Proposed Decision
and
Findings of Compliance
for the

West Elk Mine
C-1980-007

Permit Renewal No. 8

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

June 1, 2022

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Introduction

This document is the decision package prepared by the Colorado Division of Reclamation, Mining and Safety (the Division) for the West Elk Mine. This document includes: 1) the proposed decision to approve the renewal application; 2) a summary which includes a history of the review of the permit application, a description of the environment affected by the operation and a description of the mining and reclamation plan; and 3) the written findings of compliance the Division has made as required by the Colorado Surface Coal Mining Reclamation Act. Detailed information concerning the findings of compliance can be found in the Regulations of the Colorado Mined Land Reclamation Board for Coal Mining.

The Division has received an application for Permit Renewal No. 8 (RN-08) to conduct surface coal mining and reclamation operations at the West Elk Mine. The application was submitted by Mountain Coal Company, LLC (MCC), the mine operator, on January 27, 2021. The Division deemed the application complete for the purposes of filing on February 1, 2021. The mine permit area comprises 19,854.9 total acres, of which 13,358.4 acres are located on federal lands and 6,496.5 acres are located on private lands, within Delta and Gunnison Counties, Colorado. The legal description of the lands included within the permit area is:

> All or portions of Sections 9 through 36 (inclusive), Township 13 South, Range 90 West; Sections 23 through 26 (inclusive), Township 13 South, Range 91 West; Sections 1, 2, 3, 4, 5, 8, 9, 10, 11, 12, 14, 15, 16, 21, 22 and 23, Township 14 South, Range 90 West; all of the 6th Principal Meridian.

The stipulation history for the West Elk Mine was reviewed with this renewal application. The review included an investigation of any stipulations imposed, and any responses to existing stipulations received since the last midterm review. Any stipulations associated with this permit and issued over the life of this operation which are not discussed in this review have been complied with or terminated.

Three outstanding stipulations remain attached to permit number C-1980-007 and are listed below:

Stipulation No. 3

> THE OPERATOR SHALL, UPON CLOSURE, INSTALL WATER-TIGHT SEALS WITHIN THE MINE TO PREVENT GRAVITY DISCHARGE. THIS REQUIREMENT MAY BE WAIVED UPON THE DIVISION'S APPROVAL OF A PLAN SUBMITTED BY THE OPERATOR. THIS PLAN SHALL INCLUDE A DEMONSTRATION THAT THE WATER QUALITY OF THE DISCHARGE FROM THE MINE WORKINGS WILL BE OF ACCEPTABLE QUALITY AND WILL REMAIN ACCEPTABLE AFTER MINE CLOSURE. THIS SHALL INCLUDE CHEMICAL ANALYSIS AND A PREDICTIVE MODEL THAT USES OXIDATION AND REDUCTION POTENTIAL TO DETERMINE LONG-TERM WATER QUALITY OF MINE WATERS. ALSO, THE PLAN SHALL INCLUDE THE CONSTRUCTION OF A SUITABLE CHANNEL FOR MINE DISCHARGE.
>
> STATUS: FUTURE

Stipulation No. 7

THE DIVISION DIRECTS MOUNTAIN COAL COMPANY, PRIOR TO ANY DISTURBANCE AT THE UPPER WASTE SITE, TO INSTALL SEVERAL ELECTRONIC TILT METER TUBES DOWNSLOPE FROM THE TOE OF THE PROPOSED WASTE STRUCTURE. THESE TILT METER INSTALLATIONS SHALL BE INSTALLED AS SPECIFIED IN MCC'S AUGUST 15, 1985 SUBMITTAL. ONE INDICATOR SHALL BE INSTALLED WITHIN 160 FEET OF THE TOE OF THE WASTE PILE CURRENTLY HALF WAY BETWEEN MONUMENTS 51 AND 54. THE SECOND SHALL BE INSTALLED APPROPRIATELY 100 FEET NORTHEAST OF MONUMENT S2, 160 FEET NORTH OF THE TOE OF THE WASTE PILE, AS INDICATED ON DRAWING NO. MG-R C-001, INCLUDED IN THE PERMIT REVISION NO. 6 APPLICATION. DURING THE INSTALLATION OF THESE TILT METER TUBES, THE OPERATOR SHALL AUGER AND LOG THE SURFICIAL AND BEDROCK STRATIGRAPHY ENCOUNTERED. AUGERING SHALL CONTINUE UNTIL THE OPERATOR HAS ESTABLISHED INTACT BEDROCK OCCURRENCE. IF ANY EVIDENCE OF EXISTING LANDSLIDE DEPOSITS IS ENCOUNTERED, THE OPERATOR SHALL DEFINE THE NATURE AND EXTENT OF THE PRE-EXISTING SLOPE INSTABILITY. IF SUCH LANDSLIDE ACTIVITY IS DISCERNED, THE OPERATOR WILL BE REQUIRED TO APPROPRIATELY RECONFIGURE THE PILE DESIGN, PRIOR TO INITIATION OF ANY CONSTRUCTION ACTIVITY.

STATUS: FUTURE.

Stipulation No. 76

MOUNTAIN COAL COMPANY WILL INFORM THE MONTROSE OFFICE OF THE COLORADO DIVISION OF WATER RESOURCES OF PLACEMENT OF ALL NEW SURVEY MONUMENTS. MOUNTAIN COAL COMPANY WILL COPY THE MONTROSE OFFICE OF THE COLORADO DIVISION OF WATER RESOURCES ON ALL SURVEY, PIEZOMETER, AND ACCELEROMETER/SEISMOMETER MONITORING IN AND AROUND MONUMENT DAM. MOUNTAIN COAL COMPANY WILL NOTIFY THE MONTROSE OFFICE OF THE COLORADO DIVISION OF WATER RESOURCES WHENEVER THE PEAK GROUND ACCELERATION (PGA) THRESHOLD IS EXCEEDED DURING THE MONITORING PERIOD, WHETHER MINE-INDUCED OR NATURALLY-OCCURRING.

STATUS: FUTURE.

Enforcement Actions

The following enforcement actions were issued since the last renewal of the West Elk Mine permit application package (PAP):

Notice of Violation CV-2020-001, was issued November 12, 2020 for failure to conduct a subsidence survey and failure to protect the hydrologic balance. CV-2020-001 was abated with the submission of Technical Revision No. 149 (TR-149), and was subsequently terminated on January 13, 2021.

Additionally, Cessation Order CO-2020-001 was issued on June 18, 2020 and remained in effect at the time RN-7 was issued. CO-2020-001 was rendered moot with the Division's

approval of MR-456, and was terminated on January 12, 2022. More details are given on page 23 of these Findings.

Proposed Decision

The Colorado Division of Reclamation, Mining and Safety proposes to approve an application for permit renewal (RN-08).

The application was submitted by Mountain Coal Company, LLC for the West Elk Mine. This decision is based on a finding that the operations will comply with all requirements of the Colorado State Program as found in the Colorado Surface Coal Mining Reclamation Act, C.R.S. 34-33-101 et seq., and the Regulations promulgated pursuant to the Act. If no request for a formal hearing is made within thirty (30) days of the first publication of the issuance of this proposed decision, then this decision becomes final. Upon submittal of acceptable surety by the applicant, the permit will be issued. The permit application, all supporting documentation and any stipulations or conditions will become a binding part of the permit.

No coal mining operations may be conducted on any Federal surface or coal until the Secretary of the Interior has approved the proposed mining plan.

Summary

The Review Process

Permit C-1980-007 for the West Elk Mine was issued on July 31, 1981 for an initial five-year term, and since then has been renewed for eight additional five-year terms, as of the date of publication of these findings. Operations at the West Elk Mine have been conducted under several different names in the past. Before 1991, the West Elk Mine itself was known as the Mt. Gunnison No. 1 Mine. Since the mine opened, operations were conducted under the following names: Anaconda Minerals Company, ARCO Coal Company (a Division of Atlantic Richfield Company), and West Elk Coal Company, Inc. The name was changed from West Elk Coal Company, Inc., Mt. Gunnison No. 1 Mine, to Mountain Coal Company, West Elk Mine, and processed by the Division as a Succession of Operator. Both companies are wholly owned subsidiaries of the Atlantic Richfield Company. The Division issued a proposed decision to approve the name change pursuant to Rule 2.08.6(4) on December 20, 1991. The decision was final following the public comment period, on January 20, 1992. The permit was subsequently transferred by succession of operator to Mountain Coal Company, LLC, a subsidiary of Arch Coal, Inc., on April 23, 1998. Arch Coal, Inc. was renamed Arch Resources, Inc. effective May 15, 2020.

Thirteen permit revisions have been approved (PR-9 was withdrawn and PR-13 was skipped). Fourteen bond release applications have been approved. A complete summary of previous major permitting actions is given below.

Mountain Coal Company, formerly the West Elk Coal Company, applied on November 6, 1979 for a permit to conduct underground mining and reclamation operations at the West Elk Mine, formerly the Mt. Gunnison No. 1 Mine.

The application was determined to be complete on November 29, 1979. The first review comments from the Division of Water Resources were received on March 26, 1980, and comments from the Division of Wildlife were received on April 22, 1980. During the latter part of June, 1980, the Division received the Office of Surface Mining, Reclamation and Enforcement's (OSMRE) Apparent Completeness Review of the application, which was subsequently incorporated into the July, 1980 Mined Land Reclamation Board for Coal Mining (MLRB) Preliminary Adequacy Review Letter and then forwarded to the company. On January 13, 1981, a meeting was held between OSMRE and MLRD to assess the adequacy of MCC's responses, and it was at this point in time that the responses were found to be substantially inadequate in a variety of aspects. This resulted in a decision to prepare a second, joint adequacy letter which was sent to the company on February 6, 1981.

On January 30, 1981 the Division received additional comments from the Division of Water Resources which outlined the deficiencies in the application with regard to water rights and, in particular, with the deficiencies of the proposed Minnesota Creek Basin Augmentation Plan. Additional comments on water rights issues were submitted in February and March of 1981 in the form of objection letters from several concerned citizens. These letters also discussed problems relating to alluvial valley floors, protection for perennial streams, the potential for landslides to be triggered by subsidence, cumulative hydrologic impacts, the adequacy of MCC's

subsidence monitoring and subsidence control plans, and a number of procedural issues. These objections resulted in several requests for a mine site visit and informal conference, which were held on April 30, 1981 and May 12, 1981, respectively. The Division began preparation of its written findings soon after the conference and published its proposed decision on June 22, 1981. The Division's decision was to approve the West Elk permit application with stipulations.

The five-year permit was issued on July 31, 1981, pursuant to the Colorado Surface Coal Mining Reclamation Act, CRS 34-33-101 *et seq*. Construction of the West Elk Mine began in 1981. The mine began producing coal from the F Seam in January 1982. The expiration of this permit was set at July 31, 1986. On January 17, 1986, a complete renewal application was received. This application was subsequently reviewed and the Division issued a proposed decision to approve the renewal application with stipulations. Following the public comment period, the permit was renewed on May 19, 1987. The permit was to expire on August 1, 1991. The Division received MCC's complete renewal application on January 30, 1991 thereby ensuring the operator's right to successive renewal pursuant to 2.08.5(3)(f). The Division issued a proposed decision to approve the renewal application with stipulations, and following the public comment period, the permit was renewed on January 29, 1993, and was to expire on August 1, 1996.

The Division received an application for a permit revision (Jumbo Mountain; PR-5) on February 4, 1994, which was subsequently deemed complete on February 14, 1994. The Division issued the first preliminary adequacy review letter on April 15, 1994, which identified deficiencies in geology, hydrology, and subsidence. MCC's responses to the preliminary adequacy review were received on June 3, 1994. A meeting between the Division and MCC to assist MCC in responding adequately to the Division's questions was held on July 14, 1994. Extension requests were made by MCC and approved by the Division for the proposed decision to August 26, 1994, and subsequent extension approvals were associated with PR-5. Additional review materials were received September 30, October 7, 14, and 20, 1994. A final meeting concerning PR-5 was held on October 7, 1994. The proposed decision to approve the revision was issued on October 21, 1994.

The Apache Rocks Permit Revision (PR-6) was submitted to the Division on June 8, 1995. The application was deemed complete for the purposes of filing on June 18, 1995. Division adequacy review letters were sent to MCC on June 30, 1995; August 25, 1995; September 20, 1995; October 18, 1995; November 20, 1995; January 15, 1996; and January 26, 1996. All concerns were adequately addressed by MCC. MCC responses and all comments received from other agencies are available for review at the Division office. The proposed decision was issued on January 26, 1996, with full consideration of the adequacy and other agency responses.

On January 31, 1996, a permit renewal application was received by the Division for a successive five-year permit term. On February 1, 1996, the application was deemed incomplete because the proof of newspaper publication was not included with the application. On March 6, 1996 the application was deemed complete for the purposes of filing following the receipt of an Affidavit of Publication for the public notice advertisement required by Rule 2.08.5(2)(b)(ii). On May 10, 1996, an adequacy review letter was submitted to MCC identifying several issues to be addressed as part of the current permit renewal process. All concerns were adequately addressed by MCC. The Division renewed Mining Permit No. C-1980-007 for the West Elk Mine on July 26, 1996.

The Sylvester Gulch Facilities Area Permit Revision (PR-7) was submitted to the Division on November 18, 1996. The application was deemed complete for the purposes of filing on November 26, 1996. Appropriate agencies were notified of the application by letters dated December 04, 1996. Division adequacy review letters were sent to MCC on January 15, 1997, April 14, 1997, and on April 29, 1997. All concerns were adequately addressed by MCC. MCC responses and all comments received from other agencies are available for review at the Division office. The proposed decision to approve the revision was issued on April 30, 1997.

The Box Canyon Revision (PR-8) was originally received by the Division on March 2, 1998. The revision was deemed complete on March 11, 1998, and appropriate agencies were notified of the application by letters that same date. Division adequacy review letters were sent to MCC on May 8, 1998, December 15, 1998, April 1, 1999, and April 30, 1999. All concerns were adequately addressed by MCC. MCC responses and all comments received from other agencies are available for review at the Division office. The proposed decision to approve the revision was issued on January 19, 2000.

Permit Revision No. 9 (PR-9), for coal handling facilities and E-seam access in Sylvester Gulch, was first received by the Division on September 14, 1999, and deemed complete for the purposes of filing on September 24, 1999. The first adequacy letter was sent to the Operator on November 23, 1999. MCC withdrew the application for PR-9 on August 29, 2002.

MCC submitted a permit renewal application (RN-4) on January 31, 2001, and it was received by the Division on February 2, 2001. The application was found incomplete on February 4, 2001, and was deemed complete for the purposes of filing on April 12, 2001. An adequacy review was conducted but no comments were submitted to the applicant because issues had been resolved by an extensive midterm review, the revisions from which had just been completed in 2000. The proposed decision to approve the revision was issued on July 31, 2001.

The application for Permit Revision No. 11 (PR-11), the addition of 690 acres of the West Flatiron lease, was received November 16, 2004, and deemed complete for the purposes of filing on November 23, 2004. A preliminary adequacy review letter was sent by the Division on January 6, 2005, and responses were received from MCC on February 18, 2005. A second set of adequacy comments was sent by the Division on March 1, 2005, and responses were received on March 18, 2005. These responses were determined to satisfy the Division. No public comments were received. A letter was received by the Bureau of Land Management (BLM) on March 8, 2005, stating that MCC's plan was adequate to meet all current Federal regulations regarding the Resource Recovery Protection Plan (R2P2). The U.S. Forest Service sent a letter of concurrence with an approval decision on March 17, 2005. Letters were received from the Colorado State Historic Preservation Officer (SHPO) on December 1, 2004, and from the State Engineer's Office on December 3, 2004, indicating there were no comments or objections. The proposed decision to approve PR-11 was issued on April 8, 2005.

The application for Permit Revision No. 10 (PR-10), the addition to the permit area of E-seam longwall panels 1 through 9 and associated development entries in the South-of-Divide area, was received by the Division on April 2, 2004, and was deemed complete for the purposes of filing on April 8, 2004. Mining of the E seam in panels 10, 11, and 12 was approved in a previous revision. The proposed decision to approve PR-10, with new stipulations, was issued on June 2, 2006.

MCC submitted Permit Renewal application RN-5 on January 23, 2006 and the application was deemed complete for the purposes of filing on January 26, 2006. An adequacy review found that it was not necessary to submit comments to the applicant. The reclamation cost estimate was updated and the applicant submitted additional reclamation bond. The proposed decision to approve RN-5 was issued on February 13, 2007.

MCC submitted the application for Permit Revision No. 12 (PR-12), the addition of the Dry Fork lease (COC-67232), on October 1, 2007 and DRMS deemed the application complete for the purposes of filing on the same day. An adequacy review was conducted and comments were submitted to the applicant in a letter dated December 5, 2007. The Division's adequacy concerns were related to subsidence impacts in the proposed Dry Fork lease area and various changes to text and tables in the permit application. All concerns were resolved by MCC's responses submitted on February 28, 2008. The Division issued a proposed decision of March 21, 2008.

MCC submitted the application for Permit Revision No. 14 (PR-14) on August 18, 2008 and DRMS deemed the application complete for the purposes of filing on August 28, 2008. PR-14 approved the drilling of up to 152 methane drainage wells to the mine's underground workings in longwall panels E-2 through E-12, over a 12-year period. The wells were approved to be drilled within the applicant's existing coal leasehold and mining permit area on Federal (USFS) and private lands. The total aggregate surface disturbance was approved to be approximately 80 acres within a 6-square mile area. A Federal Environmental Impact Statement (EIS) was prepared for the project, titled "The Deer Creek Shaft and E Seam Methane Drainage Wells Project". The applicant substituted PR-14 for a proposed drilling project previously submitted to the Division as Technical Revision 112. A decision to approve PR-14 was proposed on October 10, 2008, and issued on November 14, 2008.

MCC submitted an application for permit renewal, RN-06, on January 20, 2011, and the application was deemed complete for the purposes of filing on January 21, 2011. The Division conducted a preliminary adequacy review of the RN-06 application and submitted comments to the applicant in a letter dated March 18, 2011. Most of the Division's comments related to updating information in the AVS. All concerns noted in the March 18, 2011 letter were resolved by MCC's responses submitted by email on March 25, 2011. During the review of RN-06, the Division updated the reclamation cost estimate for the West Elk Mine. A decision to approve RN-06 was proposed on October 17, 2011, and issued on November 28, 2011.

