



LARAMIE COUNTY PLANNING & DEVELOPMENT DEPARTMENT

Planning • Building

MEMORANDUM

TO: Laramie County Board of Commissioners

FROM: Sonny M. Pourchot, Associate Planner

DATE: June 16th, 2026

TITLE: PUBLIC HEARING regarding a Revised Commercial Site Plan for the Horse Creek Rock Quarry Expansion, located in a portion of land being situated in the E ½ Section 31, Section 32, T18N, R70W, and Section 5 and 6, T17N, R70W, Laramie County, WY.

EXECUTIVE SUMMARY

Brierley Associates, on behalf of applicant L.G. Everist, Inc., who is in a lease agreement with Farthing Ranch Company, has submitted an application for a Revised Commercial Site Plan for the Horse Creek Rock Quarry Expansion. The purpose of the project is to expand the Limited Mining Operation on 15-acres of land to a Large Mining Operation on 600-acres of land which required Board approval via a Class C Conditional Use Permit, and was approved on April 21st, 2026, by a vote of (5-0) in favor of.

BACKGROUND

The subject property is located in the Land Use (LU) zone district and consists of 11,081.31-acres, with 600-acres being utilized for the mine expansion. The surrounding area is also zoned Land Use (LU) zone district. The property is currently accessed from Horse Creek Road. The Limited Mining Operation was approved and operating under a Temporary Certificate of Compliance on December 5th, 2024, and received full compliance on March 21st, 2025.

Pertinent Laramie County Land Use Regulations or Statutory Provisions include:

Section 1-3-100 governing public notice.
Section 2-4-104 governing the LU – Land Use Zone District.
Section 3-1-109(h) governing Revised Commercial Site Plans.
Section 3-1-112(c) governing quarries.

DISCUSSION

The Laramie County Comprehensive Plan identifies the area as Ag and Range Land (AGR), which are outlying areas of Laramie County. These areas are far removed from the providers of public services and have relatively lower levels of road access. Some areas with existing development may be appropriate for expansion, identified as rural centers. Any new development in this area shall address water availability, public lands access, cultural resource preservation, and roads and connectivity. Ensuring minimal impacts to view sheds and wildlife are especially critical in the western portion of Laramie County.

Agency comments have been acknowledged by the applicant and will be complied with, mainly, WYDOT's stipulation that if the increased use with heavy loads starts to cause road degradation, then this will need to be reviewed with the applicant and corrected by implementing a load limit and a possible traffic study later. Wyoming Game and Fish will be working with the applicant to mitigate impacts to wildlife and habitat areas through the Department of Environmental Quality Land Quality Division permitting process.

Public notice was provided and no public comments were received.

Based on Section 3-1-109(h) of the LCLUR governing Revised Commercial Site Plans, Staff finds this application is in conformance with the plans and policies of Laramie County.

RECOMMENDATION and FINDINGS

Based on evidence provided, staff recommends the Board find that:

- a. This application meets the criteria for revised commercial site plan pursuant to section 3-1-109(h) of the 2025 Laramie County Land Use Regulations.
- b. This application is in conformance with section 2-4-104 of the 2025 Laramie County Land Use Regulations governing the LU – Land Use Zone District.

and that the Board approves the Revised Commercial Site Plan for the Horse Creek Rock Quarry Expansion, located in a portion of land being situated in the E ½ Section 31, Section 32, T18N, R70W, and Section 5 and 6, T17N, R70W, Laramie County, WY, with the following conditions:

- 1) **The applicant will comply with and provide a copy of the approved Department of Environmental Quality Land Quality Division permit.**
- 2) **The applicant will comply with all WYDOT recommendations.**

PROPOSED MOTION

I move to grant the approval of the Revised Commercial Site Plan for the Horse Creek Rock Quarry Expansion, located in a portion of land being situated in the E ½ Section 31, Section 32, T18N, R70W, and Section 5 and 6, T17N, R70W, Laramie County, WY, with the following conditions:

- 1) The applicant will comply with and provide a copy of the approved Department of Environmental Quality Land Quality Division permit.**
- 2) The applicant will comply with all WYDOT recommendations.**

ATTACHMENTS-

- Attachment 1: Location Map
- Attachment 2: Pre-Application Notes
- Attachment 3: Project Narrative
- Attachment 4: Agency Review Comments with Applicant Responses
- Attachment 5: Wyoming Game and Fish Correspondence
- Attachment 6: Landscape Plan
- Attachment 7: Traffic Assessment Worksheet
- Attachment 8: Hydrology Report
- Attachment 9: Drainage Plans
- Attachment 10: Hard Rock Mining Handbook (Reference Guidance)
- Attachment 11: Class C Conditional Use Permit
- Attachment 12: Revised Commercial Site Plan Resolution
- Attachment 13: Exhibit A – Revised Commercial Site Plan

