TRI-STATE

April 9, 2025

Ms. Hunter Ridley
Environmental Protection Specialist
Colorado Division of Reclamation, Mining & Safety
Department of Natural Resources
1313 Sherman Street, Room 215
Denver, CO 80203

RE: Colowyo Coal Company L.P.
Permit No. C-1981-019
Minor Revision No. 261
Streeter Pond and Ditch

Dear Ms. Ridley,

Tri-State Generation and Transmission Association Inc. (Tri-State), is the parent company to Axial Basin Coal Company, which is the general partner to Colowyo Coal Company L.P. (Colowyo). Therefore, Tri-State on behalf of Colowyo is submitting minor revision 261 (MR-261) to Permit No. C-1981-019. MR-261 removes permit items related to the Streeter Pond and lower portion of the Streeter Ditch below the Section 3 Ponds that have been Phase III released and removed from the permit boundary.

Included in this minor revision is a change of index sheet to ease incorporation of this minor revision into the permit document. If you should have any additional questions or concerns, please feel free to contact Tony Tennyson at (970) 824-1232 at your convenience.

Sincerely,

DocuSigned by:
Chris Gilbreath
4BE980BE59E442F...

Chris Gilbreath
Senior Manager,
Remediation and Reclamation

CG:TT:der

Enclosure

cc: Tom Cummins (BLM-WRFO)
Tony Tennyson (via email)
File: C. F. 1.1.1.245

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CHANGE SHEET FOR PERMIT REVISIONS, TECHNICAL REVISION, AND MINOR REVISIONS

Mine Company Name: **Colowyo Coal Company**

Permit Number: **C-1981-019**

Date: **April 9, 2025**

Revision Description: **MR-261 Streeter Pond and Ditch Removal**

Volume Number	Page, Map or other Permit Entry to be REMOVED		Page, Map or other Permit Entry to be ADDED		Description of Change
1	Table of Contents Pages iv and v (2 pages)		Table of Contents Pages iv and v (2 pages)		Rule 4 page numbers have been updated.
1	Page 2.04-22 (1 page)		Page 2.04-22 (1 page)		Reference to Streeter Pond has been removed under Permit Area.
1	Page 4-9 through 4-57 (49 pages)		Page 4-9 through 4-57 (49 pages)		Sections 4.05.4, 4.05.9, 4.05.18, and 4.12 have been updated to remove references to Streeter Pond and assoicatesd items with Streeter Pond. This caused a pagination shift in Rule 4.
2A	Exhibit 1B Page 1 (1 page)		Exhibit 1B Page 1 (1 page)		Exhibit 1B Table of Contents has been udpated.
2A	Exhibit 1B Page 5 (1 page)				Permanent retention letter for Streeter Pond has been removed.
2B					No Change
2C	Exhibit 7-14A Pages 2 through 6 (5 pages)		Exhibit 7-14A Pages 2 through 5 (4 pages)		Exhibit 7-14A has been updated with removal of Streeter Pond.
2C	Appendix Exh. 7-14E (2 pages)				Appendix Exh. 7-14E is being removed as the same informatin is contained in Appendix Exh. 7-14SE.
2D	Exhibit 7 Page 8 (1 page)		Exhibit 7 Page 8 (1 page)		Refrence to Streeter Pond has been removed.
2D	Appendix Exh. 7-14SP (75 pages)				Appendix Exh. 7-14SP is not longer applicable as the Streeter Pond and lower portion of the ditch have been Phase III released and removed from the permit boundary. Applicable information for the upper portion of Streeter Ditch is found in Appendix Exh. 7-14SE.
2E					No Change
3					No Change
4					No Change
5A					No Change
5B					No Change
6					No Change
7					No Change
8					No Change
9					No Change

CHANGE SHEET FOR PERMIT REVISIONS, TECHNICAL REVISION, AND MINOR REVISIONS

Mine Company Name: **Colowyo Coal Company**

Permit Number: **C-1981-019**

Date: **April 9, 2025**

Revision Description: **MR-261 Streeter Pond and Ditch Removal**

Volume Number	Page, Map or other Permit Entry to be REMOVED		Page, Map or other Permit Entry to be ADDED		Description of Change
10					No Change
12					No Change
13					No Change
14					No Change
15					No Change
16					No Change
15					No Change
17					No Change
18A					No Change
18B					No Change
18C					No Change
18D					No Change
19					No Change
20					No Change
20					No Change
21					No Change
22					No Change

available in the Annual Reclamation and Hydrology Reports submitted to the CDRMS for the period 1983 through the present.

Permit Area

Surface water in the mine area is limited to Streeter Gulch, East Taylor Gulch, East Taylor Pond, West Pit Pond, Warehouse Pond and sediment sump, Work Area Pond, three evaporative sewage ponds, Section 16 Pond, Prospect Pond, West Taylor Pond, and Section 28 Pond. Three additional detention ponds are located at the Loadout Area. All ponds, with the exception of the warehouse/sewage pond complex, are sedimentation ponds and respond only to runoff related events. The ponds are designed to treat the 10-year, 24-hour precipitation event, or fully contain the 100-year, 24-hour precipitation event. Additionally, water flowing off of the reclaimed lands is retained by contour furrows, revegetated slopes and a number of small depressions/stock ponds. A number of permanent drainage channels and temporary drainage channels will also be incorporated into the final reclaimed landscape to route water efficiently to sediment ponds. Refer to Map 12 and Map 12A and Exhibit 7 for the location and information about these various pond, depressions and ditch structures.

Surface Water Quality

General Area

Surface water quantity in the general area is variable and inconsistent from drainage to drainage. Drainages in the general area have not received the attention that the drainages adjacent to and within the permit area have received because there is no hydrologic connection between these areas. Flow estimates and water balance calculations for these areas have not been examined because they will not be disturbed by the Colowyo Mine.

Permit Area

The drainages that have been the most intensively studied in and adjacent to the mine area include Taylor Creek, Goodspring Creek and Wilson Creek. Continuous flow recorders have been maintained on Taylor Creek and Wilson Creek by the USGS since 1974. A continuous recorder was operated on Goodspring Creek from 1974 to 1978. The flow information resulting from these gages is presented in Table 2.04.7-8.

These data reflect the highly variable nature of surface flows in the drainages. Taylor Creek, the intermittent stream, had mean monthly flows of 0.0 cubic feet per second (cfs) for much of the period of record. Mean flows greater than 0.0 cfs were extremely low and reached a peak of 2.80 cfs in May 1980 reflecting the high snowmelt generated runoff. The maximum and minimum monthly flows also included for Taylor Creek give a further insight into its dependence on snowmelt and rainstorm runoff. This information supports the contention of very limited groundwater seepage to sustain flows near the mining area. The maximum daily flow value of 18.00 cfs in February, 1980 was a result of high snowmelt runoff and rainfall on a melting snowpack. Minimum flows of 0.0 cfs again reflect the highly sporadic nature and intermittency of this stream.

Historically, Colowyo has experienced no pH problems with water discharges sampled in the vicinity of the Colowyo operations. As reported in Section 2.04.7, all pH values of water samples taken in the vicinity of the Colowyo Operations have ranged between 7.2 and 8.5; therefore, it is anticipated that no acid mine drainage will occur as the operations continue or expand with the Collom expansion.

4.05.3 Diversions and Conveyance of Overland Flow and Shallow Groundwater Flow and Ephemeral Streams Draining a Watershed Less than One Square Mile

The drainage and sediment control plan described under Section 2.05.6 provides for temporary diversion of surface drainages within the permit area. A system of temporary ditches, as shown on Map 12, will divert runoff away from disturbed areas, and in other cases temporary ditches will be used to divert runoff from disturbed areas to sediment ponds. Specifications for all temporary diversions within the permit area are presented within Exhibit 7, Hydrology Information. Temporary diversions will -be constructed to pass at a minimum the runoff from the precipitation event with a two year recurrence interval.

The temporary diversions described above will have the purpose of reducing contribution of suspended solids to runoff and diverting undisturbed drainage from the mining area. The diversions will be constructed with a minimum gradient to pass the design flow and will be revegetated with grasses. If not removed by mining, upon completion of mining and at an appropriate point mandated in the Coal Regulations of the Colorado Mined Land Reclamation Board, the temporary diversions will be reclaimed as required in Section 4.05.17.

4.05.4 Stream Channel Diversions (Relocation of Streams)

A temporary diversion of Taylor Creek was approved as a Technical Revision on November 19, 1984. The diversion is shown on the Existing Structures-North Map (Map 21), explained in detail in Exhibit 17, Haul Road and Facilities Modifications associated with Colowyo's Raw Water Supply Plan.

All temporary diversions will be removed and reclaimed when no longer needed for sediment control in accordance with the Operations and Reclamation Plan described in 2.05.4. Channel lining rock riprap and energy dissipaters will be used when necessary. As stated above, all temporary diversion structures will be seeded and revegetated. Colowyo does not anticipate that there will be any significant excess material resulting from the construction of diversion ditches.

None of the proposed diversions will drain into underground mines.

No additional diversions of intermittent or perennial streams are planned or provided for at this time.

4.05.5 Sediment Control Measures

Sediment control measures to be implemented are shown Map 12. These facilities, consisting primarily of diversion ditches and sedimentation ponds, will be located, constructed and maintained to avoid erosion and increased contribution of sediment load to runoff. Discussion on the sediment and drainage control is presented under Section. 2.05.6. The design parameters of the various sedimentation control measures are found in Exhibit 7, Hydrology Information.

As necessary, facilities to control sediment will be installed in areas above or below the planned sites of disturbance. “Upstream” facilities, such as temporary diversion ditches and- check dams up slope from the mining activities, will divert runoff away from the disturbed areas. Temporary diversion ditches below the disturbed area will divert runoff into sediment ponds. The actual mining areas will aid in retaining sediment within the disturbed areas by catching water in pits, small depressions and dozer basins, etc. in active, unreclaimed mine workings. Water leaving the reclaimed areas will drain into contour furrows or other sediment traps, as necessary, before entering the sedimentation pond.

Small Area Exemptions from time to time, it may be necessary to have small areas that do not drain to a sediment pond. Alternative sediment control measures will be used for these areas. These will be designed to meet the requirements of Rule 4.05.2.3 and Rule 4.05.5. Exhibit 7, Item 14-P (Volume 2C) provides a specific design for a small borrow pit needed to construct the embankment for the Section 28 Sediment pond.

4.05.6 Sedimentation Ponds

The location of all existing and planned sedimentation ponds are presented Map 12 and 12A. The design plans and specifications for the sedimentation ponds are described in this section. The design parameters and detailed sedimentation calculations for the sedimentation ponds are shown in Exhibit 7, Hydrology Information. The sedimentation pond embankment and emergency spillway design are also shown in Exhibit 7, Hydrology Information. All sedimentation ponds will be located as close as practical to the areas to be disturbed. Other methods of sediment control will be located on the reclaimed areas; these methods include the use of contour furrowing, contour drainage ditches, chisel plowing and revegetation etc.

This application contains calculations used to determine runoff volumes and flow rates for a theoretical 10-year, 24-hour precipitation event and subsequent sediment volumes. The precipitation data were obtained from the NOA Atlas 2, Volume 3 for Colorado; soil types were obtained from the Soil Conservation Service, and are shown on the Soils - South Map (Map 6) and the Soils - North Map (Map 5).

The ongoing mining activities within each watershed of the permit area will create constantly changing hydrologic conditions. The design models are generally based on a static, theoretical scenario, utilizing SEDCAD^{TM} which considers a final reclamation and pit closure scenario in each watershed. Please see Map 12 for watershed boundaries used for hydrologic modeling.

It is Colowyo's contention that the proposed models represent nothing more than our best hydrologic estimates for a described range. of conditions. According to Applied -Hydrology and Sedimentology for Disturbed Areas, Barfield, Warner and Haan, 1981, "Hydrologic calculations are estimates, with the error in these estimates increasing as the degree of approximation increases or as the estimation procedure is applied beyond the range of conditions for which it is intended." Accordingly, it would be inappropriate for these modeling scenarios to be used or relied upon other than for their intended purpose: as an aid in the design of sedimentation pond structures to predict compliance with applicable effluent standards. Colowyo believes it would be an inappropriate use of the SEDCAD models to use them as an enforcement tool for such operations as topsoil stripping; backfilling, grading, reclamation, etc.

Sediment will be removed from all sedimentation ponds on an as needed basis or when the sediment level will not allow effective treatment of the runoff resulting from the 10-year, 24-hour precipitation event in accordance with Rule 4.05.2. Quarterly inspections will note the level of sediment in each pond. Ponds will typically be cleaned of sediment when water levels are lowest, and the least amount of precipitation is expected. The removed sediment will be used as topsoil or subsoil if it meets the suitability criteria discussed under Section 2.04.9. The Division will be notified of this determination if the material is selected as overburden material that can be substituted for or as a supplement to topsoil.

All ponds will be designed so that the minimum elevation at the top of the settled embankment is at least one foot above the elevation of the water surface in the pond with the emergency spillway flowing at design depth.

Colowyo will design, construct and maintain the sedimentation ponds to prevent short circuiting to the extent possible. As a general rule, the inflow to the ponds will be at the opposite end from the outflow area. The constructed height of the sedimentation pond embankment will be designed to allow for settling. During construction, a registered professional engineer will ensure that the appropriate embankment height is accomplished. For all sedimentation ponds, the entire embankment, including the surrounding areas disturbed by construction, will be seeded after the embankment is completed. The active upstream side of the embankment where water will be impounded will be riprapped or otherwise stabilized, where necessary. Areas in which revegetation is not successful or, where rills and gullies develop, will be repaired and revegetated.

Sedimentation ponds that are subsequently approved as part of the post-mining land use will remain in place after the termination of mining activities.

Colowyo will inspect the condition of each pond and submit a quarterly report. None of Colowyo's ponds meet the size criteria of 30 CFR 77.216(a)(1989).

A small area exemption for sediment control will be utilized for sediment control for the remaining reclamation area in the Gulch A watershed that has not achieved Phase II or Phase III bond release. This small area exemption allows for a grass filter to be utilized for sediment control for the small area exemption. Please see Volume 2C, Item 18 for the small area exemption demonstration (grass filter) for the Gulch A watershed.

4.05.7 Discharge Structures

The sedimentation ponds at Colowyo are designed to treat the 10-year, 24-hour storm event in accordance with Rule 4.05.6(3)(a) or fully contain the 100-year, 24-hour event. As such, the general operation of the ponds that are designed to discharge will be a passive discharge system where water is allowed to discharge automatically as necessary. Ponds designed to the 100-year, 24-hour storm event will fully contain the storm event and be managed as non-discharging structures. Colowyo will sample discharges as appropriate to remain in compliance with applicable CDPS Permit requirements. Pond dewatering through a manual headgate may be performed as necessary to lower the water level depending on operational requirements. Manual dewatering of ponds will meet applicable CDPS Permit standards. Discharge from sedimentation ponds will be controlled by energy dissipaters and flow check devices where necessary. All embankment ponds utilize separate principal and emergency spillways with the emergency spillway located at a minimum of 1 foot above the elevation of the maximum water surface during the discharge of the 10-year, 24-hour storm event through the principal spillway. The principal spillways are designed for the 10-year, 24-hour storm event and the emergency spillways are designed to pass the 25-year, 24-hour storm event in accordance with Rule 4.05.9(2)(c)(i). The design requirements for existing ponds can be found on each of the pond as-built drawings or in Volumes 2D and 2E Exhibit 7. All embankment sedimentation ponds will provide a non-clogging dewatering device or conduit spillway to remove water storage from inflow. Design requirements for all sediment ponds associate with the Collom Pit be found in Exhibit 7, Item 23. For compliance purposes, in systems that incorporate ponds in a series, CDPS effluent quality parameters will only apply to the last pond in the series that directly discharges into the receiving stream or drainage. Out of pit designed ponds internal to the last pond in the series will be inspected and maintained in the same manner as the “compliance” pond to ensure proper sediment control and design performance.