MCC submitted the application for Permit Revision No. 15 (PR-15) on March 29, 2018 and DRMS deemed the application complete for the purposes of filing on April 5, 2018. PR-15 approved the expansion of the permit area boundary into the Sunset Trails area to the south of the previously approved permit area boundary, adding 2,620 acres to the permit area, and revised the mine plan. Four E-seam longwall panels were added to the mine plan in the Sunset Trails area (LWSS1-4), with a projected area of mining of ~1,120 acres, comprising ~65% federally owned coal and ~35% privately owned. Additionally, PR-15 approved the longwall mining of four B-seam panels (LWB26-29) which had previously been approved for development with TR-137. The addition of 43 Mine Ventilation Boreholes (MVBs) was approved, with associated drill pads and access roads. A total of 53.63 additional disturbed acres was approved. A decision to approve PR-15 was proposed on September 4, 2018. An objection to the Division's proposed decision and request for formal hearing was received on September 30, 2018. The Mined Land Reclamation Board heard the objection on October 24, 2018, and upheld the Division's decision.

MCC submitted the application for permit renewal, RN-07, on February 1, 2016, and the application was deemed complete for the purposes of filing on the same day. The Division conducted a preliminary adequacy review of the RN-07 application and submitted comments to the applicant in a letter dated May 3, 2016. All concerns noted in the May 3, 2016 letter were addressed by MCC's response received by the Division on May 24, 2016. During the preliminary review of RN-07, the Division initiated an update of the reclamation cost estimate for the West Elk Mine. An important component of the revised cost estimate was a complete and accurate inventory of holes drilled by the operator. The decision due date was extended multiple times in order to allow for the compilation of the necessary information. A second adequacy review letter was sent to MCC on February 5, 2019. MCC sent a response on March 11, 2019. A decision to approve RN-07 was proposed on August 20, 2020, and issued on October 10, 2020.

As the review of RN-07 extended past the due date of the subsequent mid-term review, MT-08, a brief memo was substituted for the complete MT-08 findings document, directing the reader to the RN-07 findings. Since the publication of the RN-07 findings document on August, 20, 2020, fourteen Minor Revisions (MR), three Surety Releases (SL), and three Technical Revisions (TR) have been submitted to the Division. Two more SLs (SL-11 and -12) and a fourth TR (TR-147) were submitted prior to the publication of the RN-07 findings and were still under review at the time. Details of these permitting actions are summarized in Table 1:

Table 1

Revision	Revision Short Description	Decision Date
MR-450	Temporary Stream Diversion Pipe	10/15/2020
MR-451	Update Officers & Directors	10/26/2020
MR-452	Repair of South Prong Subsidence Basin	10/16/2020
MR-453	South Prong Restoration Plan	[Withdrawn]
MR-454	Exhibit 12 Update - 2020 MVB P&As	12/8/2020
MR-455	Update Exhibit 7 - CDPS Permit - Mod. #4	2/17/2021
MR-456	Revised Road and MVB Pad Locations & Bridge	11/2/2021
MR-457	Exhibit 12 Update- P&A Reports	12/3/2021
MR-458	Update Exhibit 1 - Officers & Directors	12/27/2021
MR-459	Update the text in sections 1.0, 2.01, 2.02, 2.03 and 2.04 of the PAP	2/22/2022
MR-460	Development mining of potential LW panels	3/30/2022
MR-461	Update MVB tracking sheet in Exhibit 80	5/17/2022
MR-462	Update the text in sections	[Under review]
MR-463	Update Officers & Directors	6/1/2022
SL-11	Partial Phase III Bond Release	11/3/2020
SL-12	Partial Phase I Bond Release	6/2/2021
SL-13	Partial Phase II Bond Release	10/13/2021
SL-14	Partial Phase I Bond Release	11/24/2021
SL-15	Partial Phase I Bond Release	[Under review]
TR-147	B-seam MVBs	[Under review]
TR-148	South Prong Restoration	11/19/2020

TR-149	Updates of Exhibits 55B and 60E	2/5/2021
TR-150	Layout of E-seam panels	[Under review]

MCC submitted the application for permit renewal, RN-08, on January 27, 2021, the Division deemed the application complete for the purposes of filing on February 1, 2021. The Division sent completeness notification letters to various agencies in accordance with 2.07.3(3)(b).

The ownership and control information was cross-checked against the AVS database on February 19, 2021, December 27, 2021 and June 1, 2022. No violations were reported.

The Division received proof of publication of the applicant's public notice on January 24, 2022. The notice was published in the *Delta County Independent* on December 8, 15, 22 and 28, 2021. No comments were received in the 30 public comment period following the final publication.

Description of the Environment

Site Description and Land Use - Rule 2.04.3

The West Elk Mine is located approximately one mile east of the town of Somerset on Colorado State Highway No. 133. The western permit boundary extends to the outer slopes of Jumbo Mountain. PR-11 extended the eastern permit boundary into the Raven Gulch and Deep Creek watersheds. The northern extremity of the permit area lies just north of the North Fork of the Gunnison. PR-10 extended the southern boundary of the permit area south of Minnesota Reservoir into the drainage basins of Minnesota Creek, Dry Fork, Lick Creek, Poison Gulch, and Deep Creek. PR-12 extended the permit area to the southeast with the addition of the Dry Fork lease. PR-15 extended the southern boundary of the permit area, to include the South Prong and Horse Creek watersheds. (See Figure 1).

The active Elk Creek Mine is located just northwest of the West Elk Mine facilities, north of the North Fork of the Gunnison River. The reclaimed Bear Mine is adjacent to the West Elk Mine on the west. Several historic mines, including the Hawks Nest, Black Beauty, Edwards and Oliver Mines are situated within or near to the northeast of the West Elk Mine permit area.

The West Elk Mine is on the western flank of the West Elk Mountains in the drainage basin of the North Fork of the Gunnison River. The climate is semi-arid. Topography is characterized by steeply sloping mountains covered primarily with tall shrub vegetation, particularly Gambel oak and Saskatoon serviceberry. The general area where the mine is located is currently used for grazing domestic livestock (cattle and sheep) and wildlife (deer and elk). Recreational activities such as big game hunting also occur here.

Slopes range from 0 to 60 percent on the permit area, and elevations range from 5,900 feet at Somerset in the valley of the North Fork, to above 9,800 feet in the southeast corner of the permit area.

The steep slopes of the stream valleys and the instability of the rock strata in the North Fork drainage basin have contributed to numerous landslides, mud flows and rock falls. These mass wasting features have been mapped by W.R. Junge of the Colorado Geological Survey and

published as an open file report, entitled "Geologic Hazards, North Fork Gunnison River Valley, Delta and Gunnison Counties, Colorado."

The primary land uses within the permit area are characterized as rangeland and woodland, supporting big game (deer and elk) and livestock (cattle and sheep). Portions of the permit area are within the boundaries of Grand Mesa, Uncompahgre and Gunnison National Forests.

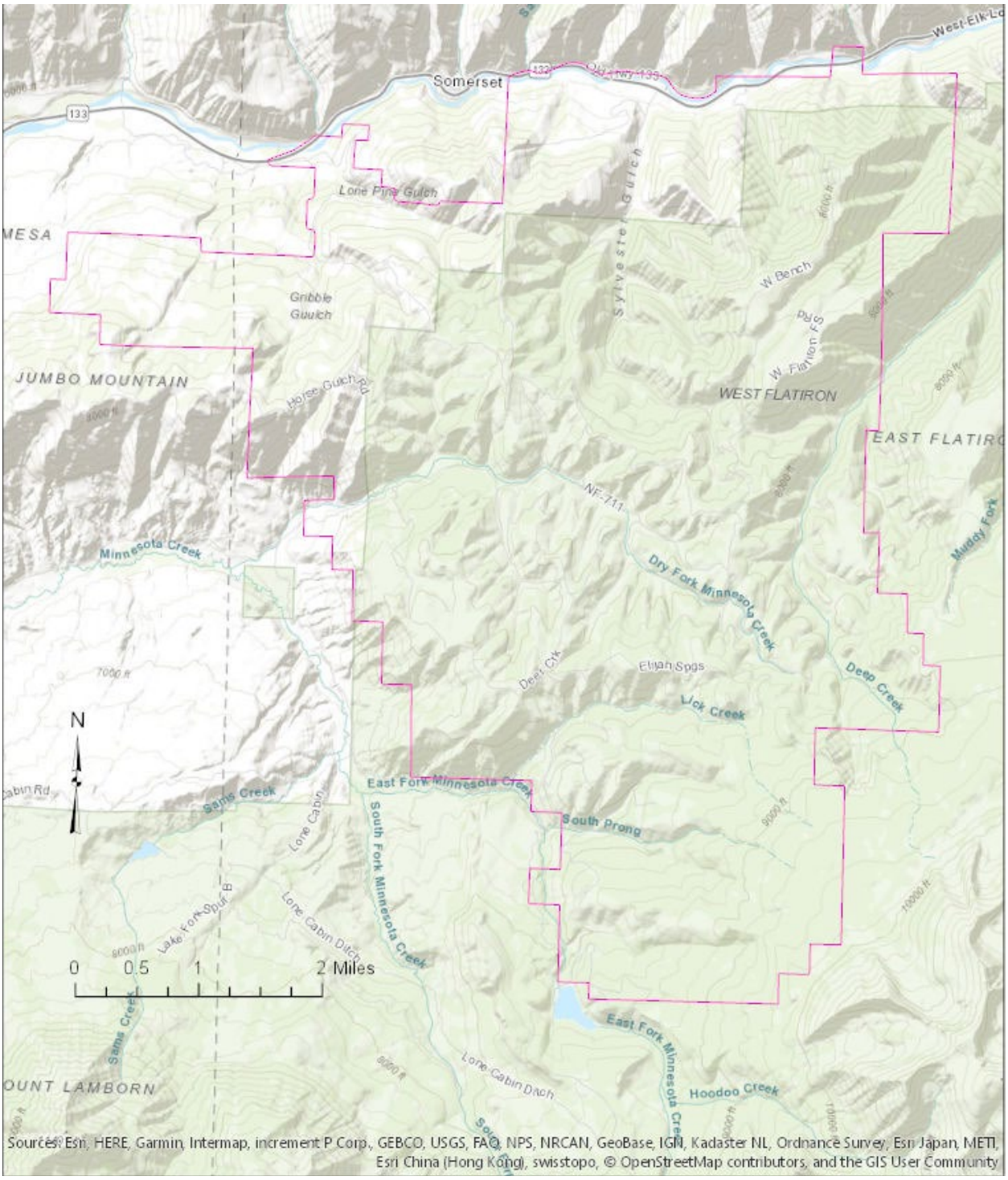

Figure 1: Approximate location of the West Elk Mine permit area

Cultural and Historic Resources - Rule 2.04.4 and 2.05.6(4)

Cultural and historic resources are discussed in Section 2.04.4 of the permit application packet (PAP). Records from the Historic Buildings and Sites file of the Colorado Historical Society and the Archaeological Survey file of the Office of the State Archaeologist were reviewed for previously recorded sites. No evidence was found indicating the existence of known sites in the vicinity of the mine. An archaeological reconnaissance was also conducted. Field studies, laboratory operations, and report preparation were completed by an archaeological team from Fort Lewis College in Durango, Colorado. This report can be found in Exhibit 10 of the permit document. No sites were found as a result of the field study.

Additional surveys for Jumbo Mountain were completed by Western Cultural Resource Management, Inc. (WCRM, Inc.) during October and November 1993. Map 7A shows the areas surveyed during the field reconnaissance. A literature search was conducted by WCRM, Inc. in September 1993. That search identified 15 cultural resource reports. Those reports are listed in Exhibit 10A. Exhibit 10B contains the results of the survey. Exhibit 11 contains clearance documentation from the State Historic Preservation Officer (SHPO).

A Class II Cultural Resource Assessment was conducted by Metcalf Archeological Consultants, Inc., with the results of the assessment contained in a report dated January 1995. This report was submitted with PR-6 and is contained in Exhibit 10C. The SHPO was contacted by the Division on August 21, 1995, and the SHPO indicated concurrence with the submittal.

The SHPO indicated in a letter to the Division dated October 5, 2007 that the Deep Creek Ditch was found to be ineligible for the National Register of Historic Places in 1996. The SHPO indicated in a letter to the Division dated September 8, 2008 that one cultural resources site had been recorded in the PR-14 project area. The site had been recommended as not eligible for listing in the National Register of Historic Places, but adverse effects to this site should be avoided until the site can be reevaluated and officially determined if it is eligible for listing. The letter was forwarded to MCC who acknowledged existence of the site by email on September 25, 2008 (PR-14 file). MCC has committed to stopping work wherever cultural or archaeological resources are discovered during surface disturbing activities until the SHPO can provide consultation (Section 2.04.4 of the permit application).

The State Historic Preservation Office indicated in a letter to the Division, dated February 15, 2011, that a finding of no historic properties affected is appropriate for Permit Renewal RN-6 because no new surface disturbance is proposed.

A Cultural Resource Survey was conducted by ERO Resources Corporation of Durango, CO, for the lands added to the permit area with PR-15. The survey was negative for cultural resources within the area of potential effect, and a determination of "no historic properties affected" was recommended. The report was added to the PAP as Exhibit 10f.

Geology - Rules 2.04.5 and 2.04.6

The applicant describes the geology of the permit and adjacent area in Section 2.04.6 of the PAP. Additional information is shown on Map 9, which details the geology of the permit area, as well as the coal outcrop line, and the strike and dip of the F, E and B Seams. Stratigraphic

information is shown on Maps 10 through 23.

The permit area lies on the southeast margin of the Piceance Basin and just south of Grand Mesa. The general geology of this area consists of gently (three to five degrees) north northeast dipping beds of sandstone, shale, and coal of upper Cretaceous and early Tertiary age.

The geologic formations exposed in the North Fork Drainage Basin consist of Late Cretaceous to Early Tertiary Age sedimentary strata, Tertiary Age igneous intrusives, and Quaternary Age alluvial and colluvial deposits. The units are described below in ascending order.

The Mancos Shale is the oldest stratum exposed in the region, and is of Late Cretaceous Age. This unit is composed of over 4,000 feet of gray marine shales and minor interbedded buff sandstones. This unit is highly erodible and unstable. Erosion and oversteepening of slopes in this formation produce the numerous rock falls and landslides observed in the lower North Fork Drainage Basin (Junge, 1978).

The Mesaverde Formation is of Late Cretaceous Age and conformably overlies the Mancos Shale. This formation consists of approximately 2,300 feet of marine and terrestrial sedimentary rocks. The Mesaverde Formation is the coal bearing formation in the region and is divided into five main members; the Rollins Sandstone, the Lower Coal Bearing (Bowie) Member, the Upper Coal Bearing (Paonia) Member, the Barren (Undifferentiated) Member (Johnson, 1948), and the Ohio Creek Member.

The Rollins Sandstone is a white to buff colored, well sorted, medium to fine grained sandstone, ranging from 150 feet to 300 feet thick. This sandstone is regionally extensive and resistant in outcrop and forms prominent cliffs.

The Lower Coal Bearing (Bowie) Member consists of 260 to 350 feet of interbedded gray shales, thin to thick lenticular beds of buff colored, fine to medium grained sandstones, and coals. Three coal horizons exist in this member: the A (Old King) horizon, the B (Somerset) horizon, and the C (Bear) horizon. The A horizon is immediately above the Rollins Sandstone and is not currently mined at any operation in the vicinity. The B horizon contains two coal seams and occurs about 20 to 120 feet above the Rollins Sandstone and has been mined by MCC. This horizon has also been mined at the Elk Creek and Bowie #2 Mines. The C horizon contains one coal seam that occurs 50 to 100 feet above the B horizon. This horizon has been mined at the Elk Creek Mine and was mined at the Bear No. 1 and 2 Mines. The top of the member is usually capped by a massive buff colored sandstone up to 90 feet in thickness. This sandstone, however, appears not to be a single persistent bed, but is actually several thick lenticular sandstones occurring at progressively lower stratigraphic horizons from east to west.

The Upper Coal Bearing (Paonia) Member consists of 200 to 500 feet of gray shales, interbedded, buff colored, lenticular sandstones, and coals. The top of this member is generally considered to be capped by a massive, cliff forming sandstone. Three coal horizons have been identified in the Upper Coal Member: the D (Oliver) horizon, the E (Hawk's Nest) horizon, and the F horizon. The D horizon occurs directly above the massive sandstone of the Lower Coal Bearing Member and contains three seams. This horizon was mined in the Bowie #1 and #2 Mines. The E horizon occurs about 130 feet above the D horizon and contains two coal seams. This horizon has been mined at the Hawk's Nest Mine and was mined at the Blue Ribbon Mine.

The West Elk Mine is mining the E Seam, but did not mine the E seam on Jumbo Mountain because this seam is split and comprised of several thin (< 5 ft.) coal benches which are separated by rock partings. The F horizon contains two coal seams and has been mined at the West Elk Mine. At the mine site, the coal is immediately overlain and underlain by shale. Coal seams of the F horizon do not exist to the north of the North Fork of the Gunnison River in thicknesses sufficient for mining. In the Jumbo Mountain area, the F Seam thins to less than five feet in thickness and is of limited aerial extent. Therefore, MCC does not plan to mine this seam in Jumbo Mountain.

Overlying the Upper Coal Member is the Barren Member of the Mesaverde Formation. This unit consists of interbedded sandstones, siltstones, shales, and coals. The unit is not thought to be of marine origin and, as a result, the sandstones and the coals are highly lenticular, discontinuous, and of limited lateral extent in outcrop. This unit ranges up to 1,500 feet thick and outcrops throughout most of the permit area.

The Ohio Creek Member is the uppermost member of the Mesaverde Group. This unit is approximately 700 feet thick and consists primarily of interbedded sandstone, mudstone, and shale. The sandstones range from a few feet to more than 100 feet in thickness and are generally lenticular in nature. Although typically fine to coarse grained, the sandstones may locally be conglomeratic.

The Mesaverde Formation is unconformably overlain by the Tertiary Age Rudy or Wasatch Formation. This formation consists of red to buff colored shales, red sandstones, and red to gray conglomerates. The sediments of this formation are weathered volcanic rocks.

Immediately south east of the permit boundary, igneous intrusives of Tertiary age form the laccolith of Mt. Gunnison.