**Laramie County
Wyoming MapServer**

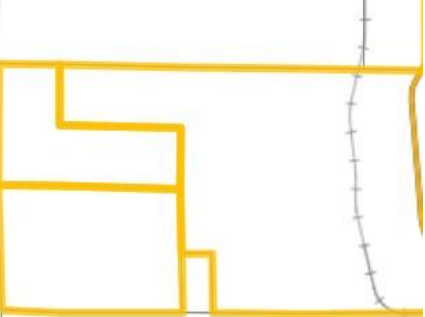
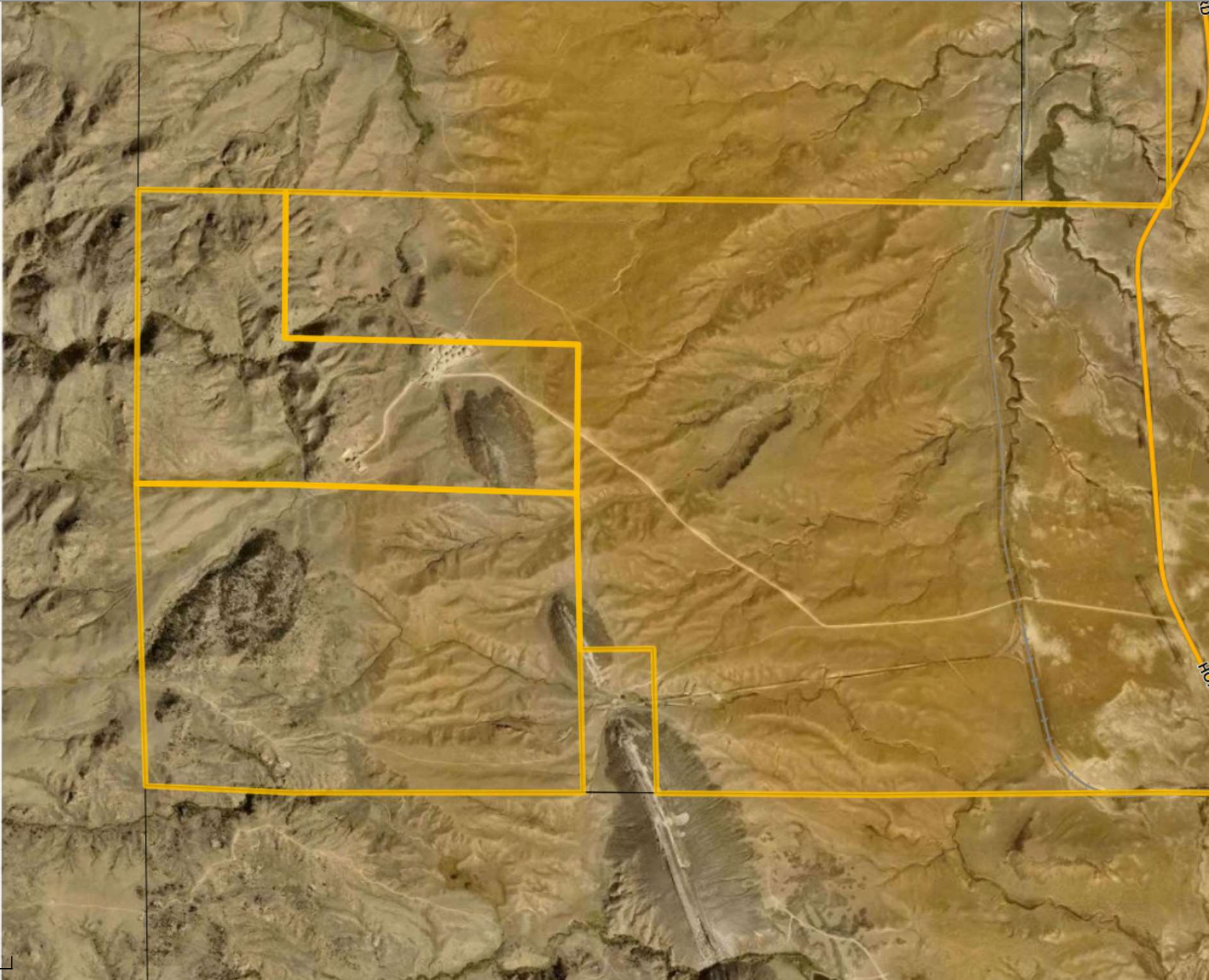
PZ-26-00042

REVISED COMMERCIAL SITE PLAN
HORSE CREEK ROCK QUARRY
EXPANSION

LU - LAND USE ZONE DISTRICT

LARAMIE COUNTY FIRE
AUTHORITY

LARAMIE COUNTY SCHOOL
DISTRICT 1



2000 ft



This map/data is made possible through the
Cheyenne and Laramie County Cooperative GIS
(CLCCGIS) Program and is for display purposes
only. The CLCCGIS invokes its sovereign and
governmental immunity in allowing access to or use
of this data, and makes no warranties as to the
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printed 5/26/2026



Laramie County, WY
Laramie County Planning and Development Office

3966 Archer Pkwy
 Cheyenne, WY 82009
 (307) 633-4303
 www.laramiecountywy.gov
 planning@laramiecounty.com

PERMIT

PA-25-00119

PRE-APPLICATION MEETINGS

SITE ADDRESS: UNKNOWN LARAMIE COUNTY
PRIMARY PARCEL: 17690610000100
PROJECT NAME: FOLLOW-UP TO PA-25-00055, SITE PLAN
 EXPANSION FOR LG EVERIST MINING OPERATIONS.