The sumps along Haul Road A are required to have flow measurement devices at the outflow of each sump. Each sump therefore will have a flume installed at the outflow to measure any flow discharged from each sump.

It was deemed necessary to install a french drain structure to monitor the flows from the East Taylor Spring. The East Taylor Spring is just above (south) of the East Taylor Pond. A clean washed gravel filter was installed to route water to an underground-perforated pipe. The perforated pipe then routes from the seep water to the surface to a parshall flume for flow measurements. At the outlet of the parshall flume, the water is then routed through another twelve-inch solid pipe, which is on the ground surface directly adjacent (west) to the Taylor Trib Ditch. The pipe ends at the inlet of the East Taylor Pond were the spring water is discharged into the East Taylor Pond. The location and a design for this french drain system is presented on Figure 4.05.7-1.

4.05.8 Acid-forming and Toxic-forming Spoil

Acid forming materials do not exist within the overburden to be removed by the mining operations. A discussion on the overburden at the Colowyo operation has been conducted as set forth in Section 2.04.6. A discussion of the overburden monitoring plan is set forth in Section 2.05.

4.05.9 Permanent and Temporary Impoundments

Colowyo constructs small impoundments on reclaimed areas in accordance with Rule 4.05.9. These small impoundments are essential and basic to the management of the rangeland post-mining land use of livestock grazing and wildlife habitat. The design of post-mining impoundments provides for structures having a vertical height less than five feet from the bottom of the channel to the bottom of the spillway and impound less than two acre-feet of water. As such they are exempt from Division of Water Resources, Office of State Engineer requirements. Water harvesting ditches may also be used to enhance the function of the impoundments, which is consistent with practices employed on adjacent rangelands.

The impoundments collect surface runoff from precipitation events and snowmelt from reclaimed areas. The impoundments do not result in the diminution of the quality or quantity of water for downstream water users. Colowyo is the holder of water rights immediately downstream. During periods of low precipitation, the impoundments may be dry, which is consistent with regional practices on similar rangelands. Since the source of water is surface runoff from revegetated areas the quality of the water will meet the requirements of the intended use.

The post-mining impoundments have slopes of 3h:1v or less to provide easy access to both livestock and wildlife. These impoundments and any associated ditches, while intended to be permanent, will be classified as temporary until the requirements of Rule 4.05.9 are met. Prior to construction, all designs are submitted to the Division. A copy of the as-built design information will be submitted after construction for inclusion into the permit document. In addition, sedimentation ponds that are subsequently approved as part of the post-mining land use, as shown on Map 12, will remain as permanent impoundments after the requirements of Rule 4.05.9 have been met. Please refer to Section 4.05.6 for additional information regarding compliance with Rule 4.05.9(7)(a thru e).

All embankments, impoundments, and associated structures will be revegetated if construction materials are conducive to plant growth. If not, rock or gravel will be used on the embankments. The quarterly routine inspections of these structures will be conducted as required by Rule 4.05.9(17) if and until a waiver is granted to allow for annual inspections of these structures in the future. As per Rule 4.05.9(14) requirements, inspections performed during and after construction of these structures will be performed by a qualified registered professional engineer or other qualified professional specialist under the direction of a professional engineer. The inspections will be made regularly during construction, at completion of construction, and at least annually (quarterly until such a time as annual inspections are requested from granted by DRMS) until removal of the structure or release of the performance bond. The qualified registered professional engineer shall provide the Division with a certified report that the impoundment has been constructed and/or maintained as designed, and in accordance with the approved plan and the applicable regulations. As per Rule 4.05.9(15), certified inspection reports shall include discussion of:

1) Any appearance of erosion, instability, structural weakness or other hazardous conditions;
2) Existing and required monitoring procedures and instrumentation;

3) The depth and elevation of any impounded waters at the time of the certified report;
4) Existing storage capacity of the impoundment; and
5) Any other aspects of the structure affecting stability, or requiring maintenance.

Colowyo will maintain a copy of each certified report at the mine site.

Colowyo successfully demonstrated that failure of small impoundments would not create a threat to public health and safety or threaten significant environmental harm. A written safety demonstration completed by a professional engineer is located in Exhibit 7, Item 11, Volume 2B, in accordance with rule 4.05.9(18)(b). None of the small post-mining impoundments act as primary sediment control structure for a particular area; they are all constructed in reclaimed areas of the mine to enhance the approved postmining land use; they are all under two-acre feet.

All impoundments will be maintained according to the specifications set forth in this part. Maintenance for impoundments may include (if necessary) mowing and cutting of excess vegetative growth for the purpose of facilitating inspections and repairs including keeping ditches, culverts, spillways, and other outflow structures free of debris. All combustible material, other than mulch or other material needed for erosion control and surface stability (vegetative growth) will be removed.

Plans for any modification of any sedimentation impoundments or dams will be submitted to the Division, and no modification will begin until approval of the plans have been granted unless such modification is necessary on an emergency basis for public health, safety or the environment would be endangered.

Colowyo will inspect the condition of each pond quarterly (until a waiver for annual inspection is granted) with the reports submitted quarterly as well. None of Colowyo's post-mining impoundments will meet the size criteria of 30 CFR 77.216(a)(1989).

4.05.10 Underground Mine Entry and Access Discharges

Colowyo currently conducts surface coal mining exclusively.

4.05.11 Ground Water Protection

There are no aquifers or continuous sources of ground water within the stratigraphic section from which the Colowyo Mine mines coal using surface mining techniques. This is also noted in Section 2.04.7. In addition, there are no continuous aquifers of regional extent within the entire Williams Fork Formation in the location of the Colowyo Mine. Occasionally, a minimal amount of water is found under perched conditions in noncontiguous lenticular sandstones and in fractured coal under the sandstones. No toxic concentrations of acid forming materials have been found in the overburden, reclaimed slopes or surface and ground water system associated with the Colowyo Mine. No adverse effects on groundwater quality are expected to occur due to mine excavations or backfilling.

4.05.12 Protection of Groundwater Recharge Capacity

The reclamation plan as described in 2.05.4 will return the disturbed lands to approximately the pre-mining condition; therefore, ground water recharge capacity is expected to approximate the premining condition. Also, because of the minimal existence of ground water in the mining area, the mining operation and subsequent reclamation should have no adverse effect on the existing ground water recharge capacities.

The ground water monitoring plan is further documented in 4.05.13. The mine has established Point of Compliance locations for alluvial and valley fill aquifers. Please refer to Volume 2C, Exhibit 7, Item 19 for a description of the alluvial aquifer investigation report and the points of compliance wells for Goodspring, Taylor, and Wilson Creeks. There are not established points of compliance for any regional aquifers because of a lack of ground water. The following is provided to document this:

The aspect of monitoring ground water is dependent on whether or not there is a continuous, non-perched ground water layer/zone to monitor. Since active mining at Colowyo Mine began 30 years ago, the mining zone in both the East and West Pits have not encountered any significant ground water, except for perched ground water. Therefore, the following is presented to clarify the ground water conditions at the Colowyo Mine.

Geology/Topography

The Colowyo Mine is located in the Williams Fork Formation of the Cretaceous Mesaverde Group. The Williams Fork Formation is comprised of discordant beds/units of sandstone, siltstone and mudstone and coal seams, with an approximate thickness of 1,200 to 1,300 feet in the mine area. Deposited in a deltaic environment, the beds vary in thickness and lateral extent throughout the Colowyo Mine. The numerous coal seams also vary in thickness and lateral extent. The sandstones tend to be very fine grained to fine grained and poorly sorted, with various amounts of silt and clay. For the siltstones and mudstones, theses units contain various amounts of finer and coarser materials. The total mined sequence in both pits is up to 450 feet thick and is comprised principally of mudstones, siltstones and coals, with sandstone layers being least prevalent.

The Williams Fork Formation conformably overlies the Iles Formation. At the top of the Iles Formation is the Trout Creek Sandstone (TCSS). The TCSS is a massive, white to light gray, very fine to fine grained, moderately well sorted sandstone with a thickness of between 50 and 70 feet and is approximately 1,200 to 1,300 feet below the Colowyo Mine. This is the only mapped continuous unit in the area of the Colowyo Mine and has been noted as being an excellent marker bed for correlation work of the coal seams. Beneath the TCSS, the Iles Formation is comprised of sandstones, siltstones and marine shales.

Two major features, the Collom Syncline and the Danforth Hills Anticline/Wilson Dome, control the geologic structure in the area of Colowyo Mine. The axis of the Collom Syncline, located approximately 0.5 miles north of the north edge of the reclaimed East Pit, trends west-northwest (approximately N60°W) with a slight dip in the axis to the west-

northwest. The Collom Syncline is sub-parallel to the Axial Anticline on the north and the Danforth Hills Anticline on the south. The Collom Syncline is asymmetrical, with the north flank of the syncline steeply dipping (20°-40°) to the south-southwest. The south flank dips to the north-northeast at around 10°±5°. The Colowyo Mine is located on the south flank of the Collom Syncline. Therefore, based on the geologic structure of the area, the coal seams and non-coal beds of the Colowyo Mine dip to the north-northeast at approximately 10°. The southern portion of the Colowyo Mine is located on a structural high, an unnamed anticline, which is an offshoot of the Danforth Hills anticline.

Topographically, the mine is located on a topographic high, bordered on the east and west by deeply incised valleys. These valleys are Good Spring Creek and Wilson Creek, on the east and west respectively. The valleys slope from south to north, similar to the topographic slope at Colowyo Mine. The topography in the area of the Colowyo Mine ranges from 8000 feet on the south to 7150 feet on the north. The valleys have elevation ranges from approximately 7100 feet on the south to 6550 feet on the north. On the south, south of the Section 16 mine area, the topography drops off into the West Fork Good Spring Creek, a small tributary to Good Spring Creek.

Hydrology

Based on the above, the Colowyo Mine is located on both a topographic and structural high. Thus, these highs cause the mined units of the Colowyo Mine to be above any significant recharge source, e.g., surface water. This is because the bottoms of the pits are at an elevation higher than the elevation of the surface water in the creeks. Only when the units are at an elevation lower than the valleys does any significant recharge occur. Thus, the only source of recharge for the mined units in the pit areas of the Colowyo Mine is precipitation.

Precipitation is less than 22 inches (on average) per year. Evaporation rates approach 30 inches per year, with recharge rates in the Goodspring Creek and Taylor Creek basins being less than 0.35 inches per year. In addition, any surface water/precipitation on this topographic high has to percolate through the clayey soils, prevalent in the area of the Colowyo Mine, into the underlying bedrock. Any water that recharges the bedrock units tends to accumulate along unit contacts since these tend to be areas of least flow resistance. This is exhibited in the highwall of both pits of the Colowyo Mine, where any discharge is easily seen as issuing primarily from these contacts and has been the case since 1981.

Any ground water that has been discharged from the mine highwall has been found to evaporate from the pit floor or be consumed by pit highwall. Past hydrological studies also reveal the mined units tend to have low permeabilities (even the sandstones) and do not allow for large water movement, even if the ground water is present. This is also the case where the ground water is under confined or unconfined conditions (i.e. below the elevation of the valley bottoms).

If any ground water does percolate vertically through the discordant geologic units, it encounters a tonstein bed near the base of the Williams Fork Formation. This bed is

approximately 150 feet above the top of the Trout Creek Sandstone and is approximately 400 feet below the bottom of the active pits. The tonstein bed has an approximate thickness of 2.5 feet. Permeability tests of this material show it has permeabilities greater than 1x10-10 centimeters per second. Thus, this bed is an effective aquiclude and prevents downward movement of any ground water to the underlying Trout Creek Sandstone.

Water Quality

The quality of the water in the area of the Colowyo Mine has been rated as poor by the USGS and designated for limited agricultural use. Since USGS testing in 1978, no water quality analysis performed at monitoring points at the Colowyo Mine have shown any significant difference in water quality compared with what the initial USGS work. The water is slightly saline, alkaline and definitely classified as 'hard' water. This can be seen in the water quality measurements for total dissolved solids (TDS) and electrical conductivity (eC). Both TDS and eC exceed the EPA secondary drinking water standards.

Since the water is alkaline, the pH is above 7, but rarely exceeding 8.4. Concentrations of heavy metals rarely exceed health limits, as stated in the USGS report. This has also been backed up by the shallow ground water monitoring performed since the Colowyo Mine began operation.

Conclusions

The Colowyo Mine has no single or multiple continuous geologic units in the mine that contains ground water under unconfined or confined conditions. The only ground water encountered is the discontinuous perched pockets of ground water. This lack of ground water, except for discontinuous perched ground water pockets, encountered during mining precludes the necessity to monitor ground water on a ridge top.

4.05.13 Surface and Groundwater Monitoring

The current monitoring program can be found in Section 4.05.13 in Volume 15.

4.05.14 Transfer of Wells

Colowyo does not plan to transfer any monitoring wells to water wells.

4.05.15 Water Rights and Replacement

Colowyo, if necessary, will replace the water supply of any owner of interest in real estate who obtains all or part of a supply of water for domestic, agricultural, industrial or other legitimate use from an underground or surface source where the water supply has been affected by the mining operation.

Colowyo does not anticipate that any water supply or water right of any owner of interest will be affected by the mining operation.

4.05.16 Discharge of Water into an Underground Mine

No surface water will be diverted into any underground mine workings.

4.05.17 Post-mining and Rehabilitation of Sedimentation Ponds, Diversions, Impoundments, and Treatment Facilities

No treatment facilities are planned. Approved permanent sedimentation ponds, stock ponds, and permanent diversions will be left in place. These structures will be maintained in an appropriate condition before the Permit area is abandoned by repairing any necessary portions, cleaning sediment and debris out, establishing appropriate vegetation and providing soil stabilization.

4.05.18 Stream Buffer Zones

In accordance with Rule 4.05.18, no land within 100 feet, or greater if required by the Division, of a perennial stream, an intermittent stream, or an ephemeral stream with a drainage area greater than one square mile, shall be disturbed by surface and underground coal mining operations unless the Division specifically authorizes surface or underground mining operations closer to, or through such a stream. Additionally, the area not to be disturbed shall be designated a stream buffer zone and marked as specified in Section 4.02.5.

The locations of the disturbances that have occurred within 100' of a stream buffer zone are described below and are depicted on Map 10C.

Good Springs Creek
Several structures have been constructed or previously existed within 100 feet of Goodsprings Creek and they include Colowyo's access road off of Highway 13 where it crossing Goodsprings Creek and Colowyo's security building. Colowyo constructed the access road to the mine and the security building at the beginning of the Colowyo Mine. To date the access road and guard shack have not created any adverse impacts to Good Springs Creek, and these long term structures are not anticipated to have any long term impacts to Good Springs Creek.

West Fork of Good Springs Creek
The access road to Section 28 Pond off of Highway 13 was not a new disturbance when Colowyo began using it to construct and access the Section 28 Pond. Rather it was premining, pre-existing "ranch" road, that accessed an old ranch home and surrounding valley area. Colowyo made minor upgrades to the road when the Section 28 Pond was constructed. The majority of these upgrades were to allow proper draining through swales across the road. To date the pre-mining ranch road and upgrades have not created any adverse impacts to the West Fork of Good Springs Creek, and it is not anticipated that this road will have any long term impacts either to the West Fork of Good Springs Creek.

Colowyo also has two surface water monitoring and two groundwater monitoring structures (flumes and wells) installed within the stream buffer zone to the West Fork of Goodsprings Creek. This includes LWFGSC, UWFGSC, A-7 and A-8 as presented on Map 10C. All four

monitoring structures have not and will not create any adverse impacts to the West Fork of Goodsprings Creek.

Taylor Creek

Colowyo constructed Haul Road A and B within the stream buffer zone which crosses Taylor Creek. During construction (late 1970's to early 1980's) and to date, the haul roads have not created any adverse impacts to Taylor Creek. These long term structures are also not anticipated to have any long term impacts to Taylor Creek.