The alluvium of the North Fork of the Gunnison River consists of Quaternary Age deposits of mixed coarse sand, cobbles and boulders. These coarse sediments are composed primarily of igneous and metamorphic rock types, and have their source area in the headwaters and upper reaches of the North Fork. This coarse alluvium is capped by finer sands and silts. The North Fork alluvium in the area of the Hawk's Nest, Bear, West Elk and Elk Creek Mines is fairly narrow in width and is between 50 and 70 feet thick. About a mile below the town of Somerset, Colorado, the width of alluvium increases while the thickness of alluvium decreases to about 35 feet.

Since the three main minable seams (B, E, and F) within the West Elk Mine's permit boundary directly overlie one another, their structural characteristics are virtually identical. The F Seam strikes north 60 degrees west and dips three to five degrees northeast across the lease blocks. In the Jumbo Mountain area, the B Seam has an average dip of 4.6 degrees in a north 25 degrees east direction. The major cleat orientation within the F and B Seams is north 70 degrees east. This face cleat is prominent and consistent throughout the existing F and B Seam workings. Fracture sets and cleat orientations of the E Seam are also the same. The major cleat direction in the nearby Bear and Elk Creek mines is from North 70 to 75 degrees east and is probably representative of the face cleat direction in the Jumbo Mountain area.

In March 1996, MCC experienced a large inflow of water in the B East Mains while mining

through a fault/fracture system. The inflow was estimated at approximately 350 gallons per minute (gpm) initially, increasing to a maximum of approximately 800 gpm from the roof and floor. The fault area is a series of small faults oriented in a N60E direction. The fault showed an apparent vertical displacement of 6 feet. In April 1996, MCC encountered the same fault in a subsequent entry, and the inflow was estimated to be a maximum of 2,500 gpm. The flows have since moved down-dip on the fault and were measured at less than 100 gpm in December 1998.

In January 1997, more than 8,000 gpm of water upsurged from the mine floor from a 10-foot cut through a fault area in the first Southeast Headgate off the Box Canyon Mains. Water flooded the mine and some equipment was lost. Water from this inflow was eventually pumped to the surface and discharged to the North Fork of the Gunnison River. Mine water inflow from this area also moved down-dip as the fault was mined through at topographically lower locations. At the end of 1998, the flow was approximately 130 gpm.

A significant fault oriented in a S60E direction was encountered by MCC during the initial development of the Sunset Trail Mains in early 2018. No significant inflows of water occurred. The fault is projected to the southeast on Map 9, but has not yet been well characterized.

Only minor faulting of limited vertical displacement has been observed in the Blue Ribbon, Bear, and Hawk's Nest Mines. However, in the Bowie #1 Mine, a fault with a displacement of 50 feet was encountered during mining. Drill hole data indicate the presence of other faults in the West Elk Mine life of mine area with similar displacements. One major fault has been encountered in the Elk Creek Mine. The faults which have been encountered in existing mines tend to be high angle, normal faults.

Hydrologic Balance - Rules 2.04.5, 2.04.7, 2.05.3(4), 2.05.6(3) and 4.05

Groundwater information can be found in Section 2.04.7 of the PAP. Additional information can be found on Map 34, which shows the location of the groundwater monitoring stations.

A description of groundwater occurrence and mining impacts on groundwater within the permit and adjacent areas can be found in the "Probable Hydrologic Consequences of Mining" section of this document and the "Cumulative Hydrologic Impact Study" document for the North Fork of the Gunnison area.

There are seven categories of potential aquifers that occur in the Somerset Coal Field. These are: 1) the alluvial and terrace deposits associated with the North Fork of the Gunnison River; 2) the localized, shallow alluvium along creeks tributary to the North Fork; 3) the discontinuous, lenticular and laminar sandstones of the Mesaverde Formation; 4) the Rollins Sandstone; 5) the coal seams; 6) shallow colluvial surficial deposits; and 7) fracture zones in bedrock.

Significant hydrogeologic units present within the West Elk Mine permit boundary include (from top to bottom) the Mancos shale, the Mesaverde Formation (including the Rollins Sandstone, Lower Coal Member, Upper Coal Member, and the Barren Member) and the colluvium and alluvium along the drainage side slopes and valley bottoms. These hydrogeologic units are depicted on Map 9 of the PAP.

With the exception of the Mancos shale (which has an extremely low permeability and acts as an

aquitard), groundwater is generally localized and of limited areal extent within these hydrogeologic units. The Mesaverde Formation is typically 2,500 feet thick at the mine and consists of sandstone, shale, clay, and interbedded coal. Within the members of the Mesaverde Formation, locally continuous permeable sands may contain groundwater which generally is recharged from the downward percolation of meteoric waters.

The most continuous sandstone of any significance in the region is the Rollins Sandstone of the Mesaverde Formation. The Lower Coal Member of the Mesaverde Formation contains the Upper and Lower Marine Sandstones which may locally produce significant quantities of water. The colluvium which overlies the Barren Member of the Mesaverde Formation consists of discrete, localized units which generally follow topography. The colluvial units recharge and discharge on a seasonal basis in response to snowmelt and precipitation events. The alluvium of the North Fork consists of mixed sand, cobbles, and boulders capped by finer sands and silts. The quantity of groundwater produced from the alluvial deposits is dependent upon the thickness and extent of the deposit.

Evidence shows that groundwater movement is controlled largely by fractures and topography. The West Elk Mine's experience in mining the F and B Seams indicates that groundwater inflows are associated with fractures and are seasonal. As discussed in the previous section of this document, a fault system was encountered while development mining in the B Seam, which produced as much as 8,000 gpm of groundwater inflow to the mine.

Groundwater use in the general area around the West Elk Mine is confined to shallow wells in the alluvium of the North Fork of the Gunnison River and its tributaries. No private, commercial, or industrial wells are presently located within or down-gradient adjacent the permit area, other than the infiltration gallery which supplies domestic water for the town of Somerset and the Elk Creek Mine.

A description of the surface water system can be found in Section 2.04.7 of the PAP. Supporting information is contained in Map 34, which illustrates the drainages associated with the West Elk Mine coal lease area; Map 37, which delineates the location of all known springs on the coal lease area, and Map 36, which shows the reservoirs and irrigation ditches associated with the Minnesota Creek Basin.

A description of the surface water occurrence and mining impacts on adjacent areas can be found in the "Probable Hydrologic Consequences of Mining" section of this document, and the "Cumulative Hydrologic Impact Study" document for this mine area.

All of the streams draining the West Elk Mine permit area are tributaries to the North Fork of the Gunnison River. Lone Pine Gulch and Gribble Gulch are ephemeral streams draining the northern portion of the permit area. Sylvester Gulch has perennial flows in its lower reaches through the mine area. Minnesota Creek and its tributaries, Horse Creek, South Prong, Lick Creek, Dry Fork, and East Fork, drain the southern portion of the permit area. Deep Creek drains the eastern portion of the permit area. Minnesota Creek enters the North Fork of the Gunnison River near Paonia. The overall drainage exhibits a dendritic drainage pattern with steep channels. Horse Creek, South Prong of the East Fork, and Deep Creek are perennial streams. Lick Creek, Upper Dry Fork, upper Sylvester Gulch and Gribble Gulch are ephemeral streams. Minnesota Reservoir controls much of the flow in the lower Dry Fork of Minnesota

Creek, and Beaver Reservoir controls the flow in the East Fork of Minnesota Creek. Lone Pine Gulch has no evidence of recent flow; therefore, no gaging station has been constructed. Even when all of the six gaged watersheds were found to be flowing, Lone Pine Gulch showed no flow or evidence of flow. Raven Creek flows through the extreme northeast corner of the permit area, but a stipulation of federal coal lease COC-67011 expressly forbids mining activities to expand the affected area into the riparian zone of the creek.

There are three different types of springs within the permit area: alluvial, colluvial, and bedrock springs. A study of the groundwater system at the West Elk Mine by Mayo & Associates found 83 different springs within the existing permit area in 1999. From the identified springs, 65% of the cumulative discharge volume comes from superficial springs in alluvium and/or colluvium. Only 5% of the discharge comes from units of the Upper and Lower Coal member. The flow rates of these springs are highly seasonal with peak flows occurring during wet weather conditions.

Reservoirs and stock ponds also occur within or near the permit area. Minnesota Reservoir, on the Dry Fork of Minnesota Creek, is centrally located within the coal permit area. Beaver Reservoir on the East Fork of Minnesota Creek is located near the southwestern boundary of the permit area.

In addition to the storage reservoirs in the area of the West Elk Mine, a total of 61 stock water impoundments have been identified in or adjacent to the permit area as of 2006. Map 37 of the permit document shows the locations of the known stock water ponds. These ponds generally do not represent adjudicated water rights or perennial flows. Within the Gunnison National Forest, the ponds are managed for seasonal use by the U.S. Forest Service.

Exhibit 32B of the permit application describes wetlands and riparian areas in the permit area. There are estimated to be approximately 77 acres of wetlands (as defined by the U.S. Army Corps of Engineers) in the permit area. Most of the wetlands are found in drainage channels, although there are small, isolated wetlands on the hillsides where springs and seeps locally emerge as a result of landslides/sumps. There are an estimated 104 acres of riparian areas in the permit area.

Climatological Information - Rule 2.04.8

Information regarding climate characteristics can be found in Section 2.04.3 and 2.04.8 of the PAP.

The mine site lies within the North Fork valley near Somerset, Colorado. At the mine site, the valley is narrow and steep sided and follows a general east-west orientation. Considerable topographic variation across the mine site, and west central Colorado in general, results in marked fluctuation in seasonal and average precipitation and temperature values for the entire area.

The mountains of the Continental Divide provide an effective barrier to the movement of moisture-laden air that reaches the eastern slope of the Rocky Mountains from the Gulf of Mexico. Under this influence, two basic types of climate, semi-arid and undifferentiated highlands, are characteristic of the general area where the mine is situated. Temperatures can

range below freezing in the winter, and yet in the summer, with the exception of higher elevations, can be extremely warm. The precipitation that does fall, originates from the Pacific Ocean weather systems, and most frequently occurs in the winter.

Average annual precipitation ranges from approximately ten inches along the North Fork of the Gunnison River and the lower portion of Minnesota Creek to as much as 24 inches on the flanks of Mount Gunnison. The majority of precipitation falls as snow during the winter months, while the sparse summer precipitation consists of isolated thunderstorms.

Vegetation - Rule 2.04.10

Specific information regarding collection and analysis of vegetation can be found in Section 2.04.10 of the PAP. The distribution of the land and vegetation types can be found on Maps 42 and 43 of the PAP.

The West Elk Mine collected baseline vegetation information in 1975, 1976, and 1993 for a study area which extends approximately one mile outside the permit boundary and mine plan boundary. This area is approximately 25,560 acres in size. This survey identified ten vegetation types and six land types. They are as follows: 1) Aspen, comprising 19 percent of the study area; 2) Douglas fir, comprising four percent of the study area; 3) Wet Mixed Shrub, comprising 50 percent of the study area, dominated by serviceberry and Gambel oak; 4) Dry Mixed Shrub, comprising 10 percent of the study area, distinguished by serviceberry, Gambel oak, Mountain mahogany, Cliff findlerbush, and bitterbrush; 5) Oak, comprising one percent of the study area, including Gambel oak and the larger size oak individuals (15-20 ft in height), which are limited to the bottom of permanent stream drainages; 6) Juniper, comprising five percent of the study area, which includes Rocky Mountain Juniper and Utah Juniper; 7) Riparian, comprising two percent of the study area, 8) Sagebrush, comprising six percent of the study area; 9) Wet Meadow, comprising one percent of the study area, distinguished by open boggy areas along major drainages above 7,000 feet and openings in brushy or forested areas at elevations above 8,000 feet, occupied by herbaceous species such as sedges and false hellebore; 10) Dry Meadow, comprising one percent of the study area which is dominated by various shrub species such as snowberry, Douglas rabbitbrush, and Gambel oak; 11) Barren Terrain, comprising less than one percent of the study area which was identified by no apparent vegetation cover; 12) Chained Area, comprising less than one percent of the study area, is so named because the area has been mechanically treated by chaining to remove tall shrub species and has been trenched along the contours and planted to ponderosa pine; 13) Reservoir, comprising less than one percent of the study area and includes Beaver Reservoir and Minnesota Reservoir; 14) Residential, comprising less than one percent of the study area and includes the town of Somerset; 15) Industrial, comprising less than one percent of the study area which includes the Elk Creek Mine, the Bear No. 3 Mine, railroad sidings, and mine vents; and 16) Agricultural, comprising less than one percent of the study area.

The two vegetation types that occur within the area to be affected by surface facilities are a dry meadow type and a moist, mixed shrub type.

In 1996, a baseline vegetation study of the Sylvester Gulch facilities area was conducted. The report is presented in Exhibit 32A of the permit document. The study area for the baseline survey incorporated the lower drainage basin of Sylvester Gulch from the mine access road south

approximately 1.75 miles along the drainage. The three lower drainage branches of Sylvester Gulch were included. The study area was a linear corridor, including the drainage bottom, terraces and sideslopes, averaging 300 feet wide. The study area also included the steep slope west of the Sylvester Gulch channel and north of the Dry Meadow Reference Area.
Five major vegetation communities were identified in the Sylvester Gulch facilities expansion area: oakbrush, aspen, riparian, dry meadow, and Douglas fir communities. The first three of these communities were sampled for vegetative cover, vegetative productivity, woody plant density and species composition. The dry meadow community was found to be significantly altered by cattle grazing within the study area. Since this community had been sampled previously, no further data was collected. The Douglas fir community was anticipated to be impacted to a minor degree with disturbance in this community limited to less than five percent of the affected area. Therefore, no quantitative data was collected for the Douglas Fir community.

Additional information on vegetation in the PR-14 project area is contained in the copy of the Federal Environmental Impact Statement for the Deer Creek Shaft and E Seam Methane Drainage Wells Project which can be found in Exhibit 79 of the permit application.

With PR-15, Map 42 was updated to provide information about the vegetation communities in the expanded permit area.

Fish and Wildlife - Rule 2.04.11

Numerous wildlife species inhabit the general area. The most predominant are mule deer, American elk, and black bear. Other species include: coyotes, long-tailed weasels, desert cottontails, snowshoe hare, beaver, raccoon, Red squirrel, woodrat, ringtails, yellow marmots, ermine, skunk, muskrat, badger, porcupine, bobcat, white-tailed jackrabbit, marten, mink, red fox, grey fox, spotted skunk, deer mouse, long-tailed vole, golden-mantled ground squirrel, chipmunk, red-backed vole, rock squirrel, western jumping mouse, masked shrew, wandering shrew, various songbirds, upland gamebirds, waterfowl, and raptors.

There is no designated critical habitat in the permit area. However, the U.S. Fish and Wildlife Service has proposed 2,094 river miles of the Colorado River and its tributaries as critical habitat for the Colorado Squawfish, Razorback sucker, Humpback chub, and Bonytail chub. These species, on the Federal and State candidate and listed species, have the potential of occurring on the study area or could be affected by a lease and subsequent coal development. None of the fishes occur on the study area or in the North Fork of the Gunnison River.

The Colorado Division of Wildlife has established a corridor along the North Fork of the Gunnison River for use by the bald eagle (*Haliaeetus leucocephalus*), which is a common winter visitor to Colorado. BLM inventories conducted in 1978 through 1980, and monitoring flights conducted through 1985, did not locate any roost or nest sites, or areas of winter concentration on or near the study area. The possibility exists for nesting to occur along the North Fork of the Gunnison River.

Loggerhead shrike (*Lanius ludovicianus*, a Federal category 2 species) use has not been recorded on the study area, although potential breeding and nesting habitat is present. Loggerhead shrikes

are dependent upon sagebrush and gambel oak shrub communities for breeding and nesting habitat in this region during spring and summer. They are uncommon in the area during winter.

For specific information regarding study areas, methods for identification and counting of the various wildlife present in the area, see Section 2.04.11 of the PAP.

Additional information on fish and wildlife in the PR-14 project area is contained in the copy of the Federal Environmental Impact Statement for the Deer Creek Shaft and E Seam Methane Drainage Wells Project which can be found in Exhibit 79 of the permit application.

Additional information on fish and wildlife in the PR-15 project area can be found in the habitat and wildlife reports in Exhibit 40, which were incorporated into the Supplemental Final Environmental Impact Statement for Federal Coal Lease Modifications COC-1362 and COC-67232.

Description of the Operations and Reclamation Plans - Rules 2.05.3 and 2.05.4

Mining at the West Elk Mine began in 1982. The West Elk Mine leasehold consists of mineable coal reserves in seven Federal coal leases, one private lease and other fee coal properties. The mine permit area encompasses approximately 19,854.9 acres. Coal production in 2017 was 4.9 million tons, with 3-6 million tons of production projected annually from 2018 through 2023. Coal is produced using the longwall mining method.

Six major coal seams exist within the West Elk Mine permit boundary. The seams are identified by the letters A through F, in ascending stratigraphic order. The seams are separated by shale, siltstone, and sandstone beds that vary in thickness from 15 feet to more than 250 feet. MCC's leasehold has economically minable coal reserves in two of the seams, the B-seam and the E-seam. Mining was by room-and-pillar methods until 1992 when longwall mining began in the northern B-seam. A new longwall was acquired in 2008 for mining in the E-seam, and is intended to be used for future mining in the southern B-seam.

MCC mined in the F-seam from 1982 to 1991 in leases D-004569 and C-0117192. This mining was only marginally successful. Poor mine roof conditions, sandstone channels, low coal areas, poor coal quality areas, and other unfavorable conditions have negatively affected mining and rendered the F-seam uneconomic under past and present market conditions. Mining in the F-seam has been discontinued, pending improved economics for this seam. Existing workings in the F-seam are shown on Map 50 of the PAP.

In April 1989, an application for a technical revision for an incidental boundary change to add 35.5 acres to the permit area was submitted. The revision was for access and associated activities by way of slopes and a ventilation shaft from inside the existing F-seam workings to the B-seam. The revision also included mining in the B-seam by room and pillar, as well as longwall mining methods. The 35.5-acre incidental boundary change was necessary to accommodate the B-seam main access entries. The Division subsequently issued a proposed decision to approve the revision on July 12, 1989.