ISSUED: 12/03/2025
EXPIRES: 06/01/2026

APPLICANT: Bautz, Melissa
 7321 E. 88th Ave., Suite 200
 HENDERSON, CO 80640
 (303) 941-9620

OWNER: FARTHING RANCH COMPANY
 228 ROAD 237
 CHEYENNE, WY 82009

Detail Name	Detail Value
Meeting Date	12/03/2025
MEETING AM OR PM	AM
Application Types	Conditional Use Class C
Attendees	Online (Teams Meeting)
Property Interest	Leasee
Detailed Project Narrative	Hello Sonny: We did a pre-application for the existing LMO in 2023. The proposed Large Mine Permit will be nearly 600 acres. It will include the existing 15-acre LMO disturbance as well as the following features: • Mining of two granite knobs, called "North Hill" (108 acres) and "South Hill" (171 acres) • Railroad loadout area (132 acres). • Crusher and Mine Facilities area (33 acres) Given the magnitude of the proposed Large Mine Permit, I think it would be helpful for us (and the client) to do another pre-application meeting.
Staff Attending	JA DP CC PB MR MB MN
Application Fees	Yes
Copy of Pre-App Notes	REQUIRED FOR APPLICATION SUBMITTAL
Project Narrative Letter	Yes
Warranty Deed and/or Lease Agreement	Yes



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Development Action	Conditional Use Class C
Drainage Plans	TBD
Drainage Study	Letter of Waiver
Traffic Study	Letter of Waiver
Public Safety Fees Acknowledgement Letter	No
Community Facility Fees Acknowledgement Letter	No
WY DEQ Chapter 23 Study/Submittal Letter	No
Development Agreement	No
Roadway Maintenance Plan	No
Road/Easement Use Agreement	No
Right-of-Way Construction Permit	TBD
Engineer Review - Paid by Applicant	Yes
Environmental Health Review/Approval	No
Environmental and Services Impact Report	No
GESC Permit	Yes, Standard
Floodplain Development Permit	No
Perimeter Fence Construction per W.S.S. 18-5-319	No
Public Notice, Paid by Applicant	Yes
Newspaper Legal Notice, Paid by Applicant	Yes
Adjacent Property Owner Letter, Paid by Applicant	Yes
Miscellaneous Notes	PW Has no issue with this since previous comments accommodate for emergency response vehicles. WYDOT has approval for access. Expansion of the existing of the LG Everist Horse Creek Quarry to approximately 600 acres. Expansion includes two granite knobs, railroad loadout area, and crusher. Access will not change. A buffer on north and west side will be a high wall to protect wetlands. South hill will also have buffer to protect creek. Life of mine is 15 to 30 years for north hill. May do mining of both mines concurrently.



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Miscellaneous Notes (2)

Material is going to ready mix, road base, and asphalt. Loadout facility will be later. Project can be phased so facility can be operational without all proposed improvements completed. DEQ application submitted in early May 2026 and can take up to 18 months. WYDOT said if access stays the same it's fine but if plan to widen would require permit. Needs traffic study that includes number of trucks and travel routes to determine requirements. railyard is anticipated to be at least 5 years away which will reduce truck traffic significantly. Current permit is 100 round trips a day which will still take care of truck traffic. No restrooms or offices will be part of the project. No building permits will be required. Standard grading permit will be required and needs a DEQ permit.

Miscellaneous Notes (3)

New 2025 regulations will require a Class C Conditional Use Permit that includes a concept plan that will be approved by the Planning Commission and the BOCC. After this permit is approved a Site Plan Permit can be submitted. Both permits can be done concurrently but site plan will be at risk if the CUP isn't approved. Fees are \$750 for CUP, mailing costs, legal ad, sign, engineer reviews fees, \$500 for Site Plan. If done concurrently costs for public notification can be shared. Be sure to show phases on site plan and existing operations. Letters go out to neighbors a distance of 500' buffer from parcel, not location of mining operations. But the operations will be shown on the documents sent to neighbors that it is located in the interior of the parcel. Shapefiles will be helpful but not required.

CONDITIONS

* Disclaimer: These are intended as guidance only. Fee calculations are determined at the time of application, and issues that arise during review periods are not always anticipated at pre-application stage. Public Records Act: This document and any documents provided by the applicant to Planning may constitute a public record under W.S.S. 16-4-201 et seq. Applicants are advised not to divulge any information at a Pre-Application Meeting with Planning that they do not yet desire to be public information.



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* A traffic study may be required for any site plan, subdivision permit, or access request for any development and shall be required for any project or development that will generate 100 or more trips during any hour or over 200 trips per day. Traffic studies shall be prepared by a qualified civil engineer licensed by the Wyoming State Board of Registration for Professional Engineers and Professional Land Surveyors to practice engineering in Wyoming. The applicant and the engineer shall meet with the County prior to preparation of the traffic study to discuss specific issues or concerns. The Director of Planning and Development may waive a traffic study based on estimated ADT, and peak hour trips, or existing road or site conditions, including adequate pedestrian access.

* Requests for waivers for drainage impact studies shall be made in writing to the Laramie County Public Works Department. The County shall review the request and approve the grant for a waiver or identify the level of study required for the proposed development action. Laramie County Public Works may waive the requirement for drainage study based on the following: a. Information is provided to substantiate there are no potential drainage problems at the site or downstream of the site (including impacts to downstream floodplains). b. The development or redevelopment will not result in an increase in the historic impervious area. c. The development or redevelopment of an area is immediately adjacent to a major drainageway that is capable of conveying the fully developed basin 100-year flood without impact to the base flood elevation. d. The development or redevelopment is unlikely to create drainage problems.

* A waiver or alternative to the required landscaping may be presented to the Planning and Development Director for review. The Director shall approve the proposed alternative landscape plan based on the following criteria: A. the proposed alternative meets or exceeds the intent of this regulation, and B. the proposed alternative is well-integrated with the surrounding landscaping and land uses, and C. the proposed alternative meets the goals of Laramie County Comprehensive Plan and; D. the purpose of the required site plan is to legalize an existing use and the impact or benefits of the landscape plan on the property would be minimal; or E. the landscaping as required would prohibit reasonable use of the property.