In 2018, Haul Road A will be widened to facilitate equipment movement from the existing facilities and South Taylor Pit to the Collom area. Haul Road A will have mechanically stabilized earth (MSE) walls constructed in locations very near to Taylor Creek to limit disturbance and protect Taylor Creek within the stream buffer zone area that already contains the footprint of Haul Road A. Best management practices (BMPs) including silt fence, s-fence, wattles, or other items at the discretion of the field engineer will be installed and maintained during the widening of Haul Road A to protect Taylor Creek. Once Haul Road A outslope is stabilized the BMP's will be removed. Utilization of BMP's during construction and until the outslopes of the road are stabilize will minimize any potential impacts to Taylor Creek. It is anticipated that the Haul Road A footprint will not have any short or long-term impacts to Taylor Creek.

During the widening of Haul Road A, two light use roads will be constructed at the toe of the Haul Road A to provide access to the Taylor Pump Holding Pond and a water rights diversion structure on Taylor Creek. Both structures will have proper BMPs installed and maintained until construction and stabilization of the light use roads is complete. It is not expected that the light use road will have any short or long term impacts to Taylor Creek.

Two sediment ponds were constructed within the stream buffer zone on Taylor Creek. The West Pit Pond embankment lies within 100' of Taylor Creek, and the West Taylor Pond was constructed at the base of the West Taylor Fill and makes up part of Taylor Creek. During construction and to date these structures have not created any adverse impacts to Taylor Creek, and both structures are also not anticipated to have any long term impacts to Taylor Creek.

Much of the upper reaches of Taylor Creek above the West Taylor Pond will be directly impacted by the South Taylor Pit, and the permeant West Taylor Fill (see Map 23A). The West Taylor Pond will protect the lower reaches of Taylor Creek that will not be disturbed during mining and reclamation. It is expected that during mining the South Taylor Pit will intercept and hold surface water runoff thus providing less discharge through the West Taylor Pond. Once mining is complete the entire South Taylor Pit will be backfilled and the pre-mine profile and function of the upper reaches of Taylor Creek will be restored.

One best management practice structure (sediment sump) lies within the stream buffer zone on Taylor Creek. This structure manages storm water runoff from the haul road and provides a benefit to Taylor Creek by capturing stormwater runoff from the haul road. This structure is not anticipated to have any impacts to Taylor Creek, and provides a benefit in protecting stormwater runoff to Taylor Creek.

The Taylor Pump Holding Pond was constructed within 100' of Taylor Creek. The Taylor Pump Holding Pond is utilized to manage water movement from Wilson Reservoir to the active operation; therefore, an underground water pipeline that transports water to and the from the Taylor Pump Holding Pond was also constructed at various locations within 100' of Taylor Creek as shown on Map 10C. Neither of these structures has impacted Taylor Creek, and neither structure is expected to have any long term impacts to Taylor Creek.

A water diversion structure is constructed in Taylor Creek that allows Colowyo to divert water from Taylor Creek to exercise a water right. This structure would be utilized even if mining was not occurring at Colowyo, as Colowyo is the private surface landowner utilizing a privately held water right structure.

A light use road that was a premine "ranch" road follows along Taylor Creek. This road is utilized to access the West Pit, East Taylor, and West Taylor sediment ponds. The road has been improved upon from its premine condition to allow equipment access for dredging activities and continued environmental monitoring. The lower reach of the road where it begins off of the paved haul road up to the East Taylor Pond, snakes in and out of the 100' stream buffer zone off of Taylor Creek. The upper reach from the East Taylor Pond to the West Taylor Pond is almost exclusively within the 100' stream buffer zone due to steep topography. To date this road has not created any adverse impacts to Taylor Creek, and it is not anticipated to have any long term impacts to Taylor Creek.

A light use road along the west side of Taylor Creek to access the 69 kV power line follows along Taylor Creek from the Taylor Pump Holding Pond up to the crossing of Taylor Creek just below the West Pit Pond. This road has been slight improved to access the power line. This road comes into the 100' stream buffer zone in several locations; however, due to the small extent of the road and minor surface runoff from the road, it is not anticipated to have any long-term impacts to the Taylor Creek.

The raw water pipeline to the Collom operation will be routed across Taylor Creek through an elevated structure. An elevated structure minimizes impacts within the stream buffer zone versus other routing options such as boring the pipeline under Taylor Creek, which requires large trenches and greater ground disturbances for equipment to bore under both sides of Taylor Creek. With the elevated structure small disturbances will occur within the stream buffer zone of Taylor Creek. Prior to ground disturbing activities proper best management practices (silt fence or other suitable sediment control measures) will be installed. Topsoil will be windowed and concrete footers will be poured which will provide the base for the structural stability needed to support the pipe over Taylor Creek. Once the pipe and structure steel is installed the limited disturbance areas have the topsoil windrows spread back out and the areas will be seeded. Sediment will be controlled during the construction of these structures and will negate any impacts to Taylor Creek while the ground is disturbed. The sediment control structures will be left in place after reclamation until a suitable vegetative cover has been achieved. The water pipe line and associated infrastructure will not create any long term impacts to Taylor Creek.

For a discussion on stream buffer zones from Wilson Creek, Jubb Creek, and Little Collom Gulch please see Volume 15, Section 4.05.18.

4.06 TOPSOIL

4.06.1 General Requirements

Before the disturbance of any area, topsoil is removed and segregated from other material. Upon removal, this material is either immediately redistributed on regraded areas or stockpiled in locations shown on the Topsoil Handling Maps 28 and 28A.

4.06.2 Removal

All topsoil, as classified in section 2.04.9, is removed from areas to be affected by the surface coal mining operations. The graphical representation of the topsoil removal is shown on the Topsoil Handling Map (Map 28 and 28A). This map has been greatly simplified from that of the original application to reflect actual on-the-ground operations. The techniques for removal of woody plant materials that otherwise would interfere with the usefulness of the topsoil is discussed in Section 2.05.3

Removal techniques for topsoil are described in Section 2.05.3.

A variance from topsoil removal was requested and approved by the Colorado Division of Reclamation, Mining and Safety for the following areas; construction of small structures such as power poles, signs or fence lines, areas of light traffic that do not destroy existing vegetation or cause erosion and areas where removal would result in needless damage to soil characteristics such as sediment control ditches and small water diversions. In most cases, especially on steep slopes, removal of topsoil prior to ditch construction needlessly damages large areas of topsoil, along with the adjacent natural vegetation. Implementation of the technique of cutting the ditches directly into the hillside without topsoil removal will limit needless topsoil disturbance, reduce unnecessary destruction of adjacent vegetation and will facilitate reclamation of the ditches at a future date.

It should also be clarified that consistent with Map 6, Soils – South and Exhibit 9, Volume 19, there will be small areas of rock outcrop, rocky steep slopes, etc. where the topsoil depth is 0 inches. Where this occurs there will not be an attempt to recover topsoil or otherwise disturb the area before disturbance by mining.

Colowyo does not plan to use overburden material for topsoil substitutes or as a supplement to topsoil. Colowyo will remove topsoil before any mining operations commence and always maintain a buffer zone between the area stripped of topsoil and the overburden drilling and blasting operations.. As depicted on the Topsoil Handling Map (Map 28 & 28C), the topsoil handling program will result in an orderly sequence for the continuous removal, storage or reapplication of topsoil. The redistribution of topsoil will be done at a time when the physical and chemical properties of the topsoil can be protected from alteration while minimizing the potential for erosion.

Topsoil and vegetation matter is typically windrowed, sloped and seeded during initial sediment pond construction and saved for reapplication when the pond is reclaimed at a future date.

The pond embankments are constructed utilizing in-place materials directly below the upper topsoil zone. This colluvial material is "topsoil" in nature and will be utilized at a future date for pond reclamation. Since the nature of the embankment material functions readily as a topsoil material, it is not anticipated that additional topsoil will be required for final reclamation of the site. However, if necessary, Colowyo will apply an appropriate amount of topsoil to pond embankments that do not readily revegetate post construction.

4.06.3 Storage

The estimated quantity of topsoil in stockpile is found in Table 2.05-1, Topsoil Balance As Of October, 2005, and in Section 11 of the Annual Reclamation Report. Topsoil stockpiles exist for support facilities and the mining area. All of the existing or proposed stockpiles result where immediate redistribution will not be practical, either because redistribution areas are not available at the time of topsoil removal, or because more topsoil is being removed than what will be necessary for immediate redistribution. Any additional stockpiles may be placed on flat spoil backfill areas or stable portions of the permit area where stockpiles will be protected from external effects of both wind and water erosion. Stockpiles have also been placed to avoid disturbances other than those incidental to their deposition and removal.

Colowyo utilizes a variety of methods to protect topsoil stockpiles from erosion. Colowyo will utilize one or more of the following techniques to protect topsoil from erosion. Small catchment berms and ditches may be employed to route surface runoff away from stockpile areas. Small sumps or dozer basins may be employed to collect runoff. Adjacent disturbance areas may be ripped or otherwise roughened to reduce runoff. Topsoil stockpiles may be strategically placed and constructed to allow runoff to be routed around stockpile locations rather than pond against a stockpile.

Topsoil marker signs will be placed on each stockpile to prevent inadvertent disturbance, unnecessary compaction or contamination.

At the locations where topsoil piles are located on undisturbed land, in place topsoil and vegetation will not be removed prior to stockpiling topsoil. The topsoil stockpiles will be seeded with the following perennial seed mixture to control erosion.

Western wheatgrass	-	4 Lbs PLS/Acre
Thickspike wheatgrass*	-	4 Lbs PLS/Acre
Yarrow**	-	.15 Lbs PLS/Acre

*option to replace Thickspike wheatgrass with Beardless bluebunch wheatgrass or Sheep fescue
**option to replace Yarrow with Cicer milkvetch

Topsoil stockpiles will be drill seeded to the greatest extent possible. The remaining areas will be broadcast seeded.

In those areas where topsoil is stripped and hauled directly back to contoured backfill, some of the established native species can be expected to occur in the revegetated area.

Stockpiled topsoil will not be moved when required for redistribution on disturbed areas prior to seeding. An exception to this can occur to facilitate mining, construction of sediment control ditches, ponds, etc. Approval from the Division will occur prior to moving stockpiled topsoil for purposes other than seedbed preparation.

All topsoil stockpiles should be protected with a ditch and berm around their perimeter to conserve the resource.

4.06.4 Redistribution

After the final grading is completed, the topsoil will be reapplied as shown on the disturbed land areas shown on the Topsoil Handling Map (Map 28 and 28A). Please see section 2.05.4 for topsoil redistribution depth replacement.

Where necessary, to prevent slippage surfaces and promote root penetration the spoil will be scarified by ripping and/or rough grading. This practice will assure a solid bond between the spoil and reapplied topsoil. To date, there is no evidence of topsoil slippage on reclaimed areas. A few small tension cracks resulting from settling of fill and topsoil have occurred in a few areas within a year or two after reclamation, but soon stabilize and begin to fill in.

Since all available topsoil existing on areas to be disturbed will be removed and reapplied, it will be fully capable of supporting growth necessary for the proposed post-mining land use. Compaction will be alleviated through chisel plowing. The method of topsoil replacement most often used at Colowyo, which makes use of dozers, leaves the surface in a rough condition which minimizes wind and water erosion. The use of a chisel plow following topsoil replacement and the construction of contour furrows at the time of seeding or before will also aid in erosion control.

4.06.5 Reconditioning

Topsoil quality at Colowyo is excellent in terms of providing a suitable plant growth medium capable of supporting the approved post-mining land use and the revegetation requirements of Section 4.15. Soil testing has not indicated any deficiencies. Refer to Volume 3, Exhibit 10, Establishment of Native Shrubs on Disturbed Lands in the Mountain Shrub Vegetation Type. This study was conducted on the Colowyo Mine July 1975 through December 1979. Colowyo has the option to apply 50-70 pounds of phosphorus per acre to all safely accessible reclaimed mine areas prior to chiseling and seeding.

4.07 SEALING OF DRILLED HOLES AND UNDERGROUND OPENINGS

4.07.1 General Requirement

Each exploration hole, or other bore hole well or other exposed underground opening encountered during surface mining, will be cased, sealed,. plugged, or otherwise managed to meet the requirements of this Section and described more fully in Section 2.05.4.

Holes used for surface blasting will not be included under the requirements of this Section.

4.07.2 Temporary Sealing

Each exploration hole or other drill or bore hole described in this Section will be protected, inspected and maintained according to this Section. This performance is described more fully in Section 2.02 and 2.05.4 of this application.

4.07.3 Permanent Sealing

Drilled holes no longer needed for monitoring or other approved uses will be backfilled and sealed as described in this Section. This performance is described more fully in Sections 2.02 and 2.05.4 of this application.

4.07.4 Abandonment in Designated Groundwater Basins

This subsection is not applicable to the Colowyo mining plan.

Exploration taking place inside and outside of the permit area will be handled through the Notice of Intent (NOI) procedures. See the appropriate NOI for details for each program.

4.08 USE OF EXPLOSIVES

4.08.1 General Requirements

Colowyo will comply with all applicable State and Federal laws in the use of explosives.

Colowyo will conduct all blasts that use more than five pounds of explosives or blasting agent according to the schedule required by Section 4.08.3.

All surface blasting operations at the Colowyo operation will be conducted by experienced, certified, trained and competent persons who understand the hazards involved. Persons responsible for blasting operations at a blasting site shall be familiar with the blasting plan and any site-specific performance standards. The blaster and at least one other person must be present at the firing of a blast. Each person responsible for blasting operations will possess a valid certification in accordance with the appropriate federal and state law.

Colowyo will not conduct blasting within 1000 feet of any building used as dwelling, school, church, hospital, or nursing facility; and 500 feet of facilities, including but not limited to petroleum or gas storage facilities, fluid transmission pipelines, gas or oil collection lines or water and sewage lines. Distances to various structures of possible concern surrounding the mining area are shown on the Blasting Analysis Map (Map 26A).

By employing the design criteria to minimize air blast and ground vibration Colowyo will insure that flyrock, including blasting material traveling along the ground, will not be cast from the blasting vicinity, more than half the distance to a nearby dwelling or other occupied structure and in no case beyond the line of property owned or leased by the Company or beyond the area of regulated access required under Subsection 4.08.4(5). The minimization of flyrock is also important and routinely monitored in order to reduce damage to mining equipment.

4.08.2 Pre-Blasting Survey

Upon request to the Division by a resident or owner of a dwelling or structure located within one-half mile of any part of the permit area, Colowyo will promptly conduct a pre-blasting survey. A copy of correspondence advising our neighbors of this. opportunity is provided in Exhibit 14 - Seismograph Measurements, Item 2. A report of the survey will be submitted to the Division and to the person requesting the survey. The pre-blasting survey will assess the condition of the structure or dwelling and document any pre-blasting damage, including any physical factors which might be reasonably affected by blasting. Such a survey will determine only the surface condition of pipes, cables, transmission lines, wells and other water systems; however, special attention will be given to the pre-blasting conditions of wells and other water systems used for human, animal or agricultural purposes and to the quantity and quality of that water.

A written report of any pre-blasting survey will be prepared and signed by the person conducting the survey. This report will include any proposed adjustments to the blasting program which might be necessary to be incorporated or should be incorporated to prevent damage. A copy of the report will be provided to the person requesting the survey and to the Division. For properties owned by Colowyo, a pre-blast survey will not be necessary.

In a report dated February 19, 1991 Colowyo initiated and reported on a Building Condition Inspection of the Durham Ranch. Although the Durham ranch was located further than one-half mile from the Permit Boundary at that time (approximately 4200 feet) the inspection was nevertheless completed. The Durham Ranch residents were also presented with a copy of the report. On May 20, 1997 an additional copy of the report was presented to the Durhams and also a copy forwarded to the Division. A copy of the May 20, 1997 letter can be found in Exhibit 14 - Seismograph Measurements.

4.08.3 Public Notice of Blasting Schedule

The blasting program at the Colowyo operation will involve the detonation of more than five pounds of explosives or blasting agent in all blasts. Colowyo will annually publish a blasting schedule in the local Craig newspaper. A typical blasting schedule published in the local newspaper is set forth in Section 2.05, Figure 2.05-1, Publication of Blasting Schedule.