The mine plan for the B-seam is shown on Map 52 of the PAP. Mining has been completed in the northern B-seam reserves (in leases D-044569, CO-117192, COC54558 and COC-67011),

but recoverable reserves totaling an estimated 31.4 million tons remain in leases COC-56447, COC-67232 and C-1362. Since recoverable reserves in the E-seam overlie the projected B-seam panels, it is intended that most of the remaining E-seam reserves be mined out before returning to the southern B-seam reserves by new rock slope entries from the E-seam workings, as approved in TR-137.

In January 2000, elevated levels of indicator gases showed there was probable combustion in gob in a mined-out area of the B-West mains. Operations were curtailed and MCC immediately began an operation to access the B-seam by drilling into the mine from the Apache Rocks area above. Approval was obtained from both the Division and the US Forest Service to initiate a drilling program in that area. Nineteen 4-inch boreholes were drilled for locating the combustion area and water was pumped into that part of the workings. In the spring of 2001, the Mine Safety and Health Administration (MSHA) gave MCC permission to curtail the pumping of water, so the company completely sealed off the area underground and initiated the approved reclamation of the disturbed ground on the surface.

A second episode of elevated levels of gas occurred in the mine in late 2005, necessitating the drilling of several boreholes from the surface to the B-seam workings in the Box Canyon area. Approval was obtained for the construction of roads and drilling the boreholes. Water and foam were pumped down into the workings and mining resumed within approximately three months.

The mine plan for the E-seam is shown on Map 51 of the PAP. MCC maintains active development entries in the E-seam in leases COC-56447, D-044569, and C-1362. These entries provide access to E-seam longwall panels 1 through 12 (LWE1-12), in lease C-1362 in the South of Divide area, as approved in PR-10, and in lease COC-67232 in the Dry Fork area, as approved in PR-12; to panels LWSS1-4 in modified leases C-1362 and COC-67232 in the Sunset Trails area, as approved in PR-15; and to panel LWE14, as approved in TR-146. As of the date of these findings, mining has been completed in panels LWE1-8, LWSS1 and LWSS2, and is in progress from west to east in panel LWE14. Development mining of the LWSS3 panel is in progress.

CO-2020-001 was issued on June 18, 2020, prohibiting any further surface disturbing activities in the Sunset Roadless area, including previously approved disturbances associated with longwall panels LWSS1, LWSS2, LWSS3, and LWSS4. While CO-2020-001 remained in place, MCC were permitted to access and continue operations in longwall panel LWSS1 and to conduct maintenance and surface stabilization activities in longwall panel LWSS1 to prevent any off-site impacts pursuant to the Colorado Surface Coal Mining Reclamation Act. MCC were also permitted to conduct ground stabilization activities in longwall panels LWSS2, LWSS3, and LWSS4. On October 19, 2021 MCC submitted Minor Revision No. 456 (MR-456), which revised previously approved permit text and maps and eliminated all proposed disturbances in longwall panels SS-2, SS-3, and SS-4 in the Sunset Roadless area. With the Division's approval of MR-456, MCC is no longer permitted to conduct ground disturbing activities in the Sunset Roadless area, rendering CO-2020-001 moot. CO-2020-001 was terminated on January 12, 2022. Any new proposed ground disturbing activities in the Sunset Roadless area would require the submittal and approval of a Technical Revision. MCC does not maintain legal right of entry for the Sunset Roadless area.

MCC access the E-seam through the mine's existing F to B seam slopes and utilize the existing surface facilities near State Highway 133; consequently, no additional surface facilities or associated surface disturbance were proposed in PR-10 or PR-12. Surface disturbance and drilling of methane drainage wells in E-seam panel 1 (LWE1) was approved in TR-111. E-seam mining of longwall panels 10, 11, and 12 (LWE10-12) was approved in PR-6; it is intended that these will be the final panels to be mined.

No major buildings, major structures, occupied dwellings, cemeteries, parks, railroads or highways overlie the coal to be mined. Two reservoirs lie close to the F-seam outcrop; however, neither is directly over the coal to be mined.

Surface facilities at the West Elk Mine are shown on the Map 53 series of the PAP. State Highway 133 provides the access to the main facilities area of the mine. A haul road joins the highway east of the Lower Refuse Pile (LRP) and serves as the access to most facilities and the mine portals. An old haul road accesses the silo storage area and other lower mine facilities, which is now considered an access road. Other access roads include the middle-mine facilities road and the Sylvester Gulch fan road, and the Sylvester Gulch extension. The Lone Pine Gulch road has been designated as a light-use road and provides access to the former site of a ventilation fan.

Power to the mine is supplied via existing lines of the Delta-Montrose Electric Association. Power is stepped down at a substation in the main mine facilities area for powering underground operations and the surface facilities.

Ventilation in the mine is provided by a fan in Sylvester Gulch (PR-7), and a vent shaft in Deer Creek, just to the east of Minnesota Reservoir (TR-109), as well as numerous Mine Ventilation Boreholes (MVBs) which are constructed in advance of mining and are operated so as to control the partial pressure of methane in the air inside the mine. Between 1995 and 2001 ventilation to the B-seam workings was provided by the Lone Pine Fan. Mining ceased in the Lone Pine portion of the mine in early 2001 and the workings served by the fan portal were sealed off underground. The Lone Pine Portals were sealed in 2001 (TR-93).

MCC occasionally uses a relatively small quantity of explosives for blasting for underground construction. The explosives are stored in an explosives magazine located in the main facilities area of the mine.

The West Elk Mine portals are located at an approximate elevation of 6,450 feet. Run-of-mine coal is transported from the production panels to the various surface facilities by a system of belt conveyors. A conveyor carries coal from inside the mine portal to the stacking tubes. From the stacking tubes, an underground conveyor reclaim system transports the coal to the two crushers. A conveyor then moves the coal from the crushers to the two storage silos. A stack-tube located to the east of the silos provides additional storage for product coal. A loadout conveyor carries coal from the storage silos to the over-the-track loadout. A portion of this conveyor is completely enclosed where it crosses the North Fork of the Gunnison River and Highway 133. Coal is shipped from the West Elk Mine mainly by rail, although some coal is either trucked from the mine or is transferred to various handling or stockpile facilities on the mine site.

Coal mine waste at the mine is generated during underground construction activities and mining. Other sources of coal mine waste are contaminated coal spillage, material cleaned out of sediment ponds, and soils contaminated with non-hazardous materials. These other sources of waste comprise only a small portion of the coal mine waste produced at the mine. Coal mine waste is currently being processed in a plant that MCC constructed on the Lower Refuse Pile (LRP). The processing plant and an adjacent coal stockpile and laboratory were approved in TR-118. The refuse generated by the processing plant was initially disposed of in a permanent coal mine waste pile called the Refuse Pile Expansion area (RPE). This is a 20 acre site to the east of the LRP, and is east of Sylvester Gulch. The level area on top of the RPE is used as an equipment lay down area and the slopes have been topsoiled and seeded. As the RPE neared its design capacity, a new refuse pile, the Refuse Pile Expansion East (RPEE) was approved for construction with TR-120 (and re-designed with TR-127 and TR-133), in the drainage immediately east of the RPE. Material is transported to and from the RPEE by haul truck. An Upper Refuse Disposal Area has also been approved for construction, but has not been built. Although MCC has verbally indicated this pile will not be needed, Stipulation #7 requires MCC to complete a geotechnical investigation prior to constructing the pile.

Surface runoff from the disturbed area is treated by six ponds (MB-3, MB-4, MB-5E, NSSA, RPE pond, and SG-1) and a number of small area exemptions (SAEs), two additional ponds (FW-1 and FW-2) are used for water storage. Surface water and sediment control structures are shown on the Map 54 series of the PAP, and designs are given in Exhibits 66 and 70. MB-3 is a small lower pond which treats drainage from the silo storage area. MB-4 serves the train loadout area. MB-5E is a large 2-celled pond which can accept mine water and treated discharge from the wastewater treatment plant, and provide some storage, as well as treat stormwater runoff. The NSSA pond treats runoff from the North Soil Storage Area. RPE pond is a 2-celled pond that treats runoff from the RPE and RPEE. SG-1 is located within Sylvester Gulch to treat runoff from the disturbed area associated with ventilation shafts.

Topsoil and subsoil storage areas are located around the disturbed areas and are shown on the Map 53 series of the PAP. The main topsoil stockpile is to the south of the run-of-mine coal stack pad, and will be used during reclamation to cover the majority of the disturbance to a depth of 12 to 18 inches. Other significant topsoil and subsoil piles are located north of Highway 133 in the North Soil Storage Area (NSSA), south of the potable water tank, south of the Materials Storage Bench (MSB), adjacent to the Sylvester Gulch haul road, and adjacent to the RPEE haul road.

Of the 19,854.9 acres in the permit area, 554.53 acres are approved to be disturbed, which primarily includes long-term surface facilities, and MVB pads and roads. Exhibit 80 of the PAP contains details of the MVB pads and roads, as well as other drill holes. The further construction of approved MVB pads and roads within the Sunset Roadless Area is prohibited by Cessation Order CO-2020-001, which was issued on June 18, 2020.

Upon cessation of mining at the West Elk Mine, reclamation will return the disturbed land to rangeland and wildlife habitat land use. Some reclamation activities (particularly of MVB pads and roads) will occur during the life of the mine as areas cease to be used for mining activities. Final reclamation includes sealing the mine portals, removing the surface facilities, and returning all disturbed areas to the approximate original contour. The waste pile will be shaped to blend into adjacent topography. The mine area will be smooth-graded, and compacted areas will be

ripped or scarified to eliminate slippage surfaces, establishing a suitable bond for the overlying seedbed material. Topsoil, which has been salvaged during construction of the surface facilities, will be redistributed over the disturbed area. Drainage control will be retained until the revegetation operation is underway and erosion is under control. Following the distribution of topsoil and final grading, the newly shaped surface will be prepared for planting. Surface preparation will include loosening and roughening the surface by disking, harrowing, or dragging. Various conditioners and neutralizers may be used to modify the seedbed conditions to ensure successful establishment of a vegetative cover. The site will then be planted using West Elk's Permanent and Riparian Seeding mix. Various species of shrubs will also be planted.

Findings of the Colorado Division of Reclamation, Mining and Safety
for the
West Elk Mine

Explanation of Findings

Pursuant to Rule 2.07.6(2) of the Regulations of the Colorado Mined Land Reclamation Board for Coal Mining, and the approved state program, the Division of Reclamation, Mining and Safety or the Board must make specific written findings prior to issuance of a permit, permit renewal or permit revision. These findings are based on information made available to the Division that demonstrates that the applicant will be able to operate in compliance with the Colorado Surface Coal Mining Reclamation Act and the Regulations promulgated pursuant to the Act.

The findings in the following sections required by Rule 2.07.6(2) are listed in accordance with that Rule. The findings and specific approvals required pursuant to Rule 2.07.6(2)(m) are listed in accordance with Rule 4 and are organized under subject or discipline subtitles.

This findings document is updated upon permit renewal, which occurs every five years for most mines. This is the renewal findings document for the West Elk Mine, which has a five year permit term. The following findings were reevaluated and updated if necessary to reflect changes which have occurred during the past permit term. Any stipulations from the original permit and findings document or subsequent revisions that have been totally resolved to the satisfaction of the Division, have been removed from this document.

Section A - Rule 2.07.6

1. The permit application is accurate and complete. All requirements of the Act and these rules have been complied with (2.07.6(2)(a)).

2. Based on information contained in the permit application and other information available to the Division, the Division finds that surface coal mining and reclamation can be feasibly accomplished at the West Elk Mine (2.07.6(2)(b)).

3. The assessment of the probable cumulative impacts of all anticipated coal mining in the general area on the hydrologic balance, as described in 2.05.6(3), has been made by the Division. This assessment entitled *Cumulative Hydrologic Impact Assessment, North Fork of the Gunnison River* is available for inspection at the offices of the Division. The Division finds that the operations proposed under the application have been designed to prevent damage to the hydrologic balance outside the proposed permit area. Please refer to Section B.III (Hydrologic Balance) of this document for additional discussion of the predicted hydrologic consequences of mining operations at the West Elk Mine (2.05.6(3) and 4.05).

4. The Division finds that the affected area is, subject to valid rights existing as of August 3,

1977, not within:

a) An area designated unsuitable for surface coal mining operations (2.07.6(2)(d)(i));

b) An area under study for designation as unsuitable for surface coal mining operations (2.07.6(2)(d)(ii));

c) The boundaries of the National Park System, the National Wildlife Refuge System, the National System of Trails, the National Wilderness Preservation System, the Wild and Scenic Rivers System including rivers under study for designation, and National Recreation Areas (2.07.6(2)(d)(iii)(A));

d) Three hundred feet of any public building, school, church, community or institutional building, or public park (2.07.6(2)(d)(iii)(B));

e) One hundred feet of a cemetery (2.07.6(2)(d)(iii)(C));

f) The boundaries of any National Forest unless the required finding of compatibility has been made by the Secretary of the U.S. Department of Agriculture (2.07.6(2)(d)(iii)(D)).

The proposed operation (portions of the lease areas) is within the boundaries of Grand Mesa, Uncompahgre and Gunnison National Forests. The Secretary of Interior has approved this by indicating that West Elk leases within the Forests are suitable for underground coal mining. Refer to the OSM 1981 Mine Plan Approval, the BLM Report of Coal Unsuitability Criteria and a letter from the U.S. Forest Service dated October 3, 1986, concurring with West Elk's Mining Plan (2.07.6(2)(d)(iii)(D)). Refer also to a letter written by the BLM on March 8, 2005, stating that MCC's plan is adequate to meet all current Federal regulations regarding the Resource Recovery and Protection Plan (R2P2). Refer also to the Coal Unsuitability Analysis for Jumbo Mountain Coal Lease, prepared by the Uncompahgre Basin Resource Area of the BLM, which includes an Environmental Assessment. The Apache Rocks Permit Revision is addressed by the U.S. Forest Service in their letter of December 5, 1995, and by the BLM in their letter of November 24, 1995. The Box Canyon Permit Revision is addressed by the U.S. Forest Service in their letter of January 6, 2000, and by the BLM in their letter of December 10, 1999. The South of Divide area (PR-10) is addressed by the U.S. Forest Service in their letter of April 27, 2006. The Dry Fork lease area (PR-12) is addressed by the U.S. Forest Service in their letter of October 15, 2007, and by the BLM in their letter of October 10, 2007. The E-seam methane drainage wells for longwall panels 1 (TR-111) and 2 through 12 (PR-14) are addressed by the U.S. Forest Service in their letter of June 6, 2008. Exploration drilling in Dry Fork Area and on Lion’s Mesa (MR-352) was addressed by the U.S. Forest Service in their memo of May 8, 2009. Revisions to Methane Drainage Wells on panels E3 and E4 (TR-121) were addressed by the U.S. Forest Service in their memo of May 28, 2009. Further revisions to Methane Drainage Wells on panel E3 (TR-123) were addressed by the U.S. Forest Service in their letter of January 3, 2011. Further revisions to Methane Drainage Wells on panel E4 (TR-129) were addressed by the U.S. Forest Service in their letter of June 13, 2012. Revisions to Methane

Drainage Wells on panel E5 (TR-130) were addressed by the U.S. Forest Service in their letter of April 15, 2013. Revisions to Methane Drainage Wells on panel E6 (TR-135) were addressed by the U.S. Forest Service in their letter of July 22, 2014. Further revisions to Methane Drainage Wells on panel E6 (TR-136) were addressed by the U.S. Forest Service in their letter of January 20, 2015. Further revisions to Methane Drainage Wells on panel E6 and E7 (TR-138) were addressed by the U.S. Forest Service in their letter of May 18, 2016. Revisions to MVBs on panel E8 (TR-145) were addressed by the U.S. Forest Service in their emails of June 4 and 5, 2018. The Sunset Trails permit revision (PR-15) was addressed by the U.S. Forest Service in their Supplemental Final Environmental Impact Statement published on September 7, 2017.

g) One hundred feet of the outside right of way line of any public road except where mine access or haul roads join such line, and excepting any roads for which the necessary approvals have been received, notices published, public hearing opportunities provided, and written findings made [2.07.6(2)(d)(iv)]. The West Elk mine permit area is within 100 feet of the outside right of way line of State Highway 133 and Forest Service road 711.

At an informal conference held May 12, 1981, in Paonia, Colorado, to review public input on the proposed West Elk Mine, no mention of any concern with the location of the surface facilities in relation to the existing or proposed right of way of State Highway 133 was expressed or implied.

The Colorado Department of Highways approves the location of the West Elk Mine within 100 feet of the outside right of way.

On August 6, 1981, the Division granted a variance from the road distance requirement of Rule 2.07.6(2)(d)(iv).

The Division's notice of proposed decision approving the variance was published June 29, 1981, and no comments were received during the ten day public comment period, which expired on July 8, 1981.

MCC's public notice for PR-14 indicated Forest Service Road 711 will be within the affected area and a public hearing may be requested for determining whether the interests of the public and affected landowners will be protected. No public hearing was requested.

h) Three hundred feet of an occupied dwelling unless a written waiver from the owner has been provided (2.07.6(2)(d)(v)).

5. On the basis of information submitted by MCC in the form of Exhibit 11, and confirmation letter from the SHPO dated March 18, 1998, the Division finds that subject to valid existing rights as of August 3, l977, the mining operation will not adversely affect any publicly owned park or place listed on or eligible for listing in the National Register of Historic Places as determined by the State Historic Preservation Office [2.07.6(2)(e)(i)]. This was confirmed by the SHPO for PR-12 in a letter dated October 5, 2007 and for PR-

14 in a letter dated September 8, 2008.

The same finding was confirmed for PR-15 on the basis of information submitted by MCC in the form of a Negative Results Report of a Cultural Resource Survey, conducted by ERO Resources Corporation of Durango, CO (added to the PAP as Exhibit 10f).

6. The operator proposes no surface mining of coal; therefore, the documentation specified by Rule 2.03.6(2) is not required [2.07.6(2)(f)].

7. On the basis of evidence submitted by the applicant and received from other state and federal agencies as a result of the Section 34-33-114(3) compliance review required by the Colorado Surface Coal Mining Reclamation Act, the Division finds that MCC, as of December 27, 2021 does not own or control any operations which are currently in violation of any law, rule, or regulation of the United States, or any State law, rule, or regulation, or any provision of the Surface Mining Control and Reclamation Act or the Colorado Surface Coal Mining Reclamation Act [2.07.6(2)(g)(i)]. MCC's compliance review information was verified through the use of OSM's AVS.