AGENCY REVIEW COMMENTS #1

Permit Notes

Permit Number: PZ-26-00042

Parcel Number: 17690610000100

Submitted: 05/01/2026

Site Address: UNKNOWN

Technically Complete: 05/04/2026

Applicant: Bautz, Melissa
Owner: FARTHING RANCH COMPANY

Laramie County, WY 00000

Approved:
Issued:

Project Description: L.G. Everist, Inc. is planning to submit a Large Mine Permit application to Wyoming DEQ/Land Quality Division in June 2026. The permit will increase the permit boundary from 15 acres (currently permitted acreage via LMO# 1696) to 563 acres.

<u>Begin Date</u>	<u>End Date</u>	<u>Permit Area</u>	<u>Subject</u>	<u>Note Type</u>	<u>Note Text</u>	<u>Created By</u>
05/04/2026		Application	PZ-26-00042	GENERAL	No comments	MANUEL.MUZQUIZ@LARAMIECOUNTY.WY.GOV
05/04/2026		Application	PZ-26-00042	GENERAL	No comments	MANUEL.MUZQUIZ@LARAMIECOUNTY.WY.GOV
05/04/2026	05/04/2026	Application	PZ-26-00042	GENERAL	No concerns noted	CONSERVATIONDISTRICT@LARAMIECOUNTY.WY.GOV
05/04/2026	05/04/2026	Application	PZ-26-00042	GENERAL	No concerns noted	CONSERVATIONDISTRICT@LARAMIECOUNTY.WY.GOV
05/05/2026	05/05/2026	Workflow	COUNTY ASSESSOR REVIEW	GENERAL	Portions of the property may be removed from agricultural classification due to industrial use.	CINDY.KEMIVES@LARAMIECOUNTY.WY.GOV
05/05/2026	05/05/2026	Workflow	COUNTY ASSESSOR REVIEW	GENERAL	Portions of the property may be removed from agricultural classification due to industrial use.	CINDY.KEMIVES@LARAMIECOUNTY.WY.GOV
05/05/2026	05/05/2026	Workflow	COUNTY REAL ESTATE OFFICE REVIEW	GENERAL	no comments	TERESA.LEMASTER@LARAMIECOUNTY.WY.GOV
05/05/2026	05/05/2026	Workflow	COUNTY REAL ESTATE OFFICE REVIEW	GENERAL	no comments	TERESA.LEMASTER@LARAMIECOUNTY.WY.GOV
05/06/2026	05/06/2026	Application	PZ-26-00042	GENERAL	WAPA has no conflict with this mining.	ROGERS@LARAMIECOUNTY.WY.GOV
05/06/2026	05/06/2026	Application	PZ-26-00042	GENERAL	WAPA has no conflict with this mining.	ROGERS@LARAMIECOUNTY.WY.GOV
05/11/2026	05/11/2026	Workflow	BUILDING FIRE CODE REVIEW	DEFICIENCY	NO DIMENSIONS PROVIDED FOR REVIEW. Premises identification shall be in accordance with 2024 IFC section 505 and 2024 IRC section 308, and 2024 IBC section 502.1. Fire Apparatus Roads required per 2024 IFC section 503. Fire protection water Supplies required per 2024 IFC section 507	DANIEL.PETERS@LARAMIECOUNTY.WY.GOV

Permit Notes

05/11/2026	05/11/2026	Workflow	BUILDING FIRE CODE REVIEW	DEFICIENCY	NO DIMENSIONS PROVIDED FOR REVIEW. Premises identification shall be in accordance with 2024 IFC section 505 and 2024 IRC section 308, and 2024 IBC section 502.1. Fire Apparatus Roads required per 2024 IFC section 503. Fire protection water Supplies required per 2024 IFC section 507	DANIEL.PETERS@ LARAMIECOUNTY WY.GOV
05/12/2026	05/12/2026	Application	PZ-26-00042	GENERAL	Ensure that all access and egress roads allow for emergency services	MATTHEW.BUTLE R@LARAMIECOUN TYWY.GOV
05/12/2026	05/12/2026	Application	PZ-26-00042	GENERAL	Ensure that all access and egress roads allow for emergency services	MATTHEW.BUTLE R@LARAMIECOUN TYWY.GOV
05/13/2026		Workflow	SHERIFF'S OFFICE REVIEW	GENERAL	The only concern is additional traffic and CMV weights. Due to the scope of the project, these issues should be re-evaluated every 5 years or when a new sheriff's administration is sworn in.	AARON.VELDHEE R@LARAMIECOUN TYWY.GOV
05/13/2026		Workflow	SHERIFF'S OFFICE REVIEW	GENERAL	The only concern is additional traffic and CMV weights. Due to the scope of the project, these issues should be re-evaluated every 5 years or when a new sheriff's administration is sworn in.	AARON.VELDHEE R@LARAMIECOUN TYWY.GOV
05/18/2026		Workflow	ENVIRONMENTA L HEALTH REVIEW	GENERAL	Plan is to use porta potties and licensed pumper.	TIFFANY.GAERTN ER@LARAMIECOU NTYWY.GOV
05/18/2026		Workflow	ENVIRONMENTA L HEALTH REVIEW	GENERAL	Plan is to use porta potties and licensed pumper.	TIFFANY.GAERTN ER@LARAMIECOU NTYWY.GOV
05/18/2026		Workflow	PUBLIC WORKS REVIEW	GENERAL	1. At time of review by Public Works, the review engineer comments had not been submitted. If the comments need further conversation and/or clarification, please do not hesitate to reach out to Public Works. 2. All comments from the review engineer shall be addressed. 3. Any internal roadways on the site shall comply with the needs of emergency services. 4. Any work taking place within the boundaries of the designated floodplain and/or floodway will require an approved Floodplain Development Permit through the Laramie County Planning and Development office. 5. A note shall be added to the site plan indicating "there will be no public maintenance of internal roadways/access easements."	MOLLY.BENNETT @LARAMIECOUNT YWY.GOV