Copies of the blasting schedule will be republished and redistributed every 12 months by mail to local governments and public utilities and by mail or delivered to each residence within one-half mile of the blasting site described in the schedule.

1. Destruction of damaged or deteriorating explosives or detonators; or
2. Disposal of misfires and/or undetonated explosives; or
3. Firing of charged holes as soon as practicable after cessation where electricity or stray current conditions where electric detonators are used; or
4. Firing of charged holes when weather conditions indicate the existence of a safety hazard is eminent

Colowyo gives warning and all-clear signals of different characters that are audible- within a range of one-half mile of the blast. Individuals within the permit area and individuals who reside or work within one-half mile of the mining area will be notified of the meaning of the signals through appropriate written instructions. Colowyo will periodically inform such individuals of the proposed blasting schedule and inform them of the meaning of the signals. Colowyo will also maintain signs in accordance with Section 4.02.

Colowyo will regulate access into the area possibly subject to flyrock from blasting to protect the public and livestock. Fences are in place to keep livestock out of the mining areas. The permit area will be identified by signs on the access road restricting entry to authorized personnel. Signs will also be posted identifying the area as a blasting area and describe the warning and all-clear signals. Immediate access to the area of blasting will be cleared and controlled by qualified mine personnel prior to any blast.

Colowyo will control air blast from its blasting operations within the permit area so it does not exceed the values specified by the chart set forth in Rule 4.08.4(6). The same design factors utilized to control the seismic effects of blasting (i.e.: the use of numerous surface delays to "spread" the shots out over time, particularly near residences) is also very effective in controlling airblast. Additionally, to keep airblast to a minimum Colowyo uses various other methods to ensure airblasts are kept in compliance.

Colowyo will not conduct blasting within 1000 feet of any building used

4.08.4 Surface Blasting Requirements

Colowyo will conduct all blasting operations during daylight hours between sunrise and sunset as set forth in the blasting schedule in Section 4.08.3.

Warnings and notices of unscheduled blasting between sunset and sunrise that cannot be delayed until the next day due to unavoidable hazardous conditions will be provided in accordance with the requirements of this Section.- oral notices will be provided to residents or owners of dwellings within one-half mile of the blasting site within 24 hours prior to any blasting which might be conducted between sunset and sunrise. A complete written report of the blasting at night describing in detail reasons for delay in blasting, including- why the blast could not be held over for the next

day, when the blast was actually conducted, the warning notices given, and a copy of the blast report will be filed- by Colowyo with the Division, but not later than three days after the night blasting.

Colowyo will conduct blasting at times announced in the blasting schedule except in those unavoidable hazardous situations, previously approved by the Division in this application. Unavoidable hazardous situations can exist if safety requires:

1. Destruction of damaged or deteriorating explosives or detonators; or
2. Disposal of misfires and/or undetonated explosives; or
3. Firing of charged holes as soon as practicable after cessation where electricity or stray current conditions where electric detonators are used; or
4. Firing of charged holes when weather conditions indicate the existence of a safety hazard is eminent

Colowyo gives warning and all-clear signals of different characters that are audible- within a range of one-half mile of the blast. Individuals within the permit area and individuals who reside or work within one-half mile of the mining area will be notified of the meaning of the signals through appropriate written instructions. Colowyo will periodically inform such individuals of the proposed blasting schedule and inform them of the meaning of the signals. Colowyo will also maintain signs in accordance with Section 4.02.

A resident or owner of a dwelling or structure that is located within one-half mile of the location of the blast, as described in the annual blasting schedule, shall be notified no less than 24 hours prior to any surface blasting or less frequently as each resident occupant in such areas shall approve in writing to the Division.

Colowyo will regulate access into the area possibly subject to flyrock from blasting to protect the public and livestock. Fences are in place to keep livestock out of the mining areas. The permit area will be identified by signs on the access road restricting entry to authorized personnel. Signs will also be posted identifying the area as a blasting area and describe the warning and all-clear signals. Immediate access to the area of blasting will be cleared and controlled by qualified mine personnel prior to any blast.

Colowyo will control air blast from its blasting operations within the permit area so it does not exceed the values specified by the chart set forth in Rule 4.08.4(6). The same design factors utilized to control the seismic effects of blasting (i.e.: the use of numerous surface delays to "spread" the shots out over time, particularly near residences) is also very effective in controlling airblast. Additionally, to keep airblast to a minimum Colowyo also routinely 1) utilizes reduced weight (12 grain Zap) surface primer cord, 2) uses proper stemming material, 3) uses a proper stemming weight, 4) avoids overdigging the front row of holes and 5) avoids overloading the front row of holes.

Colowyo does perform event triggered monitoring. However, Colowyo will not commit to daily monitoring due to unforeseen circumstances where the seismograph monitoring unit may be getting repaired or calibrated. Colowyo employs an Instantel Inc. Minimate Plus

seismograph/microphone with a low frequency limit of 2 Hz which corresponds to an airblast standard of 133 dB (peak). Records of airblast monitoring will contain the information required by Rule 4.08.5(17). This information will include either a recording of the calibration signal of the monitoring instrument's gain setting at the time of each blast, or certifications of the instrument's annual calibration.

Colowyo will conduct blasting to prevent injury to persons and damage to public or private property outside the permit area. Colowyo will insure that the maximum peak particle velocity will not exceed the criteria as prescribed by utilizing the equation found in Rule 4.08.4(10) (b) (i) when conducting blasting operations that could affect any dwelling, public building, school, church, or commercial or institutional building. As shown in the Blasting Analysis Map (Map 26A) Colowyo has determined the maximum pounds of explosives per 8ms period of time for variable distance from any such structures.

The number of blast holes detonated per 8ms period will be calculated according to the equation in Rule 4.08.4(10)(c)(i) in order to determine the maximum weight of explosive that can be detonated within any eight ms period.

4.08.5 Records of Surface Blasting Activities

Colowyo will record all blasts including coal, overburden, and overburden pre-split blasts in a format as shown in Section 2.05, Figure 2.05-2, Blasting Report, which conforms to the requirements of 4.08.5. Conducting blasting operations in accordance with the equation in 4.08.4(10)(c)(i) deems peak particle velocities from blasting to be within the regulatory limits described in 4.08.4(10). Periodic airblast monitoring occurs at Colowyo. The monitor is located along Moffat County Highway 13 at the Durham/Ott Ranch. Records of airblast monitoring described on page 2.05-30 will contain the information required by Rule 4.08.5(17). This information will include either a recording of the calibration signal of the monitoring instrument's gain setting at the time of each blast, or certifications of the instrument's annual calibration.

4.08.6 Seismographic Measurements

Colowyo will use the explosives equation found in Subsection 4.08.4 (10)(b)(i) to limit the number of blast holes per 8ms period of time such that the peak particle velocity limit of one inch per second will not be exceeded.

On June 19 and 20, 1979 initial seismic monitoring of shots at the Colowyo operation was conducted. The results of this seismographic work are set forth in Exhibit 14, Seismographic Measurements.

4.09 DISPOSAL OF EXCESS SPOIL AND UNDERGROUND DEVELOPMENT FILL WASTE

To develop the West Pit and Section 16 Pit, it was necessary to construct two excess spoil fills from material in the initial cuts. The designs detail for these fills is presented in Exhibit 19 – Geotechnical Investigations, West Pit Fill and Section 16 Fill.

The volumetric balance indicating excess spoil will be generated and disposal of excess spoil will be required is found in Section 2.05.3.

In 2006, monitoring and reporting requirements for the Section 16 Fill concluded. Since 2006, the Section 16 Fill and corresponding reclamation areas have been fully Phase III released.

In 2018, all monitoring and reporting requirements for the West Pit Fill concluded. This occurred as the requirements of Rule 4.09.1 and 4.09.2 had all been met for the West Pit Fill.

4.10 COAL PROCESSING WASTE BANKS

No coal processing waste banks are planned for the Colowyo mining operations. Therefore, this section is not applicable to this application.

4.11 COAL PROCESSING WASTE

Colowyo does not have a coal preparation facility, therefore the requirements of certain parts of this Section are not applicable to Colowyo.

4.11.1 Burning

(Not Applicable)

4.11.2 Burned Waste Utilization

(Not Applicable)

4.11.3 Return to Underground Workings

(Not Applicable)

4.11.4 Disposal of Noncoal Waste

Noncoal, nonhazardous solid waste, such as garbage, used tires, etc., is stored in a controlled manner around the operation in various waste receptacles and waste locations. Periodically the waste is disposed of in the backfill area of the pit and covered with a minimum of two feet of overburden material. No waste is allowed on the bottom of the backfill area or below the anticipated groundwater level of backfilled areas.

Facility structures including but not limited to concrete foundation will be demolished in-place and covered with a minimum of six feet of suitable material. The area will be regraded to blend with the surrounding topography followed by topsoil and seeding as described in the reclamation plan. All demolition materials related to sedimentation ponds will be placed within the ponds a covered with a minimum of six feet of suitable material or transported to the pit area during the

reclamation process. Noncoal, nonhazardous solid waste is regulated under the Moffat County Special Use permit identified in Section 2.03.10.

Nonhazardous used oil and grease, flammable liquids, etc. are stored in a tank farm facility located near the shop facilities.

Colowyo's status as a conditionally exempt small quantity generator of hazardous materials essentially indicates that Colowyo generates negligible amounts of hazardous waste. The limited amount of hazardous waste is handled according to applicable State and Federal requirements.

Waste water from toilets, sinks, and showers will be disposed of by means of septic tanks, underground leach fields and evaporation ponds.

Portable self-contained toilets will be located around the operation. These portable toilets will be serviced periodically and the waste hauled from the mine for disposal.

4.11.5 Dams and Embankments

(Not Applicable)

4.12 SLIDES AND OTHER DAMAGE

Because of the mining technique used at the Colowyo operation and the inherent nature of the coal geology, no natural barriers will be necessary.

At any time a slide occurs within the permit area which may have a potential adverse affect on public property, health, safety, or the environment, Colowyo will notify the Division or other appropriate governmental agencies and comply with any remedial measures necessary.

Higher than normal precipitation occurred in northwest Colorado in 1984 and 1985 causing numerous landslides and slope failures throughout the region. One such slide occurred on a section of the paved haul road and remedial actions were necessary to stabilize the area. This area has remained stable since implementation of the remedial measures.

At approximately 6:29 pm on June 30, 2012 Colowyo's Meteorological Station recorded wind gusts up to 81.65 miles per hour. Within several minutes, Colowyo employees identified smoke coming from the area immediately North of the mine access road West of the Lower Administration building.

After securing the scene for the safety of employees and the local responder crews including BLM, Moffat County and Rio Blanco County resources, Colowyo supervisors immediately sent heavy equipment to the Eastern and Western extents of the area actively burning and constructed fire lines approximately 20 feet wide along a defendable perimeter.

The source of the fire was determined to be power lines contacting the ground due to a power pole being snapped in half on the 25KV White River Electric Association line that runs parallel with

the mine access road on the North side of the road. This line provides power to the Gossard Loadout Area and associated facilities in the Axial Basin.

In 2012, approximately 5 acres within Colowyo's permit boundary was affected by the moderate intensity fire as shown on Figure 4.12-1. The area is comprised of a mix of wheatgrass and low density sagebrush. Additional surface disturbances within the permit boundary were created as a result of the necessity to facilitate replacement of the broken power pole, re-hanging of the lines, and access corridors on the Western and Eastern side of the fire for construction of the fire lines. Approximately 26 additional acres burned outside of Colowyo's permit boundary on Colowyo private property, primarily in low density sagebrush rangeland. A few acres of inactive wheat fields were also burned comprised mostly of volunteer winter wheat.

The relatively low intensity nature of the fire does not appear to warrant or require supplemental seeding within the permit boundary, however the areas impacted by the fire line and power pole repair access will be smoothed over as soon as possible and broadcast seeded with the approved sagebrush steppe reclamation seed mix as fall approaches.

In 2013, approximately 0.96 acres within Colowyo's permit boundary (outside the disturbance boundary) were affected by a small intensity wildland fire shown on Figure 4.12-2. The area that was affected was comprised of a mix of Gambel's Oakbrush, Mountain Mahogany, and low density sagebrush. A small area of 2011 reclamation was disturbed by Colowyo personnel to create an access to the fire and to also create a fire line to control the fire from spreading. Colowyo promptly repair the access road through the reclamation and reseeded it with the approved seed mixture soon after extinguishing the fire.

Tri-State Generation and Transmission Association, Inc. (Tri-State), owns and operates a 345 kV power line which is located within the permit boundary and is shown on Maps 21, 22, and 22A. Tri-State requires access to maintain their power line, and will at their discretion improve existing ranch roads and/or construct new roads to access their power line within the permit boundary. Any ground disturbing activities associated with Tri-State's 345 kV line are outside of Colowyo's permitted disturbance boundary, and are not related to Colowyo's mining activities. Therefore, these activities are not required to be permitted and bonded for in accordance with Rule 3.02.1(2).

In February of 2016, the Colowyo Mine site experienced a very high wind event which snapped a power pole off at the base and left the power pole dangling from the line. Colowyo constructed an emergency road into the pole location (0.4 acres of disturbance) to access the location, stabilize the line, and replaced the broken pole. Topsoil was windrowed with a dozer down gradient of the road footprint to minimize surface water flow from the area of disturbance to native areas. Once ground conditions allow access, the entire road footprint will have the topsoil re-spread on the area, and it will be seeded in accordance with the approved reclamation seed mixture. Please see Figure 4.12-4 for a location of the emergency road that was constructed to repair the power pole.

In 2016, approximately 4 acres within Colowyo's permit boundary was affected by the moderate intensity wild land fire. The location of the fire is shown on Figure 4.12-5. The area that was burned is mostly comprised of Gambel's Oakbrush and low density sagebrush. Additional surface disturbance within the permit boundary of approximately 1.4 acres was created to cut in a fire line to control and fight the fire. The relatively low intensity nature of the fire does not appear to

warrant or require supplemental seeding; however, the area impacted by the fire line will be smoothed over and seeded with the approved reclamation seed mix.

In the fall of 2016 and spring of 2017 White River Electric Association (WREA) installed and removed power lines located within the Colowyo permit boundary. The power lines that were serviced are located adjacent the Gossard Loadout facility (an overhead line will be buried) and Jubb Creek (new overhead line) north towards Moffat County Road 32. These power lines that were installed and removed are owned and operated by WREA. The final locations that will be serviced and potentially create ground disturbance will be determined by WREA. These ground disturbing activities are not associated with the Colowyo's mining activities, and will not be required to be permitted nor bonded for in accordance with Rule 3.02.1(2).

In 2017, Chevron dug up and capped an existing unused oil line in several locations just south of the Gossard Loadout facilities within the Colowyo permit boundary. These ground disturbing activities are not associated with the Colowyo's mining activities, and will not be required to be permitted nor bonded for in accordance with Rule 3.02.1(2).

At various times during the mine life of the Colowyo operation, Colowyo as a private landowner, will construct new ranch roads and/or repair or upgrade existing ranch roads within the permit boundary. These activities are not associated with the mining operation and will only occur outside of the permitted disturbance boundary. Please see Maps 19, 19B, and 19C for the permitted disturbance areas. The construction and/or repairs to these ranch roads will facilitate ongoing private landowner activities including ranching, grazing, hunting, and access for other entities which hold right of ways within the permit boundary. These ranch roads activities are not associated with Colowyo's mining activities, and will not be required to be permitted nor bonded for in accordance with Rule 3.02.1(2).

White River Electric Association (WREA) will construct, operate, and maintain a 69 kV power line from the Axial Basin substation adjacent to State Highway 13 to the Collom facilities area. This power line will be wholly owned by WREA. The ground disturbing activities associated with construction of the power line, including pole locations and roads to pole locations, are not associated with Colowyo's mining activities, and will not be required to be bonded in accordance with Rule 3.02.1(2). The power line will service the area post-mining in Collom.