8. MCC does not control and has not controlled mining operations with a demonstrated pattern of willful violations of the Act of such nature, duration, and with such resulting irreparable damage to the environment as to indicate an intent not to comply with the provisions of the Act (2.07.6(2)(h)).

9. The Division finds that surface coal mining and reclamation operations to be performed under this permit will not be inconsistent with other such operations anticipated to be performed in areas adjacent to the permit area (2.07.6(2)(i)).

10. The Division estimates the reclamation liability for mining operations in this permit term to be $11,371,768. Following the approval of RN-08, $11,371,768 will be the required surety. The Division currently holds a $15,000,000.00 performance bond for the West Elk Mine, which is in excess of the required surety (2.07.6(2)(j)).

11. The Division has made a negative determination for the presence of prime farmland within the part of the permit area that existed prior to PR-10, based on a letter dated October 10, 1980, from the Soil Conservation Service that demonstrates that no prime farmland mapping units are found within the permit area, updated with letters from the US Forest Service and the Natural Resources Conservation Service on November 23, 2005, finding no prime farmland within the West Flatiron lease area. The Division made a negative determination for the presence of prime farmland within the parts of the permit area proposed for addition in PR-12 and PR-15, based on the absence of land that has historically been used for cropland [2.07.6(2)(k)].

12. The Division has made a negative determination regarding alluvial valley floors within the permit area [2.07.6(2)(k) and 2.06.8(3)(c)].

For additional findings concerning alluvial valley floors please see Section B, XVII.

13. The Division hereby approves the post mining land uses of rangeland and wildlife habitat

for this operation. It was determined that these uses meet the requirements of Rule 4.16 for the permit area [2.07.6(2)(1)].

14. Specific approvals have been granted or are proposed. These approvals are addressed in the following section, Section B [2.07.6(2)(m)].

15. The Division finds that the activities proposed by the applicant would not affect the continued existence of endangered or threatened species or result in the destruction or adverse modification of their critical habitats (2.07.6(2)(n)).

16. The Division has contacted the OSM Fees Branch. As of the date of these findings, MCC is current in the payment of reclamation fees required by 30 CFR Chapter VII, subchapter R [2.07.6(2)(O)]. MCC's compliance information was verified through the use of the AVS on June 1, 2022.

Section B - Rule 4

I. Roads - Rule 4.03

A. Haul Roads

1. No roads on the West Elk Mine site are specifically designated or utilized as only haul roads. A majority of the roads are considered both haul and access roads. They are primarily used as access roads, but occasionally coal or coal mine waste is hauled across the road. This classification includes the following roads:

a. Main Haul/Access Road - from Highway 133 to the intersection with the Upper Mine haul/access road;
b. Upper Mine Haul/Access Road – from the Main haul/access road to the Portal access road;
c. Middle Mine Haul/Access Road – from the Main haul/access road to the breaker building
d. Sylvester Gulch Haul/Access Road – from the Main haul/access road to the Shaft 1 and 2 areas
e. Silo Haul/Access Road – around the silos and lower stack tube pad

As coal or coal mine waste may be hauled on the above roads, all of the roads have been designed, constructed and certified as haul roads. As-built certifications are provided in Exhibit 8A of the permit document. A discussion of the haul/access roads is found in Section 2.05.3 in Volume 1 of the permit document. The designs are in compliance with Rules 2.05.3 and 4.03.1. Haul/access roads are shown on Map 53 and 53B.

2. With the exception of a portion of the Sylvester Gulch Haul/Access Road, these haul/access roads will be reclaimed upon closure of the mine when the roads are no longer necessary. A portion of the Sylvester Gulch Haul/Access Road (from the Main haul/access road to the Sylvester Gulch fan) will be reduced to a light use road and will provide access to the fan site and areas to the south.

B. Access Roads

1. The West Elk Mine has three access roads which are considered access roads only. These include the Sylvester Gulch Substation Access Road, the Portal access road, and the Materials Storage Bench access road, which are shown on Map 53 and 53B. Access roads are properly certified. These certifications are provided in Exhibit 8A of the permit document. A discussion of the access roads can be found in Section 2.05.3 in Volume 1 of the permit document. The designs are in compliance with Rules 2.05.3 and 4.03.2.

2. All of these roads will be reclaimed upon closure of the mine when the roads are no longer necessary.

C. Light-Use Roads

1. The West Elk Mine has numerous light-use roads at the site, within and above the facilities area and on Jumbo Mountain to access monitoring sites and the water tank, the Lone Pine Gulch fan road and roads to the south for MVB pads and the "thermal event area." The designs, except for some preexisting roads, are in compliance with Rules 2.05.3 and 4.03.3.

II. Support Facilities - Rule 4.04

A. Construction of support facilities did not result in any damage to any protected structures. Therefore, the Division proposes to approve those activities [4.04(6)].

III. Hydrologic Balance - Rule 4.05

A. Water Quality Standards and Effluent Limitations

1. There are six sediment ponds at the West Elk Mine that treat drainage from the disturbed area. These ponds function as designed to ensure compliance with the water quality standards and effluent standards specified in CDPS Permit No. CO-0038776.

2. Previously, underground mine water has been pumped to the ground surface, passed through a polishing pond, and then discharged into Sylvester Gulch at CDPS outfall 017. Although CDPS Permit No. CO-0038776 continues to allow for mine water to be discharged from outfall 017, in practice MCC avoids doing so.

3. The Division proposes to exempt specific small areas from the use of sediment ponds for the following reasons: each area is of limited size, ponds and treatment facilities are not necessary for drainage in each area to meet the effluent limitations of Rule 4.05.2 and applicable State and Federal water quality standards for receiving streams, and no mixing of surface drainage with a discharge from underground workings will occur. The following areas are exempted: the Sylvester Gulch fan site, an area located downstream from the MB-5E pond, the 1.2 million gallon water tank, the area surrounding the raw water intake gallery, the Shaft 3 area, the drill pads utilized at the "thermal event" area, the drill pads at MVBs, the sites of the former Lone Pine substation and Lone Pine ventilation fan and associated facilities, the corrals laydown/staging area, and the Deer Creek Shaft area [4.05.2(3)(b)(i)].

B. Diversions and Conveyance of Overland Flow

1. Sediment control ditches have been designed and constructed in compliance with Rule 4.05.3. Locations are shown on the Map 54 series, and designs can be found in Exhibit 66. A summary of the designs can be found on Table 44 in Exhibit 66 of the PAP [4.05.3(2)].

C. Stream Channel Diversions

1. The West Elk Mine does not propose any stream channel diversions; therefore, this section is not applicable.

D. Sedimentation Ponds

1. Mountain Coal Company has constructed six sediment ponds and two freshwater ponds. The ponds have been designed, constructed and maintained in accordance with the requirements of 4.05.6 and 4.05.9. The location of these ponds can be found on the Map 54 series. The designs of the ponds can be found in Exhibit 66. The ponds are located as near as practical to the disturbed area and are not located within perennial streams according to 4.05.6(1)(b).

E. Acid-forming and Toxic-forming Spoil

1. Underground development waste from underground workings at the West Elk Mine is handled as coal mine waste and placed on the Lower Refuse Pile (LRP), Refuse Pile Expansion (RPE) and Refuse Pile Expansion East (RPEE). No acid-forming or toxic-forming materials are present in the waste in quantities significant enough to affect groundwater quality. Therefore, special handling is not required for these materials (4.05.8(3)). An Upper Refuse Disposal Area has also been approved for construction, but has not been built. MCC has verbally indicated this pile will not be needed. Stipulation #7 requires MCC to complete a geotechnical investigation prior to constructing the Upper Refuse Disposal Area.

F. Impoundments

1. Refer to the section regarding sediment ponds (4.05.9).

G. Surface and Ground Water Monitoring

1. The applicant will conduct monitoring of ground water in a manner approved by the Division. The ground water monitoring plan is specified in Table 5, Section 2.04.7 and in Exhibit 71 of the PAP. Point-of-compliance monitoring wells are located near the permit boundary at the approximate down-gradient extent of the B and E-seams. Areas mined in the F-seam are up-gradient from the outcrop, resulting in down-gradient flow in the F-seam not leaving the permit area. Colluvium is monitored between the refuse piles and the North Fork of the Gunnison, and data on down-gradient alluvial water is available to the Division from the up-gradient alluvial well at the Bear No. 3 Mine, adjacent to the West Elk Mine on the west, immediately down-gradient from the West Elk operation (4.05.13(l)).

2. The applicant will conduct monitoring of surface water in a manner approved by the Division. The surface water monitoring plan is specified in Table 5, Section 2.04.7 and in Exhibits 71 and 71a of the PAP (4.05.13(2)).

H. Transfer of Wells

1. No transfer of wells is proposed at this time. All monitoring wells will be reclaimed prior to bond release (4.05.14 (3)).

I. Discharge of Water into an Underground Mine

1. There will be no discharge of water into an underground mine (4.05.16(2)).

J. Stream Buffer Zones

1. The Division previously approved underground mining activities within 100 feet of the North Fork of the Gunnison River, which is a perennial stream with a biological community. This decision was based on a finding that the original stream channel will not be disturbed, water quality and quantity shall

not be adversely affected, and appropriate riparian vegetation will be reestablished. The buffer zone variance was granted for the water intake gallery, sediment pond and associated spillways and ditches, a railroad siding, the railroad loadout facility, a light-use road and a portion of the old Bear No. 1 and 2 Mines site. These facilities are located on the north and south banks of the North Fork of the Gunnison River. Figure 12 in the MCC permit shows the disturbed areas within the buffer zone. The Division approved this variance on August 6, 1981, according to Rule 4.05.18(1). This variance was amended and clarified as a result of MR-111, approved December 16, 1993.

2. The Division approved underground mining, construction of haul/access roads, and installation of a sediment pond (SG-1) and road embankment within 100 feet of Sylvester Gulch. Sylvester Gulch is a stream with a biological community as defined by Rule 4.05.18(3). A map of the Sylvester Gulch Facilities Area, which delineates the area within 100 feet of Sylvester Gulch, is incorporated into Exhibit 69 of the permit document. The Division approved this stream buffer zone variance in accordance with Rule 4.05.18(1) based on a finding that the original stream channel will not be disturbed, water quality and quantity will not be adversely affected, and appropriate riparian vegetation will be reestablished. These conditions will be met by the effective use of slope stabilization methods including Best Management Practices, appropriate use of sediment control structures during construction, revegetation, and mechanically stabilized earth (MSE) walls.

3. In PR-11, MCC proposed a buffer beneath the riparian area of Raven Creek, of 660 feet (1/8 mile) on either side of the creek, as stipulated in lease No. COC-67011. This is shown on Map 52. Since there is no mining proposed to the north of Raven Creek, the affected area occurs only to the south of that stream and does not surround it.

K. Probable Hydrologic Consequences

Under Rule 2.07.6(2)(c), the Division is required to make an assessment of the probable cumulative impacts of all anticipated coal mining in the general area on the hydrologic balance and to make a finding (as discussed in Section A of this document) that the operations proposed in the permit application have been designed to prevent material damage to the hydrologic balance outside of the proposed permit area. This section of the findings document is divided into the following subsections: Description of the Hydrologic Environment, Probable Hydrologic Consequences of the West Elk Mine, and Summary and Findings. A separate Cumulative Hydrologic Impact Assessment (CHIA) is available for review at the Division of Reclamation, Mining and Safety. The CHIA, filed at the Division office, assesses the projected cumulative hydrologic impacts of all anticipated mining operations in the general area of the West Elk Mine on the North Fork of the Gunnison River Valley.

1. Description of the Hydrologic Environment

a. Regional Geology

For information regarding regional geology, see Section A, Description of the Environment, Geology in this Findings Document.

b. Groundwater

Seven categories of potential aquifers occur in the Somerset Coal Field. These are: 1) the alluvial and terrace deposits associated with the North Fork of the Gunnison River; 2) the localized, shallow alluvium along creeks tributary to the North Fork; 3) the discontinuous, lenticular and laminar sandstones of the Mesaverde Formation; 4) the Rollins Sandstone; 5) the coal seams; 6) shallow colluvial surficial deposits; and 7) fracture zones in bedrock.

The most laterally continuous sandstone units in the region are the Rollins Sandstone and the massive sandstone separating the Upper and Lower Coal Members of the Mesaverde Formation, known as the Bowie Sandstone. The Rollins crops out in the South of Divide area, approximately one mile upgradient from the West Elk Mine's underground workings. In the Jumbo Mountain area, the Rollins Sandstone appears to be hydraulically isolated. To the south and west, the Rollins Sandstone crops out in cliffs. In the Jumbo Mountain area, the average interburden thickness between the B Seam and the Rollins Sandstone is 150 feet.

The Rollins Sandstone has been considered a hydrostratigraphic unit of potential regional importance, because of its wide areal extent in the southeastern Piceance Basin. The Rollins is a poor quality aquifer due to its low permeability and poor water quality. A pump test of the Rollins Sandstone near the West Elk Mine yielded 3 gallons per minute. Drillholes in the Rollins in the vicinity of the Bowie #1 Mine did not yield enough water to function as groundwater supply wells. The West Elk Mine's permeameter tests of the Rollins Sandstone in the permit area found horizontal hydraulic conductivity values in the range 0.0001 ft/day to 0.012 ft/day.

The Bowie sandstone, separating the Upper and Lower Coal Members, may produce water locally. Information from mines operating in the Lower Coal Member (i.e., Elk Creek and Bear No. 1 and No. 2 Mines) indicate this formation can yield small flows of water in the area. The unit crops out toward its down-gradient occurrence within the West Elk permit area and there are no seeps or springs emanating from the unit, demonstrating that the unit is dry in some areas.

The most significant reliable occurrence of groundwater in the region is the alluvium of the North Fork of the Gunnison River. Significant thicknesses of alluvial sand and gravel between 30 and 80 feet exist along the North Fork. Numerous wells are developed in the alluvium with an average yield of 17.4 gpm. A pumping test conducted by Bear Coal Company on an alluvial well near the site of the Bear No. 3 Mine yielded a value of 806.5 gallons/day/foot for transmissivity.

Three water quality analyses were conducted for the Bear No. 3 Mine on three wells completed in the North Fork alluvium. Two wells exceeded drinking water standards for total dissolved solids, sodium and sulfate. The alluvial well nearest the North Fork River channel (the Bear No. 3 office well) showed the lowest levels of these constituents. This is due to the dilution of alluvial groundwater by North Fork River water at this well.

Except for areas in the Minnesota Creek Drainage, the alluvium along the lower reaches of tributaries to the North Fork is predominantly thin and confined to discontinuous narrow bands along the stream courses. The deeply incised channels of these tributaries restrict the width of the alluvium, while the stream gradient and the presence of resistant sandstone in the stream channels limit the thickness and downstream extent of the alluvium.

Occurrences of groundwater have been noted in the Mesaverde Formation based upon information obtained from drilling, experience in the mines, and from the presence of springs and seeps in the region. This information also indicates that the only potential regional bedrock aquifer in the general area is the laterally continuous Rollins Sandstone. The laterally discontinuous lenticular sandstones within the Upper Mesaverde Formation support only localized groundwater flows.

The Rollins Sandstone is recharged in the vicinity of the West Elk Mine by snowmelt and rainfall on outcrops, and in subcrops beneath stream alluvium and in the channels of the North Fork and its tributaries. These recharge areas have limited areal extent due to the steep dips of outcrops and the narrowness of the stream valleys; consequently, little recharge occurs. Some recharge to the continuous units and much of the recharge to the more discontinuous, lenticular units will come directly from the percolation of snowmelt and precipitation downward through sandstone lens and along fractures. The same is true in the Jumbo Mountain area. Of 112 exploration drill holes at the West Elk Mine that were drilled prior to the mine opening, only three of the holes produced water from the F-seam at a production rate of 3 gpm or less. Three other holes in the Barren Member had rates of about 0.75 gpm.

The Mesaverde Formation is cut by fractures and faults that extend vertically to the surface. The faults and fractures produce narrow bands

of permeability and provide the primary ground water flow path in the areas. When faults and fractures are encountered in mines in the North Fork region, they generally produce mine inflows. The flow characteristics of each mine inflow associated with faults and fractures depend on the lateral extent and the proximity of the fault or fracture to a stream valley. All inflows from these sources are characterized by an initial surge of water which then either decreases or ceases completely with time.

Locally, water flow through fractures probably occurs more rapidly, as suggested by the seasonal fluctuation in discharge rates of some springs in the mine plan area. Mine inflow studies conducted as recently as 1985 have shown that the primary source of inflows are from fractures in areas of low overburden.

As previously described in this document, MCC encountered large inflows of water after mining through a fault/fracture system while conducting development mining in the B-seam in 1996 and early 1997. Significant mine inflows have not been experienced recently; as of the date of this findings document mine inflows have not satisfied the criteria for monitoring and sampling (discernable flows >5 gpm for >7 consecutive days) since water year 2011.

Groundwater in the area can be expected to flow generally in a downdip (northward) direction, parallel to bedding, toward the deeper part of the Piceance Basin. Data from monitoring wells generally indicate downdip flow, although some closely spaced wells in the Barren Member have highly variable water levels. Some wells are dry, indicating no groundwater flow. Dry wells and variable water levels may result from areal variation in permeability. Generally, springs in the permit area seem to act independently of the bedrock water zones and appear to be surface features related to weathered and fractured bedrock. Springs tend to exhibit highly seasonal flow and discharge only during spring snow melt. Springs recharge and discharge in relatively small areas.

Inflows into underground mine workings from faults and fractures located outside stream valleys generally dry up with time or flow intermittently at discrete points along the fault or fracture. Those which continue to flow have flow rates which diminish to a trickle. Such mine inflows from faults and fractures may represent the dewatering of lenticular sandstone units with limited recharge areas, or may represent flows through fracture zones extending to the surface which have narrow recharge zones on steep slopes. The large initial flow rates are much larger than what would be expected from intergranular porosity in low-permeability sandstone (Darcy-type flow), indicating flow probably is from fractures or faults.