Permit Notes

05/18/2026	Workflow	PUBLIC WORKS GENERAL REVIEW	<p>1. At time of review by Public Works, the review engineer comments had not been submitted. If the comments need further conversation and/or clarification, please do not hesitate to reach out to Public Works.</p> <p>2. All comments from the review engineer shall be addressed.</p> <p>3. Any internal roadways on the site shall comply with the needs of emergency services.</p> <p>4. Any work taking place within the boundaries of the designated floodplain and/or floodway will require an approved Floodplain Development Permit through the Laramie County Planning and Development office.</p> <p>5. A note shall be added to the site plan indicating "there will be no public maintenance of internal roadways/access easements."</p>	MOLLY.BENNETT @LARAMIECOUNT YWY.GOV
05/18/2026	Workflow	WYDOT REVIEW GENERAL	<p>1. Potential Growth: This quarry may be gearing up for future development in Cheyenne, which could lead to a significant increase in use.</p> <p>2. Road Conditions: WYDOT is concerned about the existing road condition and how increased use and heavy loads will affect it. If the loads begin to cause damage, we will need to implement a load limit.</p> <p>3. No new traffic comments needed. The current proposed traffic data is the same, they are will produce 24 trips (12 in 12 out) at the peak on a low volume road. while it will be important for us to note that this will affect the HorseCreek Interchange, these volumes do not warrant a study at this time.</p>	TAYLOR.MCCORT @LARAMIECOUNT YWY.GOV
05/18/2026	Workflow	WYDOT REVIEW GENERAL	<p>1. Potential Growth: This quarry may be gearing up for future development in Cheyenne, which could lead to a significant increase in use.</p> <p>2. Road Conditions: WYDOT is concerned about the existing road condition and how increased use and heavy loads will affect it. If the loads begin to cause damage, we will need to implement a load limit.</p> <p>3. No new traffic comments needed. The current proposed traffic data is the same, they are will produce 24 trips (12 in 12 out) at the peak on a low volume road. while it will be important for us to note that this will affect the HorseCreek Interchange, these volumes do not warrant a study at this time.</p>	TAYLOR.MCCORT @LARAMIECOUNT YWY.GOV

Permit Notes

05/18/2026	05/18/2026	Application	PZ-26-00042	GENERAL	We see that the proponent has acknowledged all recommendations. We look forward to developing conditions of approval for DEQ LQD permit based on these recommendations, given the proposed mine's location in a relatively sensitive area for important Wyoming wildlife and habitat. NOTE: we also recommend that Laramie County consider incorporating these recommendations into conditions of the county permit.	WYGAMEFISHDEP T@LARAMIECOUN TYWY.GOV
05/18/2026	05/18/2026	Application	PZ-26-00042	GENERAL	We see that the proponent has acknowledged all recommendations. We look forward to developing conditions of approval for DEQ LQD permit based on these recommendations, given the proposed mine's location in a relatively sensitive area for important Wyoming wildlife and habitat. NOTE: we also recommend that Laramie County consider incorporating these recommendations into conditions of the county permit.	WYGAMEFISHDEP T@LARAMIECOUN TYWY.GOV
05/19/2026		Workflow	ENGINEERS REVIEW	GENERAL	<ol style="list-style-type: none"> 1.The site plan drawings are adequate for the proposed use. 2.Access will need to be approved by WYDOT. 3.The Drainage Plan adequately addresses the drainage characteristics for the proposed development. 4.Any proposed work within a FEMA floodplain will require a Floodplain Development Permit Application to be submitted to the County for review and approval. 5.All access shall meet the minimum requirements for commercial development and for emergency vehicles. 	SCOTT.LARSON@ LARAMIECOUNTY WY.GOV
05/19/2026		Workflow	ENGINEERS REVIEW	GENERAL	<ol style="list-style-type: none"> 1.The site plan drawings are adequate for the proposed use. 2.Access will need to be approved by WYDOT. 3.The Drainage Plan adequately addresses the drainage characteristics for the proposed development. 4.Any proposed work within a FEMA floodplain will require a Floodplain Development Permit Application to be submitted to the County for review and approval. 5.All access shall meet the minimum requirements for commercial development and for emergency vehicles. 	SCOTT.LARSON@ LARAMIECOUNTY WY.GOV

APPLICANT RESPONSES #1

Permit Notes

Red font indicates LGE's replies to comments. Please note that the Applicant's name was changed from Melissa Bautz to Matthew Noteboom.

Permit Number: PZ-26-00042

Parcel Number: 17690610000100

Submitted: 05/01/2026

Site Address: UNKNOWN

Technically Complete: 05/04/2026

Applicant: Matthew Noteboom, L.G. Everist, Inc.
Owner: FARTHING RANCH COMPANY

Laramie County, WY 00000

Approved:
Issued:

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Attached to this document is a detailed site plan map for the project site's 3 structures, all of which are located in the Plant Site area of the project. Those 3 structures are: 1) Administration Trailer, 2) Weigh Scale, and 3) Storage Building/Quality Control Lab. Dimensions of each structure and the structures' distance from the site access road are provided on the map.