Tri-State Generation and Transmission Association, Inc. (Tri-State) owns and operates the Axial Basin Substation, which provides electrical services locally in the Axial Basin area including to Colowyo. Tri-State will be expanding the footprint of the substation within the permit boundary on the east and west side of the current substation location. The ground disturbing activities from the expansion of the Axial Basin Substation are not associated with Colowyo's mining activities, and will not be required to be permitted nor bonded for in accordance with Rule 3.02.1(2).

In 2018, approximately 22 acres within Colowyo's permit boundary (outside of the disturbance boundary) was affected by the wild land fire caused by a lighting strike. The location of the fire is shown on Figure 4.12-6. The area that was burned is mostly comprised of pinyon juniper and low-density sagebrush. Because the fire was not related to Colowyo's mining activities, Colowyo, as the surface landowner will reseed or managed the post-fire area, as it deems appropriate.

In 2019, the surface landowner replaced a culvert under the Taylor Creek Access Road (please see Map 25C for location of the road) to support long-term access up the Taylor Creek drainage. Minimal ground disturbance was associated with replacing the culvert. Since the activity is related to the surface landowner, it is not permitted and bonded for in accordance with Rule 3.02.1(2).

In 2019, approximately 13.5 acres within Colowyo's permit boundary (outside of the disturbance boundary) adjacent to the Collom Haul Road was affected by the wild land fire caused by high winds slapping power lines together. The location of the fire is shown on Figure 4.12-7. The area that was burned is mostly comprised of sagebrush. Because the fire was not related to Colowyo's mining activities, Colowyo, as the surface landowner will reseed or managed the post-fire area, as it deems appropriate.

Tri-State Generation and Transmission Association, Inc. owns and operates a 138kV power line that traversers through the east portion of the permit boundary. The 138kV line runs north to south through the reclaimed East Pit, and just east of the reclaimed Section 16 Pit. To ensure access to all pole locations along the power line for maintenance and emergency repairs, Tri-State will be improving existing ranch roads and/or constructing new roads to access their power line within the permit boundary. Most of this activity will take place south of the reclaimed East Pit and outside of Colowyo's ground disturbance and reclamation areas. Nonetheless, some of these access locations will traverse across Phase III released areas (Section 16 reclamation areas) and reclaimed areas including reclamation units EP056 and EP060 (please see annual reclamation report maps for the location of these reclamation units). For the approximate alignment for this access road please see Map 22A. Since these ground disturbing activities are not related to Colowyo's mining activities, the roads will not be permitted and bonded for in accordance with Rule 3.02.1(2).

In 2021, White River Electric Association upgraded their existing power line within the permit boundary and added to this existing line along Moffat County Road 51 to service customers in the area of Wilson Creek. All ground disturbing activities associated with the upgraded power line and the new power line construction is associated with White River Electrical Association and not Colowyo; therefore, it is not permitted for Colowyo nor required to be bonded for in accordance with Rule 3.02.1(2).

In 2021, approximately 641 acres within Colowyo's permit boundary, directly adjacent to the east side of the Collom Pit, was affected by a wild land fire. The location of the wild land fire is shown on Figure 4.12-8. The area that was burned is mostly comprised of sagebrush. Additional surface disturbance within the permit boundary of approximately five acres was created to cut in a fire lines to control and fight the fire. The relatively low intensity nature of the fire does not appear to warrant or require supplemental seeding; however, the areas impacted by the fire lines will be roughened, seeded with the approved reclamation seed mix, and reported in the annual reclamation report.

On September 28, 2022, approximately 11 acres within Colowyo's permit boundary, directly adjacent to the Gossard Loadout was affected by a wild land fire. The location of the wild land fire is shown on Figure 4.12-7. The area that was burned is mostly comprised of sagebrush. The local Bureau of Land Management field office determined the fire was due to a bird striking a power line and the fire was not related to Colowyo's mining operations.

On July 29, 2023, approximately 3.2 acres within Colowyo's permit boundary, south of the administration building was affected by a wild land fire. The location of the wild land fire is shown on Figure 4.12-4. The area that was burned is mostly comprised of sagebrush and serviceberry. The cause of the fire was determined to a bird striking a power line and the fire was not related to Colowyo's mining operations.

4.13 CONTEMPORANEOUS RECLAMATION

All reclamation actives, including but not limited to backfilling, grading, topsoil, replacement and revegetation, will be carried out as contemporaneously as practicable with mining operations. Implementation of the reclamation plan, as described in Section 2.05.4, will assure that each step in the reclamation process is completed in a timely manner.

Because of the multi-seam nature of the mining operation described in Section 2.05, backfilling and grading cannot be completed within 180 days following the coal removal. Backfilling and grading will be completed in variance of the 180 day requirement in a manner previously approved and described below, and in Sections 2.05 and 4.14.1. A series of benches will be necessary in the operation to recover the lower coal seams, and an additional series of benches will be necessary to dump the shovel/truck overburden material in a configuration that achieves the topography shown on the post-mining Topography Map (Map 19). When multi-seams are mined, backfilling and rough grading cannot begin until the lower-most seam is mined. See Spoil Grading Map (Map 29), which shows the time frames in which grading will occur.

Topsoil will be removed prior to the mining disturbance according to the timetable established on the Topsoil Handling – South Map (Map 28). As can be observed from this map, the initial topsoil removed at the operation must be stockpiled; however, as the operation progresses, topsoil can be immediately redistributed rather than stockpiled.

Revegetation will commence as soon as the topsoil has been redistributed and prepared for seeding as described in Section 2.05.4. The area will be seeded with the seed mixture described in Section 2.05.4 as quickly as possible.

4.14 BACKFILLING AND GRADING

4.14.1 General Requirements

The mining operations of Colowyo will not employ the use of contour mining methods.

The following sample of calculations show that Colowyo does not have thin or thick overburden as defined in Subsection 4.14.4 or Subsection 4.14.5. These calculations represent the approximate conditions found in the field and show that there is always more than enough overburden to reestablish the original elevation. As explained in the 1983 Annual Report, Colowyo currently uses an average 20% swell factor for planning purposes. Dragline swell is estimated to be 23%, and truck/shovel swell is estimated to be 17%. Approximately 45% of the overburden is removed by dragline, and 55% by truck/shovel. Since all mining at Colowyo was conducted by truck/shovel methods through 1979, the life-of-mine swell factor has continued to increase.

Example: 363 feet overburden, 47 feet coal, (these conditions are found along the western edge of the pit in 1988), 20% swell factor

363 feet	+	20% swell	=	final thickness =	1.06
363 feet	+	47 feet		initial thickness	

Example: 356 feet overburden, 49 feet coal (these conditions are found along the western edge of the pit in (1988), 20% swell factor

356 feet	+	20% swell	=	final thickness =	1.05
363 feet	+	49 feet		initial thickness	

The original permit application utilized at 17% swell factor to project the anticipated postmining topography.

During the initial permit review process the anticipated swell factor was subsequently revised to 23% to allow for sufficient pit development. At that time, excess swell was anticipated to raise the elevation of the postmining topography by about 5.3 feet, compared to the premining topography. As explained above, in 1984, as part of the 1983 Annual Report, Colowyo further refined its estimates based on measurements to date, and currently uses an overall 20% swell factor for estimating purposes. As indicated in the Annual Reports, the stripping accomplished by draglines can vary from 40% to 45% and from 55% to 60% for truck/shovel. Swell factor will continue to be monitored and the postmining topography adjusted, if necessary. Any adjustments will be minor, will be done gradually and will not affect the reclamation plan or postmining land use. Particularly, drainage channel gradients will not be changed; an entire drainage channel elevation could possibly be revised, but the gradient would remain as designed. If a change would be necessary, the dump plan elevations would be revised as appropriate.

The mining plan, as described in Section 2.05.3, was a soundly designed and engineered open pit mining plan, which maximized coal conservation and recovery while minimizing adverse environmental impacts. Because of the multi-seam mining configuration used by Colowyo, an exemption from the 180 day or four spoil ridge limitation was and still is necessary. The mining plan was designed as a continuously moving open pit operation with the mine advancing approximately parallel to the dip of the numerous coal seams. The mining operation progressed from a southward direction with shovels/trucks/ proceeding along the entire length of the mining area uncovering the upper coal seams and the draglines uncovering the lower coal seams. With the numerous benches used in an open pit operation, the mine area was opened for some time, and backfill and grading operations are occurring now in the West Pit.

As the mining operations remove coal seams (In the southward progression), the mining area must be left open until such time as the lower-most coal seam can be recovered. With the mining configuration, the time differences between mining the upper-most seam versus the lower-most seam will obviously be greater than 180 days. As the operation advances, backfilling will be as contemporaneous as practical but not so as to interfere with removal of the lower-most coal seam.

Colowyo will rough backfill and grade as shown on the Spoil Grading Map (Map 29) by methodically and actively dumping and backfilling overburden in the West and East pits very close to final contour so that minimal work will be needed to complete final re-grade of these areas in the future. All disturbed areas will be returned to the approximate original contour by grading and backfilling with the use of a dragline, trucks, dozers, scrapers and dozers assisting a dragline. Additional detail of the backfilling and grading for the mining operation is set forth in the discussion under Sections 2.05.3 and 2.05.4.

The area to be mined will be restored to a topography approximating premining grades. The outslopes of the completed fill in Streeter Draw and areas backfilled, as necessary, will utilize terraces and/or contour furrows for erosion control and stability. These terraces and contour furrows will be constructed according to the requirements outlined in Section 2.06.2. Where applicable, Colowyo will retain all overburden and spoil on the solid portion of existing benches. The final graded slopes will not exceed the approximate original premining slope grade as shown on the Postmining Topography Map (Map 19). Postmining surface drainage channels will be located to minimize erosion and to minimize slippage.

The final pit highwalls will be eliminated in Section 16 by backfilling X seam overburden materials from the West Pit mining area to achieve the final topography. Rehandle of the X seam overburden will be occur concurrently with the advance of the multiple-seam advance during the 2003-2010 period. Also, as mining advances into the final pit, the working area on the pit spoil side will decrease to a point where insufficient spoil room below the proposed postmining contours is available. When that point is reached, material will be temporarily placed above the proposed postmining topography. When the final pass of the West Pit is mined out, this temporarily-placed spoil will be rehandled concurrently with Section 16 virgin and rehandle material to fill and slope the pit to the configuration shown on Map 19 (Postmining Topography). Because the area will be redisturbed by the rehandle activities, that portion of the north end of Section 16 that is above final grade will not be topsoiled or otherwise reclaimed until final reclamation.

Final reclamation of the East Pit will take place via the sequence shown on Map 29 (Spoil Grading – South Area) with the reclamation blocks advancing from east to west or from the topographic bottom to the topographic top of the mining areas. Just as in the West Pit, all disturbed areas will be returned to approximate original contour by grading and backfilling with the use of draglines, trucks, dozers, scrapers and dozers assisting a dragline. As reclamation of the East Pit progresses, all non-reclaimed areas will be contained so that any residual runoff from these areas will be isolated within the remainder of the East Pit. All methods of erosion control and stability such as contour ditches, contour furrows, internal ditches and internal sumps will be established on an as-needed basis to ensure the integrity of the Prospect Pond and the surrounding areas include the final East Pit Ditch. Closure of the East Pit is dependent on the final reclamation and closure of the West Pit as the western most portion of the East Pit will tie-in with the West Pit in this area.

A haul road corridor from the Administration/Shop area to the South Taylor Pit will remain in place until final reclamation is completed in that area. The corridor is sufficient in width to provide a material balance as the corridor is regraded to the post mine topography. The administration/shop/facilities area will be the last area to be reclaimed. A light duty road intended for post mining use may be left as a postmining feature in this corridor with land owner consent.

In addition, Colowyo controls additional coal reserves west and south of Section 9 and 16, outside of Permit C-81-019, that may be considered for future mine expansion. It is possible that the final plans for Section 16 and Section 9 could change to provide for such expansion, with any plan changes being addressed through an appropriate permit revision.

4.14.2 General Grading Requirements

The final graded slopes at the mining operation will not exceed the approximate original premining slope grade as shown on the Postmining Topography Map (Map 19). Colowyo will retain all overburden and spoil material on solid portions of existing or new benches. The final highwall at the operation will be eliminated by backfilling overburden into the final pit area.

Small depressions of a holding capacity slightly greater than one cubic yard of water may be used to create a moist micro climate to aid in shrub establishment. See Section 2.05.4, Planting and Seedings Methods for further information regarding these small depressions. Also, several stock watering ponds will be constructed to compliment the postmining land use. Providing a supply of water is an integral part of the grazing postmining land use. Colowyo will not be mining on any slopes above 20° as shown on the Premining Topography Map (Map 18).

Final grading before topsoil placement will be conducted in a manner that minimizes erosion and provides a surface for the topsoil that minimizes slippage. Final grading will be accomplished so that overall grades will not exceed lv:3h. The plan for backfilling and grading is shown graphically on the Spoil Grading Map (Map 29).

4.14.3 Covering Coal and Acid and Toxic Forming Materials

Colowyo will not have any exposed coal seams remaining at the end of mining and reclamation. Colowyo does not have any acid forming materials at the mine. For discussion on acid- and toxic-forming materials, refer to Section 2.04.6. For disposal of noncoal wastes or materials constituting a fire hazard, refer to Section 4.11.4.

4.14.4 Thin Overburden

Colowyo does not have a thin overburden situation as explained in Section 4.14.1.

4.14.5 Thick Overburden

Colowyo does not have a thick overburden situation as explained in Section 4.14.1.

4.14.6 Regrading or Stabilizing Rills and Gullies

The implementation of soil stabilizing practices outlined under Section 4.15.4 will lessen the possibility that erosion can become a serious problem. Colowyo plans to continue using surface manipulation techniques such as chisel plowing to reduce compaction and contour ditches/furrows

to minimize overland flow over any long, uninterrupted slope. These methods have been shown to be highly successful in controlling erosion at Colowyo.

Rills and gullies which form in areas that have been regraded and topsoiled and which either (1) disrupt the approved postmining land use or the reestablishment of the vegetative covers or (2) cause or contribute to a violation of water quality standards for receiving streams will be identified during the spring of each year. Regraded and topsoiled areas will be visually inspected and rills and gullies identify. Colowyo will submit a report which provides a general description of the identified rills and gullies, activities undertaken to remediate these areas, time frames of repair, a description of any re-topsoiling and re-seeding activities, and a map identifying the problem areas on a scale of 1-inch equals 500-feet. This report will be submitted annually no later than June 15 of each year.

As rill or gully features are identified for remediation Colowyo will utilize appropriate manpower and equipment depending on the ground conditions and the extent of the erosion. This shall include but is not limited to small track dozers, blades, and small rubber tired farm tractors. Repairs will take place within three months of the visual inspections being completed. If ground conditions are such where soil conditions are not favorable, repair will commence as soon as ground conditions allow equipment to access the area without creating additional disturbance. As soon as any repair takes place the area shall be seeded with the appropriate seed mixture. Generally, remediation work will commence when soil conditions are suitable each year.

During repair of any rill or gully Colowyo will first identify and salvage any topsoil that may have been repositioned by erosion. This topsoil will be salvaged, stockpile in a location that is easily accessible by equipment making repairs, and re-applied after the repair of a rill or gully is complete. Once repairs are complete, topsoil will be re-applied to the disturbed area and re-seeded to the appropriate seed mixture. Colowyo is committed to preserving the topsoil resources and utilizing it appropriately through approved reclamation practices.

Remediated areas will be monitored for one year following repair, and should the area appear to be stabilized monitoring will be discontinued for that area. Areas that continue to exhibit unstable conditions will be remediated again and monitored for another year.

