.7	7369.3	1439961.3	388080.7	7369.3	0.0	0.0	-0.1
7011	1439812.4	387959.2	7400.2	1439812.4	387959.3	7400.3	0.0	-0.1	-0.1
7012	1439832.1	387765.2	7426.8	1439832.2	387765.2	7427.0	0.0	-0.1	-0.1
7013	1439927.1	387644.2	7494.8	1439927.2	387644.3	7494.9	0.0	-0.1	-0.1
7014	1439823.3	387604.8	7446.2	1439823.4	387604.9	7446.3	0.0	-0.1	-0.1
7015	1439878.8	387528.4	7498.6	1439878.8	387528.4	7498.6	0.0	0.0	0.0
7016	1439687.2	387517.1	7447.8	1439687.2	387517.2	7447.9	0.0	-0.1	0.0
7017	1439778.0	387423.4	7498.5	1439778.0	387423.4	7498.5	0.0	0.0	0.0
7018	1439193.5	387386.7	7385.7	1439193.4	387386.8	7385.7	0.1	-0.1	-0.1
7019	1438689.5	387187.7	7367.9	1438689.5	387187.7	7368.0	-0.1	0.0	-0.1
7020	1438878.5	386892.2	7464.5	1438878.6	386892.2	7464.6	-0.1	0.0	-0.1
7021	1439258.1	387240.9	7417.9	1439258.1	387240.9	7417.9	-0.1	0.0	0.0
7022	1439408.8	387207.7	7466.3	1439408.9	387207.8	7466.3	-0.1	-0.1	-0.1
7023	1439326.2	387134.4	7458.6	1439326.3	387134.3	7458.7	-0.1	0.1	-0.1
7024	1438990.6	386701.5	7518.0	1438990.7	386701.6	7518.0	-0.1	0.0	-0.1
7025	1439690.6	386958.6	7605.8	1439690.6	386958.7	7605.9	-0.1	-0.1	-0.1

DENVER

2490 W. 26th Avenue Suite 100A
Denver, Colorado 80211
Phone: 303.480.1700
Fax: 303.480.1020

GLENWOOD SPRINGS

818 Colorado Avenue
P.O.Box 219
Glenwood Springs, Colorado 81602
Phone: 970.945.7755
Fax: 970.945.9210

DURANGO

1666 N. Main Avenue Suite C
Durango, Colorado 81301
Phone: 970.259.7411
Fax: 970.259.8758

www.wrightwater.com



Wright Water Engineers, Inc.