Permit Notes

05/11/2026	05/11/2026	Workflow	BUILDING FIRE DEFICIENCY CODE REVIEW	NO DIMENSIONS PROVIDED FOR REVIEW. Premises identification shall be in accordance with 2024 IFC section 505 and 2024 IRC section 308, and 2024 IBC section 502.1. Fire Apparatus Roads required per 2024 IFC section 503. Fire protection water Supplies required per 2024 IFC section 507	DANIEL.PETERS@LARAMIECOUNTY.WY.GOV
<p>Attached to this document is a detailed site plan map for the project site's 3 structures, all of which are located in the Plant Site area of the project. Those 3 structures are: 1) Administration Trailer, 2) Weigh Scale, and 3) Storage Building/Quality Control Lab. Dimensions of each structure and the structures' distance from the site access road are provided on the map.</p>					
05/12/2026	05/12/2026	Application	PZ-26-00042 GENERAL	Ensure that all access and egress roads allow for emergency services	MATTHEW.BUTLER@LARAMIECOUNTY.WY.GOV
<p>All of the site's access and egress roads are greater than 20' wide and are designed to allow for emergency services.</p>					
05/12/2026	05/12/2026	Application	PZ-26-00042 GENERAL	Ensure that all access and egress roads allow for emergency services	MATTHEW.BUTLER@LARAMIECOUNTY.WY.GOV
<p>All of the site's access and egress roads are greater than 20' wide and are designed to allow for emergency services.</p>					
05/13/2026		Workflow	SHERIFF'S OFFICE REVIEW GENERAL	The only concern is additional traffic and CMV weights. Due to the scope of the project, these issues should be re-evaluated every 5 years or when a new sheriff's administration is sworn in.	AARON.VELDHEE@LARAMIECOUNTY.WY.GOV
<p>LGE acknowledges this requirement: that a review of traffic and CMV weights will be reevaluated every 5 years or when a new sherriff administration is sworn in.</p>					
05/13/2026		Workflow	SHERIFF'S OFFICE REVIEW GENERAL	The only concern is additional traffic and CMV weights. Due to the scope of the project, these issues should be re-evaluated every 5 years or when a new sheriff's administration is sworn in.	AARON.VELDHEE@LARAMIECOUNTY.WY.GOV
<p>LGE acknowledges this requirement: that a review of traffic and CMV weights will be reevaluated every 5 years or when a new sherriff administration is sworn in.</p>					
05/18/2026		Workflow	ENVIRONMENTAL HEALTH REVIEW GENERAL	Plan is to use porta potties and licensed pumper.	TIFFANY.GAERTNER@LARAMIECOUNTY.WY.GOV
05/18/2026		Workflow	ENVIRONMENTAL HEALTH REVIEW GENERAL	Plan is to use porta potties and licensed pumper.	TIFFANY.GAERTNER@LARAMIECOUNTY.WY.GOV
05/18/2026		Workflow	PUBLIC WORKS REVIEW GENERAL	1. At time of review by Public Works, the review engineer comments had not been submitted. If the comments need further conversation and/or clarification, please do not hesitate to reach out to Public Works. 2. All comments from the review engineer shall be addressed. 3. Any internal roadways on the site shall comply with the needs of emergency services. 4. Any work taking place within the boundaries of the designated floodplain and/or floodway will require an approved Floodplain Development Permit through the Laramie County Planning and Development office. 5. A note shall be added to the site plan indicating "there will be no public maintenance of internal roadways/access easements."	MOLLY.BENNETT@LARAMIECOUNTY.WY.GOV
<p>The existing access road at the Horse Creek site was constructed in adherence with the WYDOT access permit LA-07A-48569 (attached). All roads at the site are 20' wide or greater to accommodate emergency service vehicles.</p> <p>No work is planned to occur in a flood plain at the Horse Creek Rock Quarry; as there are no flood plains present in the permit area. A flood plain map was provided in the Conditional Use Permit application for this operation, a copy of which is provided as an attachment to this document.</p> <p>The following phrase has been added to the Site Plan: "There will be no public maintenance of the internal roadway/access easements."</p>					