Discharge of groundwater occurs through numerous seeps and springs identified in the life-of-mine area. The locations of these springs are shown on Map 37 and 37A of the PAP, springs and stock ponds.

c. Surface Water

The North Fork of the Gunnison River is the principal drainage in the mine area. Smaller streams in or adjacent to the life-of-mine areas are tributary to the North Fork. The North Fork has an average annual streamflow at Somerset of approximately 487.8 cfs per year (1980-2017). Flows in the North Fork usually peak in May or June at around 2,000 to 3,000 cfs, and generally range between 50 and 200 cfs during the rest of the year. The flow is regulated by the Paonia Reservoir on Muddy Creek five miles upstream of the town of Somerset. The reservoir became operational in 1962. Water yields during that period have ranged from a high of 601,800 acre feet per year in water year 1984, to a low of 82,270 acre feet in water year 1977. Water in the North Fork has a neutral to alkaline pH, and is a sodium-bicarbonate type with total dissolved solids generally less than 100 mg/l.

Streams in the northern part of the West Elk Mine permit area are Sylvester Gulch, Lone Pine Gulch, and Gribble Gulch. These three streams flow directly to the North Fork. Lone Pine and Gribble Gulches have ephemeral flows. No flow has been observed in Lone Pine Gulch for several years. Sylvester Gulch is ephemeral in its upper section, but has perennial flow in its lower section due to a spring. Sylvester Gulch has a drainage area of 4.25 square miles. The hydrologic yield of Sylvester Gulch is small for its size compared to other area watersheds due to its lower elevation and gentler slopes.

Raven Creek crosses the northeastern corner of the permit area over a distance of approximately 2,000 feet. This perennial stream and its riparian zone are protected from undermining and subsidence by a buffer zone of 660 feet (1/8 mile) on either side of the stream, as stipulated in Lease COC-67011. Mining approved by PR-11 terminated to the south of Raven Creek because of that buffer zone. No further mining is planned in the area.

A major contributor to flow in Raven Gulch is Deep Creek, a perennial stream that drains the southeastern part of the permit area. Flows in Deep Creek historically have been in the 0.1 to 0.5 cfs range during most of the year, as indicated by MCC's monitoring data from 2000 through 2005. Springtime flows exceed 30 cfs. Alluvium in the Deep Creek watershed is too thin to serve as a ground water supply source.

Most of the southern part of the permit area is in the Minnesota Creek watershed that was approved for mining in PR-10. This major watershed covers approximately 53.5 square miles. Tributaries to the mainstem of

Minnesota Creek include Horse Creek, South Prong, Lick Creek, Dry Fork, and East Fork. The mainstem of Minnesota Creek enters the North Fork of the Gunnison near the town of Paonia. Based on streamflows measured in water year 1978, prior to mining, the water yields from these drainages are nearly an order of magnitude greater than the yield from Sylvester Gulch.

The evaluation of flow within the Minnesota Creek drainage is considered only an approximation due to infiltration and seepage losses, seasonal variations in precipitation and potential evaporation and sampling difficulties. MCC estimates that more than 80% of the South of Divide mining area is in the Dry Fork drainage. MCC also describes the Dry Fork drainage as having minimal yield, but its stream channel annually conveys approximately 720 acre-feet of water imported from Little Gunnison Creek via the Deep Creek Ditch (based on Office of the State Engineer records for 1970 through 2002). The average annual flow of the East Fork of Minnesota Creek is approximately 19,920 acre-feet. Irrigation ditches annually remove about 20,000 acre-feet from Minnesota Creek.

Two reservoirs are located in the Minnesota Creek drainage. Minnesota Reservoir is located on the Dry Fork. It has a decreed capacity of 1,285 acre-feet. Beaver Reservoir is located on the East Fork of Minnesota Creek and has an absolute decreed capacity of 1,620 acre-feet and a conditional decree of 522 acre-feet. Both reservoirs store water for irrigation purposes and are filled during spring runoff. They are usually drained by late August or early September.

Water quality data have been collected at several sites throughout the Minnesota Creek and Deep Creek drainages. The data indicate that these waters are of a sodium-bicarbonate type with relatively low total dissolved solids concentration.

Minnesota Reservoir appears to have an effect on the water quality characteristics of Dry Fork. Detention of Dry Fork flows in the Minnesota Reservoir results in a decrease in total suspended solids (TSS) or turbidity, a slight increase in temperature, dissolved oxygen (DO), and total dissolved solids (TDS). The increase in TDS is most likely a result of evaporation losses. There is a slight increase in alkalinity and, as a result, a slight increase in pH. In all likelihood, these changes are also a result of evaporation losses. All of the changes in water quality observed are what would be expected as a result of impounding water in a shallow reservoir in a semi-arid climate.

There are three different types of springs within the permit area including alluvial, colluvial, and bedrock springs. Eighty-three springs have been identified within the permit area. Recent data indicate that 65 percent of the discharge originates from alluvium and/or colluvium, and 35 percent

have bedrock formation as their source. Only 5 percent of discharge comes from the Upper and Lower Coal Series. The flow rates of these springs are highly seasonal, with peak flows occurring during wet weather conditions. Measurements indicate that spring flows generally decrease from a high in the early summer to a low in the fall. A number of the springs are ephemeral, indicating that their sources are small localized aquifers (i.e. landslide deposits, colluvium, lenticular sandstones, etc.). There are a total of nineteen (19) decreed spring water rights on or near the West Elk Mine permit area.

Wetlands have also been identified within the permit area. Based on inspection of conventional and infra-red aerial photographs and reconnaissance-level field investigation, there are estimated to be approximately 77 acres of wetlands in the permit area. Most of the wetlands are found in drainage channels, although there are small, isolated wetlands on the hillsides where springs and seeps occasionally emerge as a result of landslides/sumps.

2. Probable Hydrologic Consequences

Section 2.05.6(3) of the permit application contains the applicant's prediction of the probable hydrologic consequences from mining and reclamation activities at the West Elk Mine.

During the first two permit terms, the operator mined the F-seam. During the third through fifth permit terms, MCC mined the B-seam exclusively. Activity in these seams involve longwall mining methods, with very little or no activity in the F-seam. During the sixth permit term MCC conducted development and longwall mining in the B-seam and E-seam. During the current permit term, MCC will be conducting development and longwall mining in the E-seam.

The Probable Hydrologic Consequences section of the permit is divided into two main subsections: Groundwater Effects and Surface Water Effects.

a. Ground Water Effects

During mining at the West Elk Mine, ground water seeps into the underground workings from rock exposed in the workings. Inflow into the workings was estimated to be a total of 166 acre-feet in 2004. Excess accumulations of this water are pumped out of the workings into Sylvester Gulch through a permitted discharge outfall. After mining is completed, pumping will cease, the portals will be sealed, and the underground workings will flood with the water seeping into the workings. The operator estimates it will take between 200 to 800 years for the workings to fully flood. The water that seeps into the workings will saturate the gob in the down-dip end of the workings and minerals will be dissolved from the gob, creating a gob leachate. This leachate

can be expected to be alkaline and have TDS between 1,000 and 5,000 mg/l (for comparison, North Fork alluvial water probably has TDS greater than 1,500 mg/l, based on monitoring at the Bear No. 1 Mine.)

As the down-dip end of the West Elk Mine workings fill with gob leachate, this leachate will exert a hydraulic head on the downdip walls of the workings and the leachate may seep into the cleat porosity and fault porosity that is in the coal seams exposed in the workings. This leachate could flow down-dip, parallel to bedding, through the coal seams and discharge from the coal seams into the alluvium of the North Fork of the Gunnison where the coal seams sub-crop underneath the alluvium. This seepage would form a plume of gob leachate in the alluvium that would extend downgradient from the Sylvester Gulch/North Fork confluence toward Somerset. The likely maximum discharge rate of gob leachate into the alluvium would be on the order of 100 gpm based on the maximum head that could develop in the flooded workings. Such a plume would mix with and be diluted by ground water in the North Fork alluvium and would be attenuated where the alluvium significantly widens upgradient from Somerset. North Fork alluvial ground water is monitored upgradient from Somerset at the Bear No. 3 Mine.

Low permeability of bedrock units in and near the West Elk Mine (Rollins Sandstone, B through F seams, and the Barren Member) will prevent any significant seepage of gob leachate into these units.

MCC has submitted two plans for sealing the portals upon closure of the mine. One plan calls for perpetual gravity discharge of mine water to the surface through a four-inch PVC pipe that will be installed in a block wall at the portal. An alternate plan (to be constructed if water is toxic) is to construct water-tight seals within the mine that will withstand the expected hydraulic pressures. Samples taken in the adjacent Oliver Mine indicate mine waters will not be toxic.

Subsidence fractures that develop over mine workings have the potential to dewater natural springs and wetlands in the West Elk permit area. The permit application explains that the risk of such depletion is significantly reduced by the overburden thickness of greater than 280 ft. and the resistance to fracturing of interbedded fine-grained units that would deform ductiley (bending), rather than brittley (fracturing). Monitoring of springs since before the mine was developed has not detected impacts from mining. This monitoring will continue.

The operator predicts overall ground water/surface water balance will not be significantly affected if mine inflows are much greater than predicted because mine inflows will ultimately be discharged back to the North Fork of the Gunnison.

i. Refuse Material Disposal Impacts on Groundwater -

Lower Refuse Disposal Area – Coal mine waste will be disposed in the Lower Refuse Disposal and Refuse Pile Expansion sites. The lower refuse pile is permitted for permanent disposal of 1.09 million cubic yards of mine development waste and sediment pond cleanout material. The refuse pile expansion is designed to hold 1.38 million tons of material over a life of 9.4 years. The Refuse Pile Expansion is discussed in Permit volume 10B. An Upper Refuse Disposal Area has also been approved for construction, and has not been built. MCC has verbally indicated this pile will not be needed. Stipulation #7 requires MCC to complete a geotechnical investigation prior to constructing Upper Refuse Pile.

To date, refuse piles have not impacted the groundwater zone near Sylvester Gulch. Because of the low permeability of the colluvial soils and the lack of a groundwater table near the surface in the colluvium, no impacts on groundwater are anticipated. Water monitoring near the site of the soil stockpiles and waste piles, other water quality monitoring stations on Sylvester Gulch, and sites above and below the mine on the North Fork of the Gunnison, provide data on impacts of this refuse stockpile. The wells in the colluvium in the vicinity of the refuse piles have been mostly dry since 2000 or yielded insufficient water to provide an analysis.

A leachate study of the F-seam refuse was conducted and included in the application for the permanent refuse disposal site in Exhibit 51 of the permit application. In addition, the effects of B-seam refuse on leachate were also evaluated and can be found in Exhibit 56. The permeability contrast found in the pile will cause most of the leachate to perch within the refuse pile and above the native soils. A shallow water mound will probably build within the pile and cause the water to migrate laterally to a small seepage area at the edge of the site. There have been no visible flows from the pile toe and mid-section underdrain.

ii. Mitigation of Groundwater Impacts -

The applicant anticipates no degradation of groundwater quality during mining. The applicant will treat any mine water effluent as necessary to meet water quality standards prior to discharge. There will be no uncontrolled mine water discharge after mining is complete that will significantly degrade surface water or groundwater. The operation plan indicates most water used for dust control will be adsorbed on the coal and carried from the mine, thereby minimizing the quantity to be treated. Any

discharge will be treated in the sedimentation ponds and discharged as specified in the NPDES permit.

The required ground water monitoring plan for the West Elk Mine is described in Exhibit 71 for the South of Divide and Dry Fork lease areas, and in Table 5, Section 2.04 of the permit application for other areas. MCC monitors water quality and water levels in 27 wells in the permit area. Monitoring wells are completed in the following stratigraphic units (in ascending order): the B-seam, the E-seam, a stratigraphic interval between the E and F seams, the F-seam, the Barren Member, and Quaternary alluvium. More than one well is completed in most of the stratigraphic units. Sampling occurs seasonally (three times a year). Parameters monitored include: water level, pH, conductivity, temperature, total dissolved solids, total suspended solids, total iron, and total manganese.

Underground or mine water is permitted for discharge at the following locations: Sylvester Gulch fan site, sediment pond MB-1, the Sylvester Gulch mine water treatment facility, Lone Pine Gulch and Minnesota Creek. The Lone Pine discharge has been discontinued, and the portals have been sealed. Mine water is discharged through the main portals to MB-5E and from the mine water treatment facility to Sylvester Gulch. Quality parameters appear to be such that B-seam mine water will be suitable for treatment and discharge under current NPDES/CDPS permit requirements to the North Fork of the Gunnison River. The quality of mine water from the E-seam workings can be expected to be similar to water from the B-seam workings, based on the similar depositional origin of these two seams.

The rate of mine water discharge from West Elk's underground workings ranges from 0 to 2,000 gpm. The average over a year has been approximately 100 gpm. Water discharged from the mine has met NPDES criteria with periodic excursions of high alkalinity and iron. The high alkalinity caused some WET test failures in past years. MCC has worked with the WQCD and the Division to develop a solution for eliminating the alkalinity problem.

In 1998, Mountain Coal Company performed an extensive study of the springs in the vicinity of the West Elk Mine. The study showed that nearly all the springs tapped shallow meteoric groundwater in the colluvial deposits, rather than bedrock sources. As a result of the study, a revision was made in the monitoring program, with the eighteen springs monitored to include all decreed springs and those which might have some bedrock groundwater component. Springs are also monitored

three times a year for pH, conductivity, temperature, total dissolved solids, total suspended solids, total iron and total manganese. The springs, to date, show no significant trends or changes which can be associated with mining activity. Most springs are responsive to spring runoff, but flow rates are sporadic and many times do not correlate well with other seasonal parameters such as snowpack, precipitation, or streamflow.

b. Surface Water Effects

The West Elk Mine has installed a system of ditches and ponds for controlling sediment eroded from areas disturbed by mining activities. Drainage from undisturbed land is diverted around the site. Almost all drainage from disturbed areas is collected in ponds and treated on-site. There are several small, isolated areas where drainage is not routed to a sediment pond; in these areas, alternative sediment control methods (silt fences, mulch, etc.) are used for controlling sediment.

A system of lined and unlined ditches convey water from the disturbed areas to six sedimentation ponds that have been constructed for the surface facilities area. These are:

MB-3	Small lower pond
MB-4	Train loadout pond
MB-5E	Bear pond
SG-1	Upper Sylvester Gulch pond
NSSA	North Soil Storage Area pond
RPE ponds	Refuse pile expansion area

With the exception of pond SG-1, all sedimentation ponds discharge directly into the North Fork of the Gunnison River. The mine operation has obtained the appropriate NPDES permits for the discharges. Effluent quality for the sedimentation ponds has been monitored and will continue to be monitored to determine permit compliance. With the exception of occasional WET test failures for microorganisms, and isolated exceedances of suspended solids discharge limitations, the mine has not had recurring problems complying with surface water quality standards. The NPDES permit allows for a discharge of 10,000 gpd, based on a 30-day average, from MCC's sanitary waste water treatment plant. The potential impact of discharge of waste water effluent would be greatest when the dilution ratio for effluent is smallest.

After mining is completed at the West Elk Mine, the underground workings may flood to a point where mine water discharges to the surface either through a perpetual drain that MCC may construct at the down-dip end of the workings next to State Highway 133, or as seepage from the coal outcrop on the hillside south of the highway (if the drain is not constructed). The maximum discharge is predicted to be around 100

gpm. The discharge would likely be relatively high in dissolved solids (on the order of 1,500 to 5,000 mg/l total dissolved solids). The maximum 100 gpm discharge would be diluted to near premining quality by water in the North Fork of the Gunnison River, where flow is always more than 4,500 gpm and total dissolved solids are less than 200 mg/l.

MCC predicts the quantity of its water use will not adversely affect the hydrologic balance. Snowmelt provides most surface water flow in the permit area. Mining activities will not have a significant effect on snowmelt runoff. Overland runoff passes over disturbed areas within the permit area to one of the eight sedimentation ponds, mentioned previously in this section. This water may be discharged to the North Fork or stored when water rights are in priority.

During Water Year 1982, MCC's conditional right to withdraw water from the North Fork was deemed absolute. When this water right is in priority, water can be pumped from the intake point to the 10 acre-foot freshwater pond. This water right is expected to be out of priority from July to September. Average withdrawals from the North Fork of the Gunnison are not expected to exceed 400,000 gallons per day (gpd) and are likely to be on the order of 200,000 gpd. The freshwater pond is filled during spring runoff and kept full until water rights are out of priority. The water is either treated to meet potable and sanitary water requirements, used and then treated as sanitary waste water, or is withdrawn for dust suppression in the mine and becomes mine water.

The potential effects of MCC's water diversion on North Fork flows have been projected for flow rates and flow volumes. With the existing pump capacity, 450 gallons per minute (gpm), the diversion would result in a measurable change in flow during low flows having return periods of about 200 years or greater, and would be less than 5 percent. During extreme low flow periods, MCC's water rights would be out of priority and diversion would not be undertaken.

Although subsidence fractures that develop over and next to mine workings have the potential to dewater streams and ponds, Section 2.05.6(6) of the permit application explains that dewatering is unlikely to occur because subsidence cracks that develop at the surface will not extend deep enough to intersect fractures propagating upward from the caved and fractured zones. Also, the stratigraphic sequence in stream valleys is resistant to fracturing due to the presence of interbedded fine-grained units. These beds would more likely undergo ductile deformation (bed bending), rather than brittle deformation (bed fracturing). Stream flows and local channel elevations will continue to be monitored in the permit area, as set forth in the permit application. Subsidence magnitudes of stock ponds will also be monitored. Specific measures MCC will employ for assessing and protecting the Minnesota Creek water supply are described in Exhibit 58 of the permit application

titled, "Protection of Minnesota Creek Water Supply." Possible subsidence impacts to streams and ponds are discussed in the following Subsidence Control section.

Underground mine workings will come within 800 ft. of the Monument Dam and Minnesota Reservoir. MCC explains in Section 2.05.6(6) of the permit application that the reservoir is unlikely to be affected by mining because the dam and reservoir are outside the predicted angle of draw and a subsidence control plan will be implemented for mitigating possible impacts from mining-induced seismicity. (Possible subsidence impacts to the dam and reservoir and mitigation measures are described in the following discussion of the subsidence control plan.).

MCC's surface water monitoring plan is described in Exhibit 71 for the South of Divide and Dry Fork lease areas, in Exhibit 71a for the Sunset Trails area, and in Section 2.04 of the permit application for other areas. As of late 2008, MCC monitors surface water quantity and quality at 22 stream stations, comprised of 10 stations with continuous recording and 12 stations with instantaneous recording. A minimum of one year of monthly baseline data has been collected on all streams prior to mining in a watershed

3. Summary and Findings

The Division has reviewed the Probable Hydrologic Consequences due to mining operations for the groundwater and surface water systems at the West Elk Mine. The Division finds that underground mining at the West Elk Mine will not cause material damage outside the permit area and hydrologic impacts will be minimized within the permit area. (2.07.6(2)(c)).