4.15 REVEGETATION REQUIREMENTS

4.15.1 General Requirements

Colowyo will establish on all affected lands within the mining area an appropriate post mining vegetation community. Please see Section 2.05.4 for a detailed description of the reclamation plan and Section 2.05.5 for a description of the post mine land use targets that will be implemented to achieve revegetation success. Outlined in this section are the revegetation metrics that will be used to demonstrate successful reclamation has been achieved that supports the post mining land use of rangeland with the two corresponding subcomponents of grazingland and wildlife habitat.

4.15.1(4) Vegetation Monitoring

The monitoring plan will evaluate the success of shrub and herbaceous vegetation establishment, and track progress toward achieving reclamation goals in the following manner:

1. Sampling of herbaceous vegetation will take place during the peak of the growing season when the vegetation reaches the mature stages and is most easily identified. This period of time is generally from late June to late August.

2. Unlike sampling for bond release purposes, sampling is for informational purposes and will not be required to meet statistical adequacy.

3. During the second and fourth growing seasons, herbaceous cover and woody plant density information will be gathered to the species level, and will consider the effectiveness of the seed mixture and volunteer species. Seven year and older monitoring will utilize ground cover and density sampling, and will include a modest current annual production sampling.

4. The data and an assessment of the monitoring results for that year will be submitted in the Annual Reclamation Report.

4.15.2 Use of Introduced Species

For pre-2008 revegetation (especially pre-2002 revegetation), the rangeland seed mixture used at that time included some introduced species, including Intermediate Wheatgrass (*Agropyron intermedium*), Siberian Wheatgrass (*Agropyron sibericum*), Pubescent Wheatgrass (*Agropyron trichophorum*), Smooth Brome (*Bromus inermus*), Orchard Grass (*Dactylus glomerata*), Vinall Russian Wildrye (*Elymus junceus*), Durar Hard Fescue (*Festuca ovina duriscula*), Timothy (*Phleum pratense*), Kentucky Bluegrass (*Poa pratensis*), Lutana Cicer Milkvetch (*Astragalus cicer*) and Alfalfa (*Medicago sativa*).

Of the thirty-one species in the pre-2008 seed mixtures, twenty-one species were native, which on a seed-weight basis accounts for 65% of the planted seeds. Studies and experience have demonstrates some beneficial uses for introduced species considering erosion control and forage for livestock and wildlife, but are no longer a component of the desired post-mining vegetation communities.

For post-2008 revegetation, the seed mixes (please see Tables 2.05.4-7 through 2.05.4-9) are comprised entirely of native species, except with the inclusion of modest quantities of small burnett or nitrogen fixing legumes such as cicer milkvetch or alfalfa as supplemental forage for wildlife.

4.15.3 Seeding and Planting

Please refer to the reclamation plan found in Section 2.05.4

4.15.4 Mulching and Other Soil Stabilizing Practices

As addressed in Section 2.05.4, Colowyo currently does not mulch, chisel plow, or terrace, because experience demonstrates sufficient surface roughness survives the topsoil laydown process to maintain favorable seed-bed conditions. If conditions warrant additional topsoil manipulation, Colowyo will utilize an appropriate practice specific to the circumstance. Best management practices, such as minimizing topsoil handling and manipulation, ripping along the contour, disking, or cross ripping will be implemented and are further discussed in Section 2.05.4.

4.15.5 Grazing

All the lands reclaimed by Colowyo will not be grazed by livestock for a period of at least three years after seeding or planting and will be managed to promote the postmining land use.

Grazing by livestock will not commence until Colowyo has demonstrated to the satisfaction of the Division that the vegetation on the reclaimed surface is adequately established and can be expected to withstand grazing pressures. Any grazing studies undertaken by Colowyo will not preclude or interfere with postmining vegetation sampling as required in section 4.15.8.

4.15.6 Field Trials

As a result of previous consultations with CPW and DRMS, Colowyo implemented three field trials. The field trials were meant to provide information to the appropriate expectations for success/failure of establishing these habitat types at Colowyo in the context of a ten-year bond clock, to provide some baseline information that can be used to modify practices, and the plant materials used to meet the current expectations.

The study was comprised of three test scenarios designed to explore different species and habitat requisites necessary for tall shrub survival. The first treatment was to establish an overstory of quaking aspen (*Populus tremuloides*) trees that are planted into deep topsoil (48 inches). The second treatment was serviceberry (*Amelanchier alnifolia*) and chokecherry (*Prunus virginiana*) shrubs planted into deep topsoil (48 inches). The third and final treatment was serviceberry and mountain mahogany (*Cercocarpus montanus*) shrubs planted into shallow topsoil (4 inches). The aspen trees and/or tall shrubs were planted in ten-220-foot long rows per treatment, for a total of 550 plants per treatment. The initial planting consisted of 550 quaking aspen tubelings in the first treatment, 276 serviceberry and 274 chokecherry tubelings in the second treatment, and 276 serviceberry and 274 mountain mahogany tubelings in the third treatment.

The status of each tree or shrub was evaluated in 2012 through 2016. Trees and shrubs that "were observed to be dead" during the evaluation effort in August 2012 needed to be replaced (one-time replacement). Replacement of dead plants occurred in November 2012. During the final evaluation in 2016, no quaking aspen trees in Treatment 1 were observed to be alive. In Treatment 2, no serviceberry and 42 individuals of the chokecherry (15%) were observed to be alive in 2016. In Treatment 3, 143 individuals of the serviceberry (52%) and 147 individuals of the mountain mahogany (54%) were observed to be alive in 2016. The unfavorable results of the aspen and tall

shrub trials (documented in annual reporting to the Division) have prompted Colowyo to undertake additional efforts as outlined below.

As a result of these unsuccessful test plots, Colowyo intends to design and implement new field trials which draw upon success at Trapper and Seneca IIW. Cedar Creek Associates, Inc. (Cedar Creek) has conducted a literature review to support Colowyo in achieving revegetation success criteria pertaining to tall shrub establishment. This literature review aimed to optimize success at Colowyo by synthesizing the successes and challenges of other efforts both at Colowyo and in the region.

Based on these findings, Colowyo identified areas of snow accumulation during the winter (November 2019 – February 2020). These seventeen test areas are scattered throughout recently reclaimed areas in East and West Pit and will be implemented in a manner to optimize successful tall shrub establishment. Please see Figure 4.15-1 for approximate tall shrub test plot locations. For the most part, these are small (~0.1 acres) areas which accumulate snow in the winter months and as a result improve seasonal plant available water through snow-capture. Final siting of the tall shrub test plots will be based on additional snow drift data yet to be acquired.

The first step will be to create some topsoil mounding for additional structure for precipitation retention. The test areas will then be planted with containerized Planting / tubelings as establishing tall shrubs from seed was not successful at either Colowyo or Trapper. Since the test sites are located in upland areas the following species will be considered for planting:

- Alderleaf Mountain Mahogany (*Cercocarpus montanus*)
- Chokecherry (*Padus virginiana* ssp. *melanocarpa*)
- Skunkbrush sumac (*Rhus trilobata*)
- Saskatoon serviceberry (*Amelanchier alnifolia*)
- Snowberry (*Symphoricarpos sp.*)

The planting of tubelings will not occur in the middle of winter or summer and will not exceed one tubeling per ten square feet. Fencing will be used to decrease herbivory, which will likely be crucial, at least during the first few years while tall shrubs are establishing. The fencing employed will be at least six feet in height, and will be of a type to ensure large mammals such as deer and elk cannot enter the trial area. Fencing will be removed once the tall shrubs are mature enough to handle browsing, or fencing may be retained at the discretion of the landowner. At a minimum, it will be removed prior to Phase III release of a particular reclamation area.

Native soil, collected from the locally source ecosystems on or directly adjacent to Colowyo Mine exhibiting similar tall shrubs species as being implemented in the trial, will be used to inoculate the test sites with beneficial mycorrhizae. Mycorrhizae are symbiotic relationships that form between fungi and plants. The fungi colonize the root system of a host plant, providing increased water and nutrient absorption capabilities while the plant provides the fungus with carbohydrates formed from photosynthesis. Once the mounding is completed and prior to installation of weed guard fabric, locally sourced soils (containing local mycorrhizae) will be scattered at random on the mounded surface. Care will be taken to ensure these soils are place around where the tubling will be planted and under the weed guard fabric.

Weed guard fabric will also be placed around the tubelings, with limited opening size in the weed guard fabric to plant the tubeling. This should help assist in limiting competition from moisture from other plants. The final step will be to broadcast seed the entire trial area with the seed mixture presented on Table 2.05-8. No other manipulation of the trial area will occur post construction to limit annuals, but if necessary noxious weeds will be controlled during the entire trial period.

Colowyo will monitor the survival of planted tall shrubs annually for three years following planting. The primary purpose of this approach to test plots is to identify areas that already exhibit favorable conditions to establish tall shrubs, rather than try to replicate those conditions.

4.15.7 Determining Revegetation Success: General Requirements and Standards

Three reference areas have been selected to represent the three major vegetative communities to be disturbed, sagebrush, mountain shrub, and aspen. The locations of these reference areas are shown on Map 4. Detailed vegetative sampling was performed on these reference areas as described in Section 2.04.10.

The reference areas were sampled for herbaceous cover, herbaceous production and woody plant density. Species diversity was determined utilizing herbaceous cover data from the premining inventory of the sagebrush, mountain shrub, and aspen communities. The reference areas are each approximately seven acres in size.

Statistical tests were performed on the vegetative data from the reference areas to prove that they were comparable to the premined area. The parameters compared were herbaceous cover and herbaceous production. Revegetation success will be determined by comparisons of weighted averages between reference areas and revegetated areas in accordance with Rule 4.15.7(4) (b).

For demonstration of revegetation success, vegetation cover, herbaceous production, and in certain circumstances woody plant density will be sampled to statistical adequacy (where necessary), and compared to the revegetation metrics described in Section 4.15.8 below. Sampling methodologies and statistical testing utilized for bond release evaluations are described in Section 4.15.11.

To summarize, there are three reference areas, the Mountain Shrub reference area, Sagebrush reference area, and Collom Aspen reference area that are utilized to evaluate revegetation success at Colowyo. The comparison between the reclamation area and the reference area will occur as follows:

- West and East Pit Reclamation Areas
    - Reclaimed areas shall be compared to weighted parameters from the Mountain Shrub reference area (55% weight) and the Sagebrush reference area (45% weight) in accordance with Rule 4.15.7(4)(b).
- South Taylor Pit Reclamation Areas
    - Areas reclaimed to grazing land shall be compared to weighted parameters from the Mountain Shrub reference area (52% weight), the Sagebrush reference area

(25% weight), and the Collom Aspen reference area (23% weight) in accordance with Rule 4.15.7(4)(b).

- Collom Reclamation Areas
    - Areas reclaimed to grazing land shall be compared to weighted parameters from the Mountain Shrub reference area (39% weight), the Sagebrush reference area (47% weight), and the Grassland reference area (14% weight) in accordance with Rule 4.15.7(4)(b).

4.15.8 Revegetation Success Criteria

Colowyo will meet the requirements to ensure that the post-mining vegetation will be adequate for final bond release. As described in Section 4.15.7, Colowyo will utilize the reference areas for comparisons between reclaimed areas and appropriate native reference areas for the variables of ground cover and production. For the variables of woody plant density and species diversity, Colowyo shall compare revegetated areas against defined standards (detailed later in this section). Data to be used in these comparisons must be from statistically adequate sampling (where necessary) as indicated in Rule 4.15.11.

Herbaceous Cover

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

Herbaceous Production

For revegetation targeting the rangeland land use subcomponents of grazingland and wildlife habitat, herbaceous production of the revegetated area will be considered adequate for final bond release if it is not less than 90% of the herbaceous production, as determined from the reference areas with a 90% statistical confidence utilizing a standard students statistical t-test comparison of the means, as described in Rule 4.15.8 (4).

Woody Plant Density

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

Tall Shrubs and Aspens

For the South Taylor reclamation areas, as part of the revegetation success criteria for those areas, Colowyo will establish 18.5 acres of aspens and 12.0 acres of tall shrubs. This will be accomplished through large singular plots or various small plots that add up the acres noted

previously. Tall shrubs plots will consist of, but may not contain all, of the following species to be considered successful.

- Alderleaf Mountain Mahogany (*Cercocarpus montanus*)
- Chokecherry (*Padus virginiana* ssp. *melanocarpa*)
- Skunkbrush sumac (*Rhus trilobata*)
- Saskatoon serviceberry (*Amelanchier alnifolia*)
- Snowberry (*Symphoricarpos sp.*)

For the Collom reclamation areas, at the request of CPW, Colowyo will incorporate approximately 750 small size exclosures into Collom reclamation areas on 150 acres at a density of approximately five exclosures per acre to meet their expectations for establishing tall shrub species.

Diversity

The revegetation objective for diversity will be to establish at least four native* perennial species, each more than 3% composition, minimum of two of which are grasses and a minimum of one which is a forb, with the following caveat;

If no single forb species exceeds 3% composition, the forb requirement can be met if:

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

The dominant species will contribute to the appropriate structure and stability of the post-mining vegetative community to insure that the post-mining land use as addressed in Section 2.05.5.

4.15.9 Revegetation Success Criteria: Cropland

Colowyo does not impact any cropland areas; therefore, the requirements of this rule are not applicable to Colowyo.

4.15.10 Revegetation Success Criteria: Previously Mined Areas: Areas to be Developed for Industrial or Residential Use

Colowyo does not plan to develop any areas to industrial or residential use; therefore, the requirements of this rule are not applicable to Colowyo.

4.15.11 Revegetation Sampling Methods and Statistical Demonstrations for Revegetation Success Revegetation

During monitoring of revegetated units, developing shrub patches will be identified and as necessary delineated to facilitate mapping that in turn will represent the juxtaposition (stratification) of developing communities. As indicated previously, delineated shrub patches will be classified as either low or high density areas depending on apparent density of developing shrub populations.

Sample Layout

The sample layout protocol for revegetation monitoring and bond release evaluations shall be a systematic procedure designed to better account for the heterogeneous expression of seedings within reclaimed areas while precluding bias in the sample site selection process. By design, the procedure is initiated randomly, and thereafter, samples are located in a systematic manner, along grid coordinates spaced at fixed distances (e.g. 200 ft). In this manner, representation from across the target reclamation unit is forced rather than risking the chance that significant pockets are entirely missed, or overemphasized as often occurs with simple random sampling.

Older reclaimed units (e.g., 7+ years) shall receive a minimum of 20 ground cover transects and co-located shrub density belts. Production for monitoring purposes shall be collected from a representative five of these 20 sample points. For bond release efforts, production will be collected from a statistically adequate sample as defined below. Monitoring efforts for younger reclaimed units (e.g., 2 to 4 years) shall receive 15 transects and co-located woody density belts (as necessary) but no production sampling. First year units will receive one cluster of five emergent density quadrats spread in a representative manner for approximately every two acres of reclamation. For units 50 acres or larger, a five-quadrat cluster should be collected from every 4 acres of reclamation. With regard to any two-year old or older reclamation unit that is smaller than about 3 acres, the number of samples (for monitoring) shall be limited to five.

The systematic procedure for sample location in revegetated units shall occur in the following stepwise manner. First, a fixed point of reference (e.g., fence corner) will be selected for the target unit to facilitate location of the systematic grid in the field. Second, a systematic grid of appropriate dimensions will be selected to provide a reasonable number of coordinate intersections (e.g., 5, 15, 20, etc.) that would then be used for the set of sample sites. Third, a scaled representation of the grid will be overlain on a computer-generated map of the target unit extending along north/south and east/west lines. Fourth, the initial placement of this grid will be implemented by selection of two random numbers (an X and Y distance) to be used for locating a systematic coordinate from the fixed point of reference, thereby making the effort unbiased. Fifth, where an excess number of potential sample points (grid intersections) is indicated by overlain maps, the excess may be randomly chosen for elimination. (If later determined that additional samples are needed, the eliminated potential sample sites would be added back in reverse order until enough samples can be collected.) Sixth, using a handheld compass and pacing techniques, or a hand-held GPS, sample points will be located in the field.