Permit Notes

<p>05/18/2026</p> <p>Workflow</p> <p>PUBLIC WORKS GENERAL REVIEW</p> <p>The existing access road at the Horse Creek site was constructed in adherence with the WYDOT access permit LA-07A-48569 (attached). All roads at the site are 20' wide to accommodate emergency services.</p> <p>No work is planned to occur in a flood plain at the Horse Creek Rock Quarry; as there are no flood plains present in the permit area. A flood plain map was provided in the Conditional Use Permit application for this operation, a copy of which is provided as an attachment to this document.</p> <p>The following phrase has been added to the Site Plan: "There will be no public maintenance of the internal roadway/access easements."</p>		<ol style="list-style-type: none"> 1. At time of review by Public Works, the review engineer comments had not been submitted. If the comments need further conversation and/or clarification, please do not hesitate to reach out to Public Works. 2. All comments from the review engineer shall be addressed. 3. Any internal roadways on the site shall comply with the needs of emergency services. 4. Any work taking place within the boundaries of the designated floodplain and/or floodway will require an approved Floodplain Development Permit through the Laramie County Planning and Development office. 5. A note shall be added to the site plan indicating "there will be no public maintenance of internal roadways/access easements." 	<p>MOLLY.BENNETT @LARAMIECOUNT YWY.GOV</p>
<p>05/18/2026</p> <p>Workflow</p> <p>WYDOT REVIEW GENERAL</p> <p>LGE acknowledges WYDOT's comments 1 & 2 and will work with WYDOT to address any concerns that arise during the operation of the quarry. If WYDOT determines that a load limit must be implemented, LGE will work with WYDOT to ensure those load limits are understood and followed.</p> <p>Comment number 3 indicates that the quarry will experience 24 daily trips (12 in and 12 out) for this project. However the correct numbers traffic information for this application are 86 trips per day on average. Specifically, an average of 76 trips per day are anticipated for haul trucks and 10 trips per day are anticipated for personnel. The 86 daily average trips is codified in the project's Class C Conditional Use permit (Number PZ-26-00011), approved on May 4, 2026. Additionally, in the Conditional Use Permit, LGE has committed to not exceed 199 daily trips for this quarry.</p> <p>If the above-indicated average and maximum daily limits are anticipated to increase, LGE will contact WYDOT immediately to discuss the process for such changes.</p>		<ol style="list-style-type: none"> 1. Potential Growth: This quarry may be gearing up for future development in Cheyenne, which could lead to a significant increase in use. 2. Road Conditions: WYDOT is concerned about the existing road condition and how increased use and heavy loads will affect it. If the loads begin to cause damage, we will need to implement a load limit. 3. No new traffic comments needed. The current proposed traffic data is the same, they are will produce 24 trips (12 in 12 out) at the peak on a low volume road. while it will be important for us to note that this will affect the HorseCreek Interchange, these volumes do not warrant a study at this time. 	<p>TAYLOR.MCCORT @LARAMIECOUNT YWY.GOV</p>
<p>05/18/2026</p> <p>Workflow</p> <p>WYDOT REVIEW GENERAL</p> <p>LGE acknowledges WYDOT's comments 1 & 2 and will work with WYDOT to address any concerns that arise during the operation of the quarry. If WYDOT determines that a load limit must be implemented, LGE will work with WYDOT to ensure those load limits are understood and followed.</p> <p>Comment number 3 indicates that the quarry will experience 24 daily trips (12 in and 12 out) for this project. However the correct numbers traffic information for this application are 86 trips per day on average. Specifically, an average of 76 trips per day are anticipated for haul trucks and 10 trips per day are anticipated for personnel. The 86 daily average trips is codified in the project's Class C Conditional Use permit (Number PZ-26-00011), approved on May 4, 2026. Additionally, in the Conditional Use Permit, LGE has committed to not exceed 199 daily trips for this quarry.</p> <p>If the above-indicated average and maximum daily limits are anticipated to increase, LGE will contact WYDOT immediately to discuss the process for such changes.</p>		<ol style="list-style-type: none"> 1. Potential Growth: This quarry may be gearing up for future development in Cheyenne, which could lead to a significant increase in use. 2. Road Conditions: WYDOT is concerned about the existing road condition and how increased use and heavy loads will affect it. If the loads begin to cause damage, we will need to implement a load limit. 3. No new traffic comments needed. The current proposed traffic data is the same, they are will produce 24 trips (12 in 12 out) at the peak on a low volume road. while it will be important for us to note that this will affect the HorseCreek Interchange, these volumes do not warrant a study at this time. 	<p>TAYLOR.MCCORT @LARAMIECOUNT YWY.GOV</p>

Permit Notes

05/18/2026	05/18/2026	Application	PZ-26-00042	GENERAL	We see that the proponent has acknowledged all recommendations. We look forward to developing conditions of approval for DEQ LQD permit based on these recommendations, given the proposed mine's location in a relatively sensitive area for important Wyoming wildlife and habitat. NOTE: we also recommend that Laramie County consider incorporating these recommendations into conditions of the county permit.	WYGAMEFISHDEP T@LARAMIECOUN TYWY.GOV
<p>All of the WGFD Wildlife comments and recommendations for this project are included in the forthcoming LQD mine plan application. During this project's conditional use permit discussions, LGE committed to providing Laramie County with a copy of the fully executed, approved LQD permit to mine. Approval of the LQD permit to mine for the Horse Creek Rock Quarry is expected on (approximately) May 30, 2027. LGE commits to comply with and provide the County a copy of the approved Dept. of Env. Quality mining permit.</p>						
05/18/2026	05/18/2026	Application	PZ-26-00042	GENERAL	We see that the proponent has acknowledged all recommendations. We look forward to developing conditions of approval for DEQ LQD permit based on these recommendations, given the proposed mine's location in a relatively sensitive area for important Wyoming wildlife and habitat. NOTE: we also recommend that Laramie County consider incorporating these recommendations into conditions of the county permit.	WYGAMEFISHDEP T@LARAMIECOUN TYWY.GOV
<p>All of the WGFD Wildlife comments and recommendations for this project are included in the forthcoming LQD mine plan application. During this project's conditional use permit discussions, LGE committed to providing Laramie County with a copy of the fully executed, approved LQD permit to mine. Approval of the LQD permit to mine for the Horse Creek Rock Quarry is expected on (approximately) May 30, 2027. LGE commits to comply with and provide the County a copy of the approved Dept. of Env. Quality mining permit.</p>						
05/19/2026		Workflow	ENGINEERS REVIEW	GENERAL	<ol style="list-style-type: none"> 1.The site plan drawings are adequate for the proposed use. 2.Access will need to be approved by WYDOT. 3.The Drainage Plan adequately addresses the drainage characteristics for the proposed development. 4.Any proposed work within a FEMA floodplain will require a Floodplain Development Permit Application to be submitted to the County for review and approval. 5.All access shall meet the minimum requirements for commercial development and for emergency vehicles. 	SCOTT.LARSON@ LARAMIECOUNTY WY.GOV
<p>WyDOT access permit LA-07A-48569 has been approved for the approach/access to the Horse Creek Rock Quarry. A copy of the access permit is attached to this document.</p> <p>No work is planned to occur in a flood plain at the Horse Creek Rock Quarry; as there are no flood plains present in the permit area. A flood plain map was provided in the Conditional Use Permit application for this operation, a copy of which is provided as an attachment to this document.</p>						
05/19/2026		Workflow	ENGINEERS REVIEW	GENERAL	<ol style="list-style-type: none"> 1.The site plan drawings are adequate for the proposed use. 2.Access will need to be approved by WYDOT. 3.The Drainage Plan adequately addresses the drainage characteristics for the proposed development. 4.Any proposed work within a FEMA floodplain will require a Floodplain Development Permit Application to be submitted to the County for review and approval. 5.All access shall meet the minimum requirements for commercial development and for emergency vehicles. 	SCOTT.LARSON@ LARAMIECOUNTY WY.GOV
<p>WyDOT access permit LA-07A-48569 has been approved for the approach/access to the Horse Creek Rock Quarry. A copy of the access permit is attached to this document.</p> <p>No work is planned to occur in a flood plain at the Horse Creek Rock Quarry; as there are no flood plains present in the permit area. A flood plain map was provided in the Conditional Use Permit application for this operation, a copy of which is provided as an attachment to this document.</p>						