IV. Topsoil

Baseline soils information can be found in Section 2.04.9 in Volume 1 of the PAP. A suitability analysis of the topsoil was performed before the site was disturbed. In most areas topsoil quality as seedbed material is considered moderate to good, with a few areas that are considered poor. Soil mapping and physical descriptions of the soil are based on SCS soil surveys completed for the area.

The operator's topsoil salvage and redistribution plan can be found in Section 2.05.4. Topsoil and subsoil stockpiles are shown on Map 53.

Topsoil will be removed ahead of surface disturbance activities. Any vegetative cover that would interfere with topsoil removal will be removed first. The West Elk Mine had already completed the majority of topsoil and vegetation removal when the mine facilities were constructed in 1981. Since the majority of reclamation will occur upon completion of mining, topsoil stockpiles have been designed and maintained so as to minimize wind and water erosion and to preserve the seedbed material. Stockpiles in place for five years or more have been or will be seeded with the permanent seed mix.

Subsoil not fully suitable for seedbed material is also excavated, as necessary, for construction purposes. Topsoil consisting of all of the A horizon and part of the B horizon of each soil series present is stripped before construction begins.

The operator will distribute 12 to 18 inches of topsoil over the entire disturbed area. However, the Lower Refuse Disposal Area will be replaced with 18 to 24 inches of topsoil and subsoil. A variance to the four feet of nontoxic cover has been granted to the West Elk Mine. This variance is discussed further in Section VIII, Coal Mine Waste Banks in this Findings Document. After the soil has been replaced, the surface is loosened and roughened by disking, harrowing, or dragging, which will increase infiltration, thereby reducing surface runoff. Various conditioners and neutralizers may be used to modify seedbed conditions, or enhance vegetative cover.

V. Sealing of Drilled Holes and Underground Openings

1. The Division will require that each hole, well or other underground opening be capped, sealed, backfilled, or otherwise properly managed (4.07.3).

VI. Use of Explosives

1. Mining techniques used at the West Elk Mine do not require blasting as part of the regular extraction cycle. Occasionally, explosives are used for underground construction purposes. These uses only require small quantities of explosives. MCC's Explosives Handling and Blasting Procedures are presented in Exhibit 41 of the permit document. Map 53 shows the location of the powder magazine.

   Limited application of explosives may be necessary for additional future surface construction. Pursuant to Rule 4.08.1(2), blasts that use more than five pounds of explosives or a blasting agent will be conducted according to the blasting schedule required by 4.08.3. As appropriate, a pre-blasting survey will be performed (4.08.2).

VII. Disposal of Excess Spoil

1. The West Elk Mine will not require a disposal area for excess spoil (4.09).

VIII. Coal Mine Waste Banks

The West Elk Mine is currently permitted for five refuse disposal areas – the Lower Refuse Pile (LRP), the Refuse Pile Expansion (RPE), the Refuse Pile Expansion East (RPEE), the Upper Refuse Pile and the Lone Pine Refuse Pile. The Upper Refuse Pile has not been constructed and is on indefinite hold. Specific information on that waste pile can be found in Exhibit 50 of the permit application package. Construction of the LRP is complete and a coal processing plant has been constructed on top of it. The design for the LRP, RPE and RPEE are contained in Exhibits 51, 70 and 82 of the PAP, respectively. As of 2022 refuse is being disposed of on the RPEE.

The LRP is located adjacent to Highway 133, at the west side of the mouth of Sylvester Gulch. MCC initially proposed the disposal of waste rock within two waste piles in the original permit application. One pile, the "initial waste rock pile," would contain approximately 1.25 million cubic yards and would be located on the lower facilities bench (the current location of the shop). Subsequent to permit approval, this initial waste rock pile was deleted from MCC's permit.

In the summer of 1985, MCC submitted an application for PR-3 requesting approval of a permanent lower waste pile to be located adjoining the mouth of Sylvester Gulch. This application originally requested approval to permanently dispose of 1.77 million tons of coal processing waste within the proposed structure. The original design phased the refuse pile into five specific design layouts (Phases I through V), including recompaction and reconfiguration of temporarily stored waste material. The pile was constructed according to this original phased design until the Phase IV configuration. TR-63 was submitted in November 1992, which eliminated Phase V and reduced the pile to 1.2 million tons. The proposed storage volume represents a 15.7 year life. The proposal included the combination of a 28,500 cubic yard topsoil pile during Phases I through III and a maximum of 45,000 cubic yards of non-toxic soil cover (subsoil) stockpile. Topsoil removed for Phase IV will be stored on the 50-foot bench constructed in Phase III. In addition, an access road was constructed in Phase III and a portion of the Sylvester Gulch access road to the main fan portal was relocated. Underdrains have been constructed beneath the pile. Piezometric groundwater monitoring will be conducted. Slopes of the pile will be maintained at 2.5H:1V.

The TR-63 application included a thorough slope stability analysis performed in accordance with the prudent state-of-the-art slope analysis for the original design in 1985, and for the redesigned pile in 1992. Material strength values were derived from on-site sample testing and nearby previously reported test results. Piezometer observations, falling head parameter tests and analytical projections were completed in order to predict appropriate phreatic surfaces within the proposed waste structure. Data for the 1992 analysis utilized data collected for the 1985 analysis.

The applicant has committed to the installation and quarterly monitoring of three sets of survey monuments to monitor slope stability of the waste structure. One row of monuments has been installed parallel to the state highway adjoining the toe of the waste pile on 100-foot intervals. Two additional rows of monuments have been installed perpendicular to the highway on the facial slope of the pile at 50-foot interval spacing. The operator has also committed to quarterly reporting of visual inspections of the topsoil, non-toxic soil cover stockpiles, and refuse pile.

For the LRP, drainage will be controlled by a series of drainage ditches, terraces, and a sedimentation pond. Since the pile will be constructed in phases, the drainage system will also be built in phases. All disturbed area drainage from the topsoil piles, subsoil stockpile and waste pile will be routed to the sedimentation basin at the northwest corner of the lower waste pile (MB-2R).

The design incorporates several permanent drainage features into the plan. After final reclamation of the pile, the terraces will be barricaded with rocks or berms to prevent

access to the pile. However, the terraces will still function to control runoff from the pile. A hundred-year diversion ditch has been constructed around the perimeter of the pile to permanently collect any runoff from the site and safely route it to the natural drainage system. For a discussion of the hydrologic effects of the waste pile on both surface and groundwater, see the hydrology section in the Probable Hydrologic Consequences section of this findings document.

The Division has granted a variance from Rule 4.10.4(5), to cover the LRP with a minimum of four feet of non-toxic and non-combustible material. The operator was able to demonstrate that there would be no expected detrimental effects on revegetation and that the probability of spontaneous combustion occurring is very low with a proposed soil cover of 18 to 24 inches. A satisfactory revegetation, erosion, and spontaneous combustion monitoring plan was proposed for the LRP. Also, contingency plans were proposed for all three concerns in the event of failure or poor reclamation success. Therefore, upon reclamation of the LRP, the operator will cover the pile with 18 to 24 inches of topsoil and subsoil. For more information, please see information regarding Technical Revision No. 53.

The West Elk Mine was permitted to accept and dispose coal mine waste from other neighboring operations, if comparable in characteristic to MCC's refuse. In the past, MCC has accepted sediment clean-out from the Terror Creek Loadout and development waste from Bear Coal Company (4.10.1(2)).

The LRP is inspected quarterly by a qualified professional specialist under the direction of a professional engineer, experienced in construction of similar earth and waste structures. Features inspected are erosional, drainage, structural, reclamation, and general compliance and other miscellaneous features (4.10.2(1)).

In January of 1997, MCC submitted an application for TR-79 which proposed the addition of the RPE on approximately 20 acres immediately east of the LRP, on the opposite (east) side of Sylvester Gulch. TR-79 was approved in 1997. The plan is to develop the pile in stages. Phase I is the buildout which involved the removal of topsoil, initial grading, construction of a dual-cell sedimentation pond, liner, and underdrains along with run-off control. Phase II was the initial refuse emplacement. Phase III will involve the main build-out as the pile will proceed up the hillslope to the north at a slope of 2.5 to 1. Sediment controls will be extended to the west, south and east sides. Ultimately Phase IV will be the completion of the pile with a capacity of 1,384,102 cubic yards total.

The sedimentation ponds and initial run-off control berms and ditches were completed prior to the beginning of Phase I. Topsoil was placed north of Highway 133 in an area known as the north soil storage area (NSSA). Subsoil from Phases I and II were used in the development of the Sylvester Gulch facilities area (PR-7). Subsoil removed in phases III and IV will be sufficient for reclamation of the RPE area itself and will be placed in a stockpile to be determined prior to the beginning of Phase III.

The RPE area of Phases I and II is lined with high-density polyethylene liner. An underdrain, designated as a rock drain, is used for collecting refuse fill drainage. The

liner will allow subsurface water to migrate into the rock drain system and be routed to the RPE sedimentation pond. Phases III and IV subsurface will not be lined because of the steeper slope grade (2.5H:1V) and the greater clay content of the colluvium.

The reclamation of the RPE was approved with an average total of 18 to 24 inches of subsoil and topsoil. A variance to cover the LRP was approved through TR-43 in July, 1987. That variance was applied also to the RPE. As the RPE is graded and covered with subsoil and topsoil, it will be revegetated with the approved permanent seed mix. The seeding will be done either by broadcast or by hydroseeding and then mulched. Interim and final revegetation will be conducted in the same manner as for the LRP. The haul road for the RPE will be reclaimed at the end of mine life to approximate original contour.

A small waste pile at the Lone Pine ventilation fan site was approved through TR-69 on August 12, 1994. The pile stores refuse from the development of that facility. It covers 0.7 acres, storing 17,000 cubic yards of refuse. A subdrain system was installed. The pile was covered with three feet of subsoil and one foot of topsoil and reclaimed.

The RPEE was approved with TR-121 in 2010, and was under construction in 2011. This pile has an approximate maximum capacity of 4 million cubic yards. Colluvium is to be left in place underneath the refuse pile, and an underdrain is to be constructed on top of the colluvium after 24 inches of soil is removed and stockpiled. Ditches designed for a one hundred year storm will be constructed on either side of the pile. These ditches are approved as permanent structures. Runoff from the RPEE will go to the RPE ponds. The East RPE will be reclaimed progressively as successive benches are constructed

IX. Coal Mine Waste

1. The Division proposes to approve a plan for extinguishing coal mine waste fires. This plan has been approved by MSHA and contains provisions about who will be involved in the extinguishing operations (4.11.1). The plan can be found in Exhibit 65 of the PAP.

2. No coal mine waste from the West Elk Mine is proposed to be returned to underground workings (4.11.3).

3. Disposal of non-coal waste will be handled as required (4.11.4).

4. No dams or embankments constructed of coal mine waste have been or are proposed to be constructed (4.11.5).

X. Backfilling and Grading

The Backfilling and Grading plan can be found throughout Section 2.05.4. Exhibit 54 of the permit document contains detailed information regarding abandonment and sealing of portals. Maps 58, 58A, 58B, and 59 show post-mining topography.

During the course of MCC's study of the original West Elk lease property and the Jumbo Mountain lease area, numerous slope failures and rock falls were identified. Landslides and rockfalls identified during their study are delineated on Map 32 and 32A. However, MCC also observed that it believes such slope problems would have a minimal effect on the operation and these areas can be stabilized or removed when the facility is built.

In order to judge the credibility of MCC's statements regarding slope stability, the Division requested the submittal of supporting information. MCC responded by submitting a report prepared by Geo-Hydro Consultants, Inc., entitled "Landslide Study, Geo-Hydro Consultants, Mt. Gunnison No. 1 Mine," included within the permit document in Exhibit 14. This report, prepared in conformance with the current state-of-the-art, includes design recommendations for the surface facilities to be constructed within the landslide deposit delineated in the surface facility area of the West Elk Mine site. One of the design recommendations forwarded within the report is the installation of a dewatering system consisting of horizontally inclined dewatering wells installed throughout the affected area, specifically within the portal bench and access road. Specific engineering design plans for this system have been included within the permit document. In addition, intricate bin-wall retaining structures were subsequently included within the design documents in the permit section.

The area of the surface facilities has been the focus of historic and recent landslide activity. The Division required MCC to demonstrate, through appropriate geotechnical analyses, that the proposed backfilled surfaces would satisfy the required static slope safety factor of 1.3. Merrick and Company prepared a "Report of Stability Analyses and Recommendations for Reclaimed Surface Facilities at the West Elk Coal Company, Mt. Gunnison No. 1 Mine." The report presents the results of the required stability analyses and recommendations for reclamation of the affected area.

MCC proposes to return all surface disturbed areas to approximate original contour, with the exception of the waste disposal sites.

XI. Revegetation

Information regarding the vegetation in the West Elk Mine permit area is found in Sections 2.04.10 and 2.05.4; Exhibits 31, 32 and 33; and Maps 42, 43 and 44 of the PAP. No threatened and/or endangered plant species were found anywhere within the permit area.

Success of revegetation efforts was originally based on reference areas established in July 1980 and enlarged in 1981. Reference areas were established for mixed shrub and dry meadow communities and were shown on Map 44.

MCC proposed replacing the two reference areas with the use of a historic reference area, the Historic Records Study Area (HRSA), for evaluating revegetation success. Vegetation in the HRSA resembles the expected post-mining vegetation community. The HRSA is located in a former agricultural and pasture area southwest of the facilities area as shown on Map 53. Use of the HRSA was approved with PR-7 and is presented

in Section 2.05, page 2.05-69 of the PAP.

The following technical standards were established with TR-125 (approved in 2011) as the standards that will be used for determining revegetation success on disturbed areas of the West Elk Mine: minimum live vegetation cover of 53.04 %, minimum herbaceous production of 180.38 grams per cubic meter, and at least three perennial species of which two are cool season perennial grasses and one is a cool season perennial forb. No one component of the grass and forb species shall comprise greater than 40% relative cover, nor less than 3% relative cover. The technical standards were based on the mean of samples collected in the HRSA in 1996, 1997, 1998, and 2010. Elimination of a standard for woody shrub stem density was approved with TR-125 after the Division consulted with the Colorado Division of Parks and Wildlife and the U.S. Forest Service.

The proposed post-mining land use is rangeland and wildlife habitat. Tables 48 and 49 of the PAP list the seeds and shrubs to be planted to establish this land use. The West Elk Mine also will reclaim 1.3 acres within a riparian buffer zone. The riparian seed and shrub mix is listed on page 2.05.53 of the permit document. The West Elk Mine based their selection of plant species on species listed in the baseline biological survey, species geographical range, soils, climate, slope and aspect, root competition, cover and seasonal variation. Seed mixes are also based on experience gained on West Elk Mine revegetation plots, and quantitative data collected in 1980 describing the present vegetative cover, and in terms of wildlife requirements suggested in the literature. The Division approves the use of these species based on the post-mining land use.

Once stockpiled topsoil has been distributed and graded, the surface is prepared for planting. Surface preparation loosens and roughens the surface by disking, harrowing, or dragging which increases infiltration and reduces surface runoff. Seeding and planting are conducted parallel to the contour unless such activities prove hazardous to equipment and/or operators. Various conditioners and neutralizers may be used to modify the seedbed conditions. Seeding and shrub planting will be done during the spring (March 15 through June 15) or fall (September 15 through November 15).

Grasses and forbs are seeded primarily by drill seeding. Broadcast of seed is utilized on small areas, with hydroseeding used on areas with slopes steeper than 3:1.

XII. Post-mining Land Use

1. The Division is proposing to approve a post-mining land use of rangeland and wildlife habitat. The land use meets the criteria of Rule 4.16.3.

XIII. Protection of Fish, Wildlife and Related Environmental Values

1. Information regarding compliance with Rule 4.18 is located in Section 2.05.4 of the permit document.

2. Wildlife habitat is a planned post-mining land use. The applicant has selected appropriate plant species and distributions to benefit wildlife.

XIV. Protection of Underground Mining

1. MCC proposes surface impacts incident to an underground coal mine. These impacts are not surface coal mining activities (4.19(1) and 4.22.4(1).

XV. Subsidence Control

1. MCC has proposed a subsidence control plan in accordance with Rule 2.05.6(6) and has committed to adopting measures for reducing the likelihood of subsidence, preventing material damage, and mitigating the effects of subsidence. The Division proposes to approve the plan (4.20.1(2) and 4.20.3(1)).

   a. Inventory of Structures and Renewable Resource Lands

      Rule 2.05.6(6)(b) requires the operator to include in the permit application an inventory of structures and renewable resource lands in and adjacent to areas proposed for underground mining activities. MCC has previously provided such inventories prior to mining in an area. The inventories are in Section Rule 2.05.6(6) of the PAP.

      Structures identified in inventories prior to PR-10 are: the segment of State Highway 133 next to panels 18, 18A, and 19 of the mine; Forest Service roads, ditches, trails and stock ponds; and all of MCC's mine facilities. The renewable resource lands identified in inventories prior to PR-10 inventory are water-bearing bedrock and alluvial strata in and adjacent to mining areas.

      Structures identified in the PR-10 inventory are: Monument Dam, Minnesota Reservoir, Cow Camp on the Dry Fork (consisting of a wood-framed building on a concrete slab, a smaller wood-framed building, and a livestock enclosure), Forest Service roads, ditches, trails and stock ponds, and MCC's hydrologic monitoring stations. The renewable resource lands identified in the PR-10 inventory are the water-bearing bedrock and alluvial strata in and adjacent to the South of Divide area.

      Structures identified in the PR-12 (Dry Fork lease) inventory are: U.S. Forest Service Roads 711 and 711.5, the Deep Creek Ditch, the Minnesota Creek Ditch Rider's cabin, trails, stock ponds, and MCC's hydrologic monitoring stations. The renewable resource lands identified in the PR-12 inventory are the water-bearing bedrock units in and adjacent to the Dry Fork lease area.

      A thorough subsidence evaluation was completed for the Sunset Trails expansion (PR-15), which can be found in Exhibit 60e of the PAP. No new structures or renewable resource lands were added to the inventory.

   b. Possible Subsidence Consequences and Mitigation of Impacts

Possible subsidence consequences are described in Section 2.05.6(6)(b)(I) of the permit application. Additional information is contained in a report in Exhibit 55, titled “Subsidence Evaluation for the West Elk Mine". Information for specific areas in the permit area can be found in Exhibit 60.