Once a selected grid (sample) point is located in the field, sampling metrics will be utilized in a consistent and uniform manner. In this regard, ground cover sampling transects will always be oriented in the direction of the next site to be physically sampled to further limit any potential bias while facilitating sampling efficiency. Depending on logistics, timing, and access points to a target sampling area, the field crew may occasionally layout a set of points along coordinates in one direction and then sample them in reverse order. However, orientation protocol will always be maintained (i.e. in the direction of the next point to be physically sampled). If the boundary of an area is encountered before reaching the full length of a transect, the transect orientation will be turned 90° in the appropriate direction so the transect will be completed within the target unit. In this manner, edge transects will be retained entirely within the target unit by "bouncing" off the boundaries. Production quadrats will always be oriented 90° to the right (clockwise) of the ground cover transect and placed one meter from the starting point so as to avoid any trampled vegetation.

Woody plant density belts (for monitoring efforts) will be extended parallel to the ground cover transects for a distance of 50 meters and width of 2 meters. (If the grid distance is less than 50 meters, density belts will be reconfigured to be 4 m X 25 m or similar configuration, but always totaling 100 m^2.)

Determination of Ground Cover

Ground cover at each sampling site will be determined utilizing the point-intercept methodology. This methodology will be applied as follows: First, a transect 10 meters in length will be extended from the starting point of each sample site toward the direction of the next site to be sampled. Then, at each one-meter interval along the transect, a "laser point bar", "optical point bar" or 10-point frame will be situated vertically above the ground surface, and a set of 10 readings recorded as to hits on vegetation (by species), litter, rock (>2mm), or bare soil. Hits will be determined at each meter interval as follows:

1. When a laser point bar is used, a battery of 10 specialized lasers situated along the bar at 10-centimeter intervals will be activated and the variable intercepted by each of the narrow (0.02") focused beams will be recorded;

2. If an optical point bar is used, intercepts will be recorded based on the item intercepted by fine crosshairs situated within each of 10 optical scopes located at 10-centimeter intervals.

3. If a 10-point frame is used, sharpened pins will be used to determine intercepts at 10-centimeter intervals. Care will be taken to NOT record "side touches" on the pins as this will result in a significant overestimation error.

The following sampling rules should apply during data collection. Intercepts will be recorded for the first (typically highest) current annual (alive during the current growing season) plant part intercepted without regard to underlying intercepts or attachment to a living base except when multiple strata are present. In this circumstance, multiple live hits may be recorded, but only one hit per stratum with the second live hit being recorded separately and not used to calculate total ground cover. Otherwise, the intercept will be litter, rock or bare soil. Rock intercepts are based on a particle size of 2 mm or larger (NRCS definition), otherwise it would be classified as bare soil. To distinguish between current year senescent plant material and litter (including standing dead), the following rule should apply: 1) if the material is gray or faded tan it should be considered litter; and 2) if the material is bright yellow or beige it should be considered current annual (alive) and recorded by species. On occasion, experience with non-conforming taxa may override this rule.

When using laser or optic instruments during windy field conditions, the observer should consistently utilize one of the following techniques for determining a hit: 1) record the first item focused upon that is intercepted by the narrow laser beam or cross-hair; 2) wait a few moments and record the item intercepted for the longest time, or 3) block the wind and record the intercept. When using a pin frame, the observer must wait for the wind to subside.

With regard to gaps in the overstory, the point-intercept procedure naturally corrects for overestimations created by 2-dimensional areal (quadrat) or 1-dimensional linear (line-intercept)

techniques. In this regard, the 0-dimensional point is extended along a line-of-sight until it intercepts something that is then recorded. Frequently points simply pass through overstory gaps until a lower plant part, litter, rock or bare soil is encountered.

Regardless of instrument, a total of 100 intercepts per transect will be recorded resulting in 1 percent cover per intercept. This methodology and instrumentation (excepting the 10-point frame) facilitates the collection of the most unbiased, repeatable, precise, and cost-effective ground cover data possible. Identification and nomenclature of plant species should follow Weber and Wittman (1996) Colorado Flora: Western Slope or newer text.

Determination of Production

Where production samples are to be collected (7+ year-old units or bond release units) current annual herbaceous production will be collected from a $^1/_2$ m^2 quadrat frame placed one meter and 90° to the right (clockwise) of the ground cover transect to facilitate avoidance of vegetation trampled by investigators during sample site location. If more production samples are necessary than cover samples (typical case for bond release efforts), orientation protocol will be maintained except that no ground cover data will be collected. From within each quadrat, all above ground current annual herbaceous vegetation within the vertical boundaries of the frame will be clipped and bagged separately by life form as follows:

Perennial Grass	*Perennial Forb*
Annual Grass	*Annual Forb*
Subshrub	*Noxious Weeds (if found)*

All production samples will be returned to the lab for drying and weighing. Drying will occur at 105° C until a stable weight is achieved (24 hours). Samples will then be re-weighed to the nearest 0.1 gram.

Determination of Woody Plant Density

Two sampling methods may be employed for monitoring woody plant density within Colowyo's revegetated units. The first method, belt transects, may be employed when the size of the monitoring unit exceeds one to two acres. At each sample site in such areas, a 2-meter wide by 50-meter long belt transect (or alternately 4 x 25 meter transect) should be established parallel to the ground cover transect and in the direction of the next sampling point. All woody plants (shrubs and trees) within each belt will be enumerated by species. Determination of whether or not a plant may be counted is dependent upon the location of its main stem or root collar where it exits the ground surface with regard to belt limits. A total of 5 or 15 belt transects may be sampled for each monitoring unit.

For bond release sampling with belts, sufficient samples must be collected to insure adequacy of the effort (to facilitate valid testing) in accordance with one of the three methods under either Rule 4.15.11 (2), or Rule 4.15.11 (3). Depending on the selected protocol, care must be taken to collect at least the minimum number of samples indicated.

The second method, total enumeration, may be employed for monitoring when the size of a unit is less than approximately one to two acres in size. Total enumeration shall be the typical method

utilized for bond release purposes unless shrub patches are too large (e.g., greater than 10 to 15 acres) to practically utilize this technique (in which case belts will be utilized). This method involves total counts of woody plant populations as opposed to estimates of mean densities through statistical sampling. Implementation of the total count technique would involve circumscribing the boundaries of a target polygon with hip chain thread or similar visible designation. Once a unit is circumscribed in this manner, a team of two or more biologists walking shoulder-to-shoulder traverse the plot enumerating each plant by species. The person farthest inside the line of observers trails hip chain thread, or other means, to mark their path to prevent missing or double counting specimens on subsequent passes. The distance between observers should be 15 to 20 feet or less depending on the height of grasses and the presence of low growing taxa such as rose or snowberry. Each internal observer should also "zigzag" as the team progresses, occasionally turning to view the area just passed to ensure visual coverage of the entire survey path. Constant communication among crew members precludes double counting or missing of plants located along the margins of observed paths. Results from total enumeration efforts can be compared directly with success criteria without statistical testing.

Sample Adequacy Determination

Sampling within each unit under consideration for bond release shall start with a minimum of 15 (reference area) or 20 samples (revegetated area) and continue until a statistically adequate sample has been obtained in accordance with Rule 4.15.11 (2). Woody plant density success comparisons can be obtained utilizing Rule 4.15.11(2) or Rule 4.15.11 (3). For woody plant density adequacy determinations utilizing Rule 4.15.11 (2)(a), the estimate is to within 15% of the true mean. Where sampling is for managerial (monitoring) information, adequacy is not necessary and is calculated for informational purposes only.

Success Evaluation

To summarize, success evaluations involve either a direct or a statistical *t*-test comparison of appropriate parameters for each variable of interest (cover, production, diversity, or woody plant density). Ground cover and production comparisons shall be made against reference area data of the same year. Diversity and woody plant density variables shall be compared against the standards defined above.

For bond release efforts, direct comparisons are made when the revegetated area mean value for a given variable is greater than either 90% of the standard or the reference area mean assuming that a statistically adequate sample has been collected in accordance with Rule 4.15.11(2)(a). If a statistically adequate sample cannot be obtained, a "reverse-null" hypothesis test may be employed as detailed in Rule 4.15.11(2)(c). If an adequate sample is obtained for a particular variable, but the mean is less than 90% of the reference area mean or success criteria outline in Section 4.15.8, a standard-null hypothesis *t*-test may be used in accordance with Rule 4.15.11(2)(b).

If adequacy for woody plant density cannot be achieved utilizing the formulation in Rule 4.15.11 (2)(a), additional sample adequacy and success evaluation options are described under Rule 4.15.11(3).

4.16 POSTMINING LAND USE

4.16.1 General

Implementation of the detailed reclamation plan as presented in Section 2.05.5 will result in a landscape and vegetative cover that is equal to or better than the premining condition for rangeland use that currently exists in the area.

4.16.2 Determining Use of Land

The premining land uses for the mine plan and adjacent areas are shown on the Land Use Map (Map 17). The narrative describing the land use of the permit area is presented under Section 2.04.3. The proposed postmining land use will involve the restoration of the premining land use of rangeland, as described in Section 2.05.5.

4.16.3 Prior to Release of Lands from the Permit Area in Accordance with 3.03.1 (2) (c)

The land use of rangeland will be restored in a timely manner as outlined in Section 2.05.4. Implementation of the timetables contained therein will assure a contemporaneous reclamation program. No alternative land uses will be implemented in the reclamation plan set forth under Section 2.05.4.

4.17 AIR RESOURCES PROTECTION

Colowyo employs fugitive dust control measures in all phases of the mining and reclamation activities. The control measures currently used are set forth in detail in Section 2.05.6.

The operations at Colowyo are presently regulated under numerous emission permits issued by the Colorado Department of Health, Air Pollution Control Division. Section 2.03.10 identifies the various permits under which Colowyo currently operates. The permits are set forth in Exhibit 8, Air Quality Information.

4.18 PROTECTION OF FISH, WILDLIFE, AND RELATED ENVIRONMENTAL VALUES

As described in Section 2.04.11, no threatened or endangered species have been identified within the active mining operation. Also, no critical habitat for any species is known to exist. Golden Eagle nesting complexes, which are located within the permit area but outside the area to be mined, are described in Section 2.04.11.

Electric power lines and other transmission facilities in the permit area will be constructed in accordance with the guidelines set forth in the environmental criteria for Electric Transmission System by the United States Department of Interior (USDI) and the United States Department of Agriculture (USDA) 1970. Distribution power lines are to be constructed by guidelines set forth in the Rural Electrification Administration (i.e., Rural Utilities Service) 1979 Bulletin 61-10 and will suffice for Rural Utilities Service's current construction guidelines for raptor-safe power line

structures. Colowyo's design criteria has been developed in association with the Avian Power Line Interaction Committee's (APLIC) *Suggested Practices for Raptor Protection on Power Lines: "The State of the Art in 1996" (APLIC 1996).* Please refer to the Figure 4.18-1 - Raptor Protection Retrofitting of Existing Power Poles. For structure configurations and retrofitting locations, please refer to Figure 4.18-2 through 4.18-6, and Maps 22A and 22B. The following schedule will be used to update existing power poles with adequate raptor protection in accordance to the guidelines.

As part of Colowyo's Avian Protection Plan effort, EDM examined the distribution structures in July 2002 to identify pole configurations that present a risk to perching raptors and other large birds. EDM also conducted a reconnaissance of the 69kV power lines to record the overall structure configurations and determine if any of these configurations present an electrocution risk to area raptors. Additional transmission and distribution power lines located in and adjacent to the Colowyo Coal Mine are owned and operated by White River Rural Electric Association, Tri-State Generation and Transmission, and Western Area Power Administration. The operation of these lines fall under the jurisdiction of each of these respective utilities and agencies.

Distribution lines (less than 69 kilovolts {kV}) are of lower voltages than transmission lines and, therefore, have reduced hardware and equipment clearances. Depending on the pole configuration, perching on distribution line poles (particularly by juvenile birds) increases the potential of a bird connecting phase-to-phase or phase-to-ground, which typically results in bird mortalities and often leads to increased power outages. Although most of the 69kV structures examined during the July 2002 field survey were of sufficient clearance for eagles and other raptors, thereby minimizing any electrocution risk, a few 69kV structure configurations were identified that could represent an increased hazard. Two such configurations recorded included Gang Operated Air Brake Switches (GOABS) where the center phase switch was located less than 60 inches from the pole-top ground wire. The second 69kV configuration of concern included structures where the center phase jumper was placed on a crossarm insulator in close proximity to the pole-top ground wire.

Colowyo is responsible for several miles of additional distribution lines on the mine that were not surveyed as part of the July 2002 study. However, these lines are currently de-energized, and the structures are scheduled for long-term removal as the mining operation expands and areas are reclaimed. In addition, a portion of the existing 4160 volt line located along the Taylor Creek drainage traveling south of the Taylor Pump Holding Pond were previously retrofitted to address the potential risk of raptor electrocution.

As described in Section 2.05.6, all disturbed acreage, including roads, has been kept to a minimum by proper planning to reduce impacts to all environmental resources, including impacts on wildlife.

Colowyo's objective of returning the post-mining land use to a rangeland condition capable of supporting the diverse wildlife populations is being approached in several ways. As described in Section 2.04.11, Colowyo initiated efforts to restore wildlife habitats during premine planning and early mining, by conducting an extensive four-year study to assist in determination of the best techniques for revegetating disturbed areas with native species to enhance wildlife habitat.

A habitat improvement program, as described in Section 2.05.6, was initiated in 1975 to offset temporary habitat loss during mining. As described in Section 2.05.4, the reestablishment of herbaceous species, topographic relief, impoundments and limited reestablishment of a shrub component form the integral elements of the reclamation plan.

To date these efforts have proven successful. Herds of Deer and Elk are regularly seen grazing on the reclaimed areas. Rodent and small game populations have reestablished on the reclaimed areas providing a readily available food source for local raptor populations and other predators.

4.19 PROTECTION OF UNDERGROUND MINING

Colowyo will not conduct coal mining closer than 500 feet to any point of either an active or abandoned underground mine. Underground coal mines have been operated in the past as discussed in Section 2.04.4, but their locations were on the-northern side of Streeter Draw well over 500 feet from present Colowyo mining.

The surface mining activities of Colowyo have been designed so as not to endanger any present or future operations of either surface or underground mining operations. As discussed in Section 2.05.3, Colowyo has engineered its mining plan to maximize recovery of coal by current economical surface mining methods.

4.20 SUBSIDENCE CONTROL

Colowyo is conducting a surface coal mining operation. Therefore, the requirements of 4.20 are not applicable to the Colowyo operation.

4.21 COAL EXPLORATION

4.21.1 Scope

This section sets forth performance standards and design requirements for coal exploration, which substantially disturbs the natural land surface.

4.21.2 General Responsibility of Persons Conducting Coal Exploration

Colowyo will comply with the minimum environmental protection performance standards under this Section as discussed below and in Section 2.02.

Colowyo plans to conduct coal exploration which may affect the natural land surface and during which less than 250 tons of coal will be removed. As stated in Section 2.02, Colowyo will not conduct coal exploration during which more than 250 tons of coal are removed.

4.21.3 Required Documents

As stated in Section 2.02, Colowyo will not conduct coal exploration during which more than 250 tons of coal are removed.

4.21.4 Performance Standards

No habitats of unique value for fish, wildlife, and other related environmental values and areas were identified in Section 2.05.6(2)(b), which could be affected by coal exploration work.

During any coal exploration, Colowyo will obtain any supportive information that might be necessary for proper mining, reclamation and environmental control.

All vehicular traffic will be limited to established, graded roads at all times, except in cases where limited off road travel will be less damaging to vegetation and the ground surface than the construction of a new road. Travel will be confined to graded surface roads during periods when excessive damage to vegetation or rutting of the land surface could occur.

Any new road to be built for the exploration project will be utilized for less than six months and thus will be constructed as a light use road according to the provisions of Section 4.03.3.