MCC's predictions of possible subsidence are based on historical observation from past mining, conceptual analytical modeling (relation between extraction height and workings depth, adjusted for lithologic variation), and numerical modeling (computed influence function). MCC predicts the angle of draw for longwall mining in the E-seam in the Dry Fork lease area will be 21 degrees. (The angle of draw is the angle between a vertical line at a panel edge and a line extending from the panel edge to the point of zero subsidence at the ground surface.) MCC predicts the angle of draw for longwall mining in the E-seam in the South of Divide area will be between 10 and 20 degrees. MCC predicts 95 percent of subsidence will have occurred at a location in the Dry Fork lease area when the longwall face has moved from the location a distance equal to 1.0 to 1.2 times the depth of mining. The depth to mining in the Dry Fork lease area will range between 800 and 1,400 feet, with maximum vertical displacement on the land surface of 7.0 feet. The depth to mining in the South of Divide area will range between 375 ft. and 1,300 ft. Maximum surface crack depth is predicted to occur in brittle sandstone ridges, as observed elsewhere in the permit area, with maximum crack depth of 50 feet. Maximum crack depth is predicted to be 5 to 15 feet on gently sloping land (<30%). Surface cracks are predicted to not occur where mining depth is several hundred feet and alluvium is more than a few feet thick.

Possible subsidence effects on ground water has been previously discussed in this Findings document under the heading “Probable Hydrologic Consequences”.

MCC predicts the mining nearest State Highway 133 (600 feet horizontal distance) will likely not re-activate existing landslide deposits in the area because the mining there consists of room-and pillar development entries which have a relatively small subsidence potential. The angle of draw of longwall mining activity does not intersect landslide bodies in the area. MCC monitors monuments it has installed on a landslide mass in the mine’s surface facilities area.

Monument Dam and Minnesota Reservoir – MCC predicts the dam or reservoir will not be subsided by mining because the nearest mining will be 800 ft. away in panel E9. The angle of contact between the reservoir is 69 degrees, significantly more than the 20-degree predicted maximum angle of draw in the South of Divide area. MCC has committed to monitoring the angle of draw of panel E9 in order to verify the prediction. MCC predicts that ground vibration (seismicity) created by longwall mining could affect the dam, the reservoir, and the landslide abutting the dam because the static safety factor of the dam has been found to be less than 1.0, as shown in an analysis

conducted by MCC's consultant and contained in Exhibit 72 of the permit application. The suspected cause of the relatively low factor of safety is a landslide that underlies the dam's south abutment. Possible effects from mining-induced seismicity are: rockfall into the reservoir; overtopping of the dam by water in the reservoir; catastrophic failure of the dam; flooding, sediment deposition, and erosion downstream from the dam; flood damage to roads, houses and other structures downstream from the dam. MCC has summarized in the permit application the predicted effects of a catastrophic failure of the Monument Dam determined in a Dam Breach Analysis, dated February 8, 1984. Predicted out-of-channel floodwater depths are in the range 0.3 to 3.5 ft. in the lower 6 miles of Minnesota Creek. Predicted floodwater velocity is in the range 13 feet per second to 42 feet per second. As many as four houses could suffer shallow flooding, although loss of life would not be expected. Depending on proximity to the creek, houses could suffer structural collapse as a result of foundation erosion. Extensive erosion and resource damage would occur along Minnesota Creek and a sediment bar would probably be deposited in the North Fork of the Gunnison River. In order to mitigate any potential impacts to the dam from mining-induced seismicity, MCC has committed to the following measures (which are set forth in more detail in Section 2.05.6(6) of the permit application):

1. Surveying the structures downstream from the dam that could be impacted by dam failure six months prior to longwall mining in the South of Divide area, and incorporating the survey into the permit application as a revision.

2. Conducting annual aerial photo surveys of landslides located north and south of the reservoir,

3. Installing and periodically surveying monuments on the dam and the north, south, and east edges of the reservoir,

4. Monitoring water levels in piezometers installed in the dam,

5. Installing and periodically surveying monuments on the landslide that adjoins the south abutment of the dam,

6. Monitoring seismicity at a seismic station previously installed on Monument Dam and to be installed in selected E-seam panels,

7. Removing any significant sediment accumulation from the reservoir caused by mining,

8. Constructing a stability berm and buttress at the dam, and making other modifications to restore the dam to a 1.5 static safety factor and to enable the dam to withstand the predicted maximum seismic event from mining in the South of Divide area of 2.3 on the Richter scale and peak ground acceleration of 0.15 g,

9. Surveying monuments on the dam within two days of a seismic event that exceeds 0.15 g, and if the integrity of the dam or reservoir appears threatened, immediately notifying the Division, the Minnesota Reservoir Company, the U.S. Forest Service, the Office of the State Engineer, and other appropriate agencies,

10. Submitting periodic reports of monitoring data to the Division, and

11. Replacing, repairing, and otherwise restoring the dam and structures downstream or purchasing insurance policies addressing downstream damage that will be in effect at the time of longwall mining, should catastrophic failure of the dam occur as a result of mine-induced impacts.

12. Augmenting surface water supplies lost due to subsidence according to the Augmentation Plan contained in Exhibit 52 of the permit application.

To address concerns raised by the Division of Water Resources, Office of the State Engineer, Colorado Department of Natural Resources in DWR's letter of April 21, 2006 to the Division of Reclamation, Mining and Safety, the Division attached Stipulations Nos. 74, 75, and 76 to the decision for PR-10. As of late 2008, the West Elk Mine had completed the mitigation measures listed above, and had received final approval of the work on the dam from the Office of the State Engineer (letter dated September 2, 2008). Stipulation Nos. 74, 75, and 76 have been terminated.

Minnesota Creek Ditch Rider's Cabin - MCC predicts the cabin will not be affected by mining because the nearest longwall panel (panel E6) will be at a depth of 1,200 feet, approximately 800 feet away from the cabin. The calculated angle of contact between the panel and the cabin will be approximately 40 degrees, significantly more than the 20-degree predicted maximum angle of draw in the Dry Fork lease area.

To promote more predictable subsidence, MCC may design pillars to yield and crush after mining (in order to minimize humps in the subsidence profile), and mine at a rapid uniform rate.

MCC predicts subsidence cracks may form in areas that are located over or next to underground workings. (See preceding description of predicted crack depths.) Subsidence cracks could dewater streams, ponds, or wetlands; cause local cracking or downcutting in streams; damage roads, fences, and the buildings at the Cow Camp; dewater aquifers or cause cross-stratal flow of ground water or methane.

MCC predicts mining may cause local temporary pooling and temporary accelerated erosion in the main channel and east fork of Sylvester Gulch, and in parts of the Deep Creek Ditch. Channel avulsion could occur in the Deep

Creek Ditch.

To mitigate subsidence impacts, MCC has committed to: filling surface cracks; redirecting flow into the original channels of streams or ditches; installing temporary culverts to bridge surface cracks; repairing subsidence-damaged roads, fences, and buildings; monitoring wetland vegetative health in the South of Divide area and the subsidence magnitudes of Minnesota Creek (as set forth in Exhibit 32 of the permit application); conducting hydrologic monitoring (as set forth in Exhibit 71 for the South of Divide area, and in Section 2.05.4 of the permit application for other areas); and augmenting any water supply losses, including any mining-caused losses from Minnesota Reservoir or the Deep Creek Ditch (as set forth in the Augmentation Plan contained in Exhibit 52 of the permit application). MCC has also committed to adhering to the recommendation of Wright Water Engineers made in Exhibit 60E, including reducing mining height at overburden depths of 300' or less, and not longwall mining at all where the overburden depth is less than 250'; and not conducting development mining beneath a perennial stream where the overburden depth is less than 110'.

To detect subsidence impact, MCC has committed to monitoring the following items: wetland vegetative health in the South of Divide area; subsidence magnitudes of Panel El, Minnesota Creek (as set forth in Exhibit 32 of the permit application), and the Deep Creek Ditch (Section 2.05.6(6)(f)(iii)(C)(IV); surface and ground water flow and quality (as set forth in Exhibit 71 for the South of Divide and Dry Fork lease areas, and in Section 2.05.4 of the permit application for other areas). MCC has committed to performing periodic visual inspections of subsidence impacts to structures and conducting annual traverses recently mined areas. The results of monitoring and inspections are to be submitted to the Division in periodic reports as required by the Rules and the permit application.

MCC predicts rock falls or landslides may occur as a result of mining-induced seismicity. To mitigate these impacts, MCC has committed to placing warning signs where appropriate, conducting visual inspections of possible rock fall and landslide areas, and removing any blockages of roads or drainages caused by mining-caused rockfall or landslides.

2. Section 2.05 and Map 53 of the permit application provide information on the perennial portion of Sylvester Gulch. The information was submitted in TR-25. The information includes: depth of mining, height of mining, lithologic description of overburden, and a map of the workings. Based on this detailed subsurface information, the Division previously found that MCC's proposed undermining of the portion of the perennial portion of Sylvester Gulch will not cause material damage to the main channel or east fork of Sylvester Gulch. (4.20.4).

Flow in Deep Creek in the Dry Fork lease area is perennial. Two of the operator's B-seam panels previously undermined the segment of Deep Creek that is downstream from the Dry Fork lease area. Detailed underground information provided in the PR-12 submittal and in the existing permit application (workings maps, depth of mining, height of mining, and the lithologic description of overburden) indicates subsidence may cause localized temporary pooling and temporary accelerated erosion in the channel. Exhibit 55 B contains a prediction that undermining of Deep Creek in the Dry Fork lease area by panels 3 and 4 will tilt the 7.3% pre-mining slope of the stream by 1.9%, an amount too small to significantly change the hydraulic characteristics of the stream. Exhibit 55 B predicts mining effects on Deep Creek in the Dry Fork lease area will be the same as the previously undermined section of Deep Creek which had no detectable impacts, indicating the depth to mining in the Dry Fork lease area (which is similar to depths downstream) is sufficient to prevent subsidence fractures from capturing significant volumes of stream flows. Based on this information, mining in the Dry Fork lease area does not appear to have the potential to cause material damage to Deep Creek.

3. Until 1999, subsidence monitoring at the West Elk Mine was accomplished using conventional survey methods of a monument grid. The monitoring of MCC's subsidence grid established the amount of subsidence that occurs over a longwall panel, when and where it occurs and when it is complete. MCC was approved to replace the monument survey with a visual inspection of the ground over areas that have been undermined to document any disturbance. A survey is done prior to mining and to areas where effects of subsidence were previously noted in order to monitor the healing of cracks. Given the heavy snow cover and inaccessibility of most of the affected area, MCC conducts the surveys during the summer of each year and reports the results by the end of September. Any mechanical response detected during these surveys that is not consistent with previous observations will be reported to the Division within ten working days of the survey.

   Due to the extremely steep topography and dense vegetative cover of the West Flatiron area, MCC has proposed a subsidence monitoring program, in accordance with Rule 2.05.6(6)(c), designed to concentrate on the landslide areas nearest Highway 133. MCC will drive steel rods vertically into the old landslide body and monitor these rods to assess any movement.

   Section 2.05.6(6) of the permit application specifies proposed subsidence monitoring locations, frequencies, and methods for the South of Divide area and the perennial portion of Sylvester Gulch. Methods include surveying monuments, aerial photography, surface water flow measurements, piezometer water level measurements, and visual inspections. The monitoring frequency for each structure or feature is designed to span the pre-subsidence to post-subsidence time period.

XVI. Concurrent Surface and Underground Mining

1. This section does not apply to the West Elk Mine.

XVII. Operations on Alluvial Valley Floors

MCC has performed a detailed reconnaissance investigation for alluvial valley floors (AVFs). During the investigation, MCC identified several areas within or adjacent to the mine plan area which may meet the geomorphic criteria of alluvial valley floors. Alluvial deposits were identified along Minnesota Creek, the Dry Fork of Minnesota Creek, Sylvester Gulch, and the North Fork of the Gunnison River. Based on MCC's reconnaissance, and the Division's field inspections, the Division designates the following three areas as alluvial valley floors: 1) **North Fork AVF –** North Fork of the Gunnison River downstream from Gribble Gulch, 2) **Minnesota Creek Main Stem AVF –** The alluvial deposits of the main stem of Minnesota Creek extending from the north section line of Section 17, T14S, R90W, downstream to the North Fork of the Gunnison, 3) **Minnesota Creek Lower East Fork AVF –** The alluvial deposits on the lower East Fork of Minnesota Creek, extending from the upper limit of mapped alluvial deposits in Section 9, T14S, R90W to the confluence with the main stem of Minnesota Creek. Mining will not occur in these AFVs.

MCC's monitoring, as described below, will provide sufficient information for the Division to determine that the requirements of 4.24.4 (1)(a), (b), and (c) are being met.

North Fork AVF – Oxbow Mining, LLC monitors North Fork of the Gunnison River surface water immediately downstream from the headgate of the Fire Mountain Canal (site NF-3). This site is within a sub-irrigated portion of the modern-day alluvial valley, approximately 2 miles upstream from the agriculturally productive North Fork AVF. Data from site NF-3 enables identification of material damage to the quantity and quality of water supplying the North Fork AVF. MCC's contribution to impacts can be identified from MCC's monitoring of its CDPS outfalls, approximately 2.5 miles upstream from NF-3. Significant inputs from the West Elk Mine would occur only from the part of the mine that is upstream from Somerset, as the Lone Pine Gulch area no longer has a pumping site and has been Phase II bond-released.

Minnesota Creek Main Stem AVF - MCC financially supports the USFS monitoring station that is located on this AVF. This station and MCC's monitoring upstream from the AVF would enable identification of material damage to the quantity of water supplying the AVF. Material damage to water quality would not be expected because the mine does not propose to discharge mine water to this drainage.

Lower Minnesota Creek Lower East Fork AVF - MCC financially supports the USGS monitoring station on this AVF. This station and MCC's monitoring upstream from the AVF would enable identification material damage to the quantity of water supplying the AVF. Material damage to water quality would not be expected because the mine does not propose to discharge mine water to this drainage.

A stipulation regarding the North Fork of the Gunnison AVF was included in the original permit approval requiring MCC to demonstrate that the mining operation's fresh water usage will not materially damage the quantity and quality of water supplying the alluvial valley floor. This stipulation was complied with on March 25, 1982, with the following response:

Mining activities at the West Elk Mine will not affect the quantity and quality of water in the North Fork. The coal seam to be mined lies a significant distance above the North Fork and is not considered to be an aquifer. Surface facilities have been designed and located to prevent contamination of the river.

Alluvial deposits in Sylvester Gulch and along the North Fork of the Gunnison River next to the mine are too small or irregular in shape to support agricultural activities, and therefore do not qualify as AVFs. High terraces along the North Fork of the Gunnison River are colluvial upland deposits and, therefore, do not qualify as AVFs.

Changes in the quantity of water supplied to the North Fork AVF depend on the difference between water used by MCC and water discharged to the North Fork of the Gunnison River. MCC's total water use is expected to be about 150 acre-feet per year during maximum projected production. This represents less than 0.04 percent of the average annual stream flow on the North Fork. Since less than 70 percent of this use is deemed to be consumptive use, the loss is actually less than 0.03 percent of the average stream flow. In addition, water is withdrawn during higher flows when MCC's water rights are in priority. During low flow periods when other calls for water exist, MCC would not be withdrawing water.

Water quality changes resulting from MCC's discharge of waste water will not constitute material damage because no measurable change in water quality is expected to occur. Of the 200,000 gallons/day maximum projected use, 38,000 gallons/day (28.5 acre-feet/year) would be required for potable water use. Consumptive use of potable water would be minimal. Assuming no consumptive use, one would expect a discharge of less than 0.06 cubic feet per second (cfs) during plant operation. This use and return flow is insignificant compared to the flows in the North Fork of the Gunnison. Even during the lowest flow on record (17 cfs) for the 1934 through 1979 period of record on the North Fork at Somerset, the potable water use would be less than 0.4 percent of the flow. The return water will be treated to meet NPDES effluent limits and should pose no problem for downstream irrigation use of AVFs.

The remaining 162,000 gallons per day (gpd) of water use is for coal spraying and dust suppression activities. The estimate is conservative and includes a 15 percent contingency for leakage. Consumptive use is difficult to estimate, but should be less than 85 percent. The return flow along with any seepage water would be collected and routed to sediment pond MB-1. This water is then treated and either released to the North Fork or recycled. Assuming 138,000 gpd (0.2 cfs) is the consumptive use, only about one percent of the lowest flow on record would be consumed. The information provided above demonstrates that there is no risk of material damage to the quantity and quality of water supplying the AVF identified on the North Fork of the Gunnison River.

MCC has met the requirements of Rules 2.06.6 and 2.06.8.

Based on the above information, for the North Fork AVF, Minnesota Creek Main Stem AVF, and the Lower Minnesota Creek AVF, the Division makes the following findings.

1. The surface coal mining operations would not interrupt, discontinue, or preclude farming on an alluvial valley floor (Rule 2.06.8(5)).

2. The surface coal mining operations would not materially damage the quantity and quality of water in surface and underground water systems that supply those alluvial valley floors or portions of alluvial valley floors (Rule 2.06.8(5)).

2. Surface coal mining and reclamation operations will be conducted to preserve, throughout the mining and reclamation process, the essential hydrologic functions of alluvial valley floors not within the affected area (Rule 4.24.2).

3. An environmental monitoring system will be installed, maintained, and operated by the permittee on all alluvial valley floors during surface coal mining and reclamation operations and continued until all bonds are released in accordance with Rule 3 [Rule 4.24.5(1)].

XVIII. Operations on Prime Farmland

1. There are no prime farmlands within the West Elk Mine permit area.

XIX. Mountaintop Removal

1. This section does not apply to the West Elk Mine.

XX. Operations on Steep Slopes

1. This section does not apply to the West Elk Mine.

XXI. In Situ Processing

1. This section does not apply to the West Elk Mine.

References

Colorado Division of Minerals and Geology. "Proposed Decision and Findings of Compliance for Five Year Permit Renewal for the Mt. Gunnison No. 1 Mine." June 22, 1981. 94 pages.

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Mayo & Associates, Characterization of the Groundwater System in the Vicinity of the West Elk Mine near Somerset, Colorado. February 1999.

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