Any existing roads in the area will be altered for exploration purposes only so far as they may be widened or smoothed to accommodate exploration equipment and in accordance with all applicable Federal, State and local requirements. Water bars and ditches will be added where appropriate. All existing roads to be used during the exploration program will be left in the condition that is superior to their pre-exploration condition.

Any drill sites that are no longer needed for exploration or environmental monitoring (such as piezometer wells) will be returned to their approximate original contour promptly after all coal exploration activities are completed.

Topsoil will be removed prior to construction of any drill site when necessary. After the site is recontoured, topsoil will be redistributed over the surface in a manner that will provide for successful reclamation. If any exploration drilling is to be conducted in an area directly ahead of the mining operations where topsoil has been removed, the site will be mined through and reclaimed in accordance with Section 2.05.4.

Revegetation of drill sites and roads will be performed by drill or by broadcast seeding with a variety of native and introduced species during the late fall or early spring to produce a satisfactory vegetative cover capable of stabilizing the soil surface. The affected areas will be seeded according to the mixture described in Section 2.02.

In no case will any ephemeral, intermittent or perennial stream be diverted during the exploration activities. Overland flow will be diverted, if necessary, so that erosion is controlled by ditches, water bars, sedimentation ponds or other methods capable of controlling erosion and minimizing additional contributions of suspended solids in the stream flow outside the exploration area. Such diversions will be done in a manner that complies with all other applicable Federal and State requirements.

Upon completion of the hole, cuttings from the drill hole will be placed in the drill hole and the site reclaimed. Some holes maybe left open and completed with piezometers, if they are needed for ground water monitoring. The requirements of Section 4.07 will be met for each exploration hole. See Section 2.04.4, Sealing of Exploration and Mine Holes, for further information concerning reclamation of exploration holes.

With the exception of possible piezometers to be installed in some of the drill holes for groundwater quality and quantity monitoring, all equipment related to the exploration program will be removed from the exploration area when it is no longer needed for exploration.

During the exploration program, minimization of surface disturbance and prompt reclamation practices will be utilized to eliminate sedimentation problems and any disturbance of the present hydrologic balance. Water bars and ditches will be built wherever needed. In addition, water from drilling operations will be contained on the drill site and allowed to evaporate thus eliminating any off-site disturbance.

As discussed under Section 2.04.6, no acid-forming materials have been found to exist within the mine plan or adjacent area.

A compilation of 1989-1997 Permit Area Coal Resource Confirmation/Exploration/Monitor wells and Transfer of Permit Area Exploration Liability to NOI-X-95-109-05 status can be found in Exhibit 6, Geological Information an Item #5.

Exploration taking place inside and outside of the permit area will be handled through the Notice of Intent (NOI) procedures. Se the appropriate NOI for details for each program.

With the approval of Technical revision 50, all exploration holes located within the permit boundary are transferred to NOI X-95-109-5 and are managed under Coal Exploration procedures.

Wells drilled as an integral part of water monitoring plans identified in the PAP (Permit C-81-019) and water supply wells (for mining purposes) are managed under this Permit C-81-019.

4.21.5 Requirements for a Permit

No coal will be removed or extracted by the proposed coal exploration other than occasional spot coring. No coal will be removed or extracted for commercial sale during coal exploration.

4.22 CONCURRENT SURFACE AND UNDERGROUND MINING

Colowyo does not currently plan to have concurrent surface or underground mining activities; therefore, the requirements of this Section are not applicable to this permit application.

4.23 AUGER AND HIGHWALL MINING

4.23.1 Scope

This Section establishes environmental protection performance standards in addition to those applicable performance standards in Rule 4, to prevent any unnecessary loss of coal reserves and to prevent adverse environmental effects from auger mining incident to surface mining activities.

4.23.3 Performance Standards

4.23.4 Maximize Recoverability of Mineral Reserves

Colowyo maximize recoverability of the mineral resources through highwall mining in the East, West, and Section 16 Pits. Please see Map 23 for the historically mined areas. Also please see Section 4.23.2 in Volume 12 and 15 for additional information pertaining to the South Taylor and Collom Pit.

4.23.5 Undisturbed Areas of Coal Shall Be Left in Unmined Sections

As for the CDRMS Rules (Rules) requirement for leaving undisturbed areas of coal in unmined sections, Colowyo contends that this application of the Rules does not apply since the seams to be highwall mined are being accessed from active surface pits that by this Permit and other applicable sections of the Rules are required to be backfilled and fully reclaimed. Hence should undisturbed barrier areas of coal be left for some future access, these potential portal areas would be inaccessible for future generations because they would be buried under the pit backfill. Additionally and importantly, as discussed above, due to the many geological reasons, there is not economical coal to be recovered from "behind" the areas slated to be highwall mined.

4.23.6 Abandoned or Active Underground Mine Workings

To Colowyo's knowledge, no abandoned or active underground mine workings have ever existed or currently exist in any of the coal seams in the areas proposed to be highwall mined. No highwall mining will be allowed to take place within 500 feet of any abandoned or active underground mining operation.

4.23.7 Surface Mining Activities and Highwall Mining

The highwall mining shall follow the surface coal mining activities in a contemporaneous manner consistent with the applicable requirements of CDRMS Rule 4. Due to active pit progressions and sequencing of mining (in addition to meeting the Permit requirements for contemporaneous reclamation), it is required that highwall mining occurs timely if not immediately following conclusion of pit mining activities. Also, as described more fully in 2.06.9(2), the need to backfill, i.e., contemporaneously reclaim the pits, is mandatory for Colowyo in order to build the pit floor from which to work from to mine the successively higher (in the geologic column) coal seam. Hence successful highwall mining is in part dependent upon timely and successful contemporaneous reclamation of the pits.

4.23.8 Prevent Pollution of Surface and Groundwater and to Reduce Fire Hazards

Ground water in the pit or highwall mining holes will not be problematic being that the Colowyo pits are essentially dry (minor perched aquifers with limited seasonal flows) and are located above the first regional aquifer (Trout Creek) by a substantial distance. Ground water flow regimes and the negligible impact that Colowyo's surface mining activities have on ground water as a result of mining these target coal seams/rock interburdens are detailed extensively in Permit Section 2.04.7(1). From this extensive body of data and from experiences to date with mining activities, no toxic forming or acid forming water discharge is anticipated from any of the highwall openings. Should toxic forming or acid forming water discharges be encountered, the opening exhibiting the discharge will be backfilled within 72 hours of completion.

Colowyo will backfill each highwall miner entrance hole within 30 days following coal extraction. All highwall miner entrance holes will be further buried by pit backfill during the normal backfill sequence for the pits to remain in compliance with Rules 4.05.1 and 4.05.2. Ground water hydrologic regimes will be re-established in the backfilled pits with no anticipated detrimental effects from the highwall miner holes.

4.23.9 Division shall prohibit Auger (Highwall Mining) Mining

There is no probable reason to prohibit the highwall mining in light of no anticipated adverse impacts to water quality, fill stability, pit backfilling, increased resource recovery, and highwall mining is designed for zero subsidence to prevent disturbance or damage to powerlines, buildings, or other surface facilities.

4.23.10 Backfill and Grading Requirements

Highwall mining will be conducted in accordance with the backfilling and grading requirements of 4.14.

4.23.11 Highwall Shall be Eliminated

Highwall mining is proposed to occur in areas previously mined with adequate material on hand to backfill the pits with proper static safety factors for stability to the approved postmining topography thereby eliminating all highwalls. Any minimal spoil material generated by the highwall mining operation will be buried at depth in the pit backfill. All coal seams mined will be adequately covered by pit backfilling in conformance with the permitted PMT and reclamation plan. No remnant highwalls will be left at conclusion of the reclamation activities and no spoil material will be place on any outslopes.

4.24 Operations in Alluvial Valley Floors

The field investigation described in Section 2.04.7 and 2.06.8 resulted in no identification of alluvial valley floors in the general area, which would be adversely affected by mining operations. Therefore, no special performance standards for operations in the alluvial valley floors are

applicable to this mining permit application and no protection or remedial measures are proposed for compliance to this Section.

4.25 Operations on Prime Farmlands

Since a negative determination of prime farmland was arrived at using the eligibility requirements established for prime farmland under Section 2.04.12, these performance standards do not apply to the permit application.

4.26 Mountaintop Removal

No mountaintop removal will be conducted by Colowyo.

4.27 Operations on Steep Slopes

No operations at Colowyo will be conducted on steep slopes as defined in this section.

4.28 Coal Processing Plants and Support Facilities not Located at or Near the Mine Site or not Within the Permit Area for the Mine

Colowyo will not use any coal processing plants or support facilities not located at or near the mine sites therefore, this section is not applicable to the permit application.

4.29 In-Situ Processing

Colowyo will conduct no in-situ processing; therefore, this Section is not applicable to the permit application.

4.30 Cessation of Operations

4.30.1 Temporary

If, for any unforeseeable circumstances, temporary cessation of mining and reclamation operations at the Colowyo operation becomes necessary for a period of thirty (30) days or more, Colowyo will submit to the Division a notice of intention to temporarily cease or abandon mining and reclamation activities. This notice will include a statement of the exact number of acres which will have been affected in the permit area prior to temporary cessation, the accomplished, an identification of back filling, regarding, Revegetation, environmental monitoring, and water treatment activities that will continue during temporary cessation.

4.30.2 Permanent

At the permanent conclusion of surface mining operations, Colowyo will close, backfill, or otherwise permanently reclaim all affected areas. The reclamation plans are set forth in Section 2.05.5. The projected postmining topography is set forth on the Postmining Topography Map (Map 19).

Colowyo will remove any equipment, structures, or other facilities at the conclusion of mining activities and will reclaim the affected land.

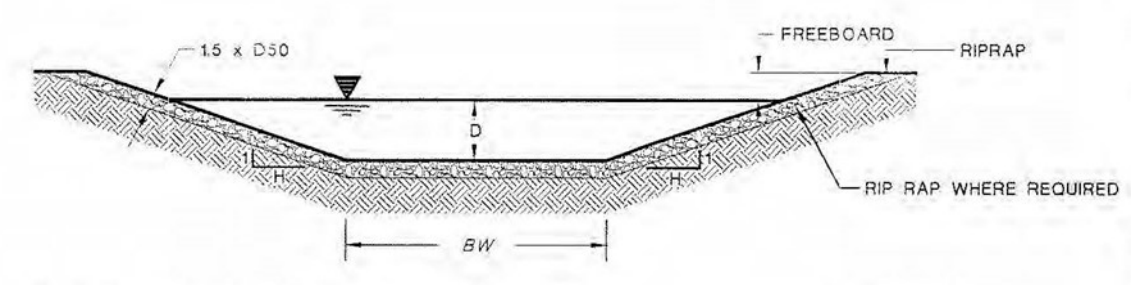
Introduction

Some mining related structures may be determined by Colowyo or requested by the surface landowner to be retained post mine to support the post mine land use of the property. If this should occur the structure will not be demolished and/or reclaimed and will remain as constructed post mine. Letters from the appropriate surface land owner providing their request or concurrence for a permanent structure are contained within this exhibit.

Other landowner specific letters that pertain to lands within the Colowyo permit boundary are also presented within this exhibit.

This exhibit contains the following letters:

Contents



Typical Riprap Lined Emergency Spillway Outslope

Pond Emergency Channel	*Flow Q (cfs)*	*Slope (%)*	*Bottom Width (ft)*	*Side Slope H:1V (ft)*	*Depth of Flow D (ft)*	*Freeboard (ft)*	*Total Depth (ft)*	*Rip Rap D50 (in)*
Work Area Pond	0.1	7.7	20	1.5:1	NA	NA	NA	NA
Stoker Siding Pond	0.1	50.0	5	3	NA	NA	NA	NA
Rail Loop Pond	0.1	50.0	5	2.0:1	NA	NA	NA	NA
Prospect Pond	10	33.3	12	1.5:1	0.2	1	1.2	9
West Pit Pond	0.1	33.3	20	`	NA	NA	NA	NA
Section 16 Pond	10	33.3	19	2.0:1	0.1	1	1.1	9
East Taylor Pond	10	40.0	20	2.0:1	0.1	1	1.1	9

Prospect Pond Emergency Spillway: Q=10.0

Material: Riprap

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
12.00	1.5:1	1.5:1	33.3	1.00		

PADER Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Depth:	0.18 ft	1.18 ft
Top Width:	12.54 ft	15.54 ft
Velocity:	4.54 fps	
X-Section Area:	2.20 sq ft	
Hydraulic Radius:	0.174	
Froude Number:	1.91	
Manning's n:	0.0590	
Dmin:	2.00 in	
D50:	3.00 in	
Dmax:	4.50 in	

Section 16 Pond Emergency Spillway :Q=10.0

Material: Riprap

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
19.00	2.0:1	2.0:1	33.3	1.00		

PADER Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Depth:	0.12 ft	1.12 ft
Top Width:	19.50 ft	23.50 ft
Velocity:	4.16 fps	
X-Section Area:	2.40 sq ft	
Hydraulic Radius:	0.123	
Froude Number:	2.09	
Manning's n:	0.0510	
Dmin:	1.00 in	
D50:	1.50 in	
Dmax:	3.00 in	

East Taylor Pond Emergency Spillway :Q=10.0

Material: Riprap

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
20.00	2.0:1	2.0:1	40.0	1.00		

PADER Method - Steep Slope Design

	w/o Freeboard	w/ Freeboard
Depth:	0.12 ft	1.12 ft
Top Width:	20.47 ft	24.47 ft
Velocity:	4.22 fps	
X-Section Area:	2.37 sq ft	
Hydraulic Radius:	0.116	
Froude Number:	2.18	
Manning's n:	0.0530	
Dmin:	1.00 in	
D50:	1.50 in	
Dmax:	3.00 in	

adequate freeboard to prevent overtopping were also evaluated. The TR-60 discharge criteria used in the emergency spillway capacity and freeboard evaluations are as follows:

- Discharge flow basis for emergency spillway capacity evaluation (for a Class B pond):
- 100-yr, 6-hr peak flow + 0.12 (PMP, 6-hr peak flow - 100-yr, 6-hr peak flow)
- Discharge flow basis for impoundment freeboard evaluation (for a Class B pond):
- 100-yr, 6-hr peak flow + 0.4 (PMP, 6-hr peak flow - 100-yr, 6-hr peak flow)

TABLE 5
IMPOUNDMENT HAZARD ANALYSIS SUMMARY

IMPOUNDMENT	HAZARD CLASSIFICATION/BASIS	SPILLWAY CAPACITY EVALUATION BASIS[1]/RESULT	FREEBOARD EVALUATION BASIS[1]/RESULT/ FREEBOARD
Work Area Pond	A/Agricultural Land	Class B/Ok	Class B/Ok/1.55’
Gossard Pond	A/Agricultural Land	Class B/Ok	Class B/Ok/6.46’
Stoker Siding Pond	A/Agricultural Land	Class B/Ok	Class B/Ok/3.64’
Rail Loop Pond	A/Agricultural Land	Class B/Ok	Class B/Ok/1.82’
Prospect Pond	B/Proximity to State Highway 13	Class B/Ok	Class B/Ok/0.61’
West Pit Pond	A/Agricultural Land	Class B/Ok	Class B/Ok/2.47’
Section 16 Pond	B/Proximity to State Highway 13	Class B/Ok	Class B/Ok/0.96’
East Taylor Pond	A/Agricultural Land	Class B/Ok	Class B/Ok/0.76’
Taylor Pump Holding Pond	A/Agricultural Land	Class B/Ok	Class B/Ok/0.91’

Notes: [1] Spillway capacity and freeboard for all ponds were evaluated for a uniform worst-case hazard classification (Class B)

The results of the WWC impoundment hazard analysis indicate that emergency spillway capacities and available freeboard for all existing ponds are adequate to affect full compliance with applicable requirements under the guidelines of TR-60, based on the applicable hazard classifications. Given this confirmation of compliance, no modifications to the existing emergency spillway structures are required.

5.0 POND DESIGN EVALUATION RESULTS

The supporting SEDCAD™4 analyses and watershed maps are presented as attachments in each of the individual pond design sections