LGE commits to provide Laramie County's Planning and Zoning Department with a copy of the finalized, approved WDEQ-Land Quality division mining permit for the Horse Creek Rock Quarry project. The estimated date for the LQD permit approval is May 30, 2027. However, approval could occur before or after that date.

The following phrase has been added to all of the maps associated with LGE's Site Plan application:

"There will be no public maintenance of the internal roadway/access easements."

The updated Site Plan map packet (which includes the above phrase on all the maps) is provided at the end of this submittal; i.e. the last 6 pages of this PDF document.



Mark Gordon
Governor

WYOMING Department of Transportation

"Provide a safe and effective transportation system"

5300 Bishop Boulevard, Cheyenne, Wyoming 82009-3340



Darin J. Westby
Interim Director

Matt Noteboom, L.G Everist,
Attn: Todd Mattson, HDR Engineering
7321 East 88th Avenue
Henderson, CO 80640

June 22, 2023

Re: Permit No. LA-07A-48569

Dear Applicant:

The application for constructing an access has been reviewed and approved. The approach must be constructed according to the requirements shown on the permit along with the supplementary sheets attached to the permit.

Please contact Mark Papke, 307-777-4386 in Cheyenne, if you have any questions regarding the approach. **Please make note of remarks in the comments section on the access permit.**

If the requirements on the permit have not been met by the expiration date, the permit will be canceled. The approach will then be blocked from the permitted use. The applicant will be required to remove any material within the WYDOT right of way associated with the construction of the access.

This permit will expire on June 26, 2024 if construction has not started by that date.

If you have any comments or questions regarding this approach, contact the Maintenance Foreman or myself at 307-745-2118.

Sincerely,

Michael Ginther,
District Traffic Technician

cc: Brian Erickson, Area Maintenance Supervisor
Mark Papke, Maintenance Foreman
File

Permit Number: _____

THIS ACCESS IS HEREBY GRANTED, WITHIN THE CONDITIONS STATED HEREIN.

- 1) To construct the access in a safe manner so as not to interfere with existing authorized facilities previously permitted nor endanger public travel and to perform all related work in a neat and workman like manner, to use materials acceptable to the Wyoming Department of Transportation and leave the right-of-way clean and in a condition equal to or better than the original condition.
- 2) To fully protect any traffic on the highway during construction covered hereunder by proper barricades, flaggers, and/or signs as shown in the TRAFFIC CONTROL FOR ROADWAY WORK OPERATIONS manual.
- 3) That no access shall be constructed such that there will be parking or servicing of vehicles within the highway right-of-way.
- 4) That the profile grade of the access shall be constructed as indicated on attached sketch or plan sheet(s) and shall in no case be graded or maintained in such a way that water/mud will run out onto the highway surface.
- 5) That this permit shall become VOID if construction is not completed within _____ days after initiation of construction or one (1) year from approval date if construction has not been started.
- 6) That any change in access use or change in business type will nullify this access permit and a new application must be submitted for approval.
- 7) That the Wyoming Department of Transportation reserves the right to inspect this installation at any time during construction until accepted by the Department, and to require changes at any time necessary to provide protection of life and property on or adjacent to the highway. Once the access has been accepted by the Department it then becomes the property of the Wyoming Department of Transportation and theirs to maintain and repair except for snow or debris removal.
- 8) To any additional requirements as described in the DISTRICT MAINTENANCE/TRAFFIC ENGINEERING, REQUIREMENTS/COMMENTS sections on this permit, and/or any on attached sketch or plan sheets.
- 9) The applicant shall hold harmless the Transportation Commission of Wyoming, Wyoming Department of Transportation, and its appointed agents and employees against any action for personal injury or property damage sustained through use of this permit.

APPROVAL FOR CONSTRUCTION:



Signature

(District Engineer / District Traffic Engineer)

Date

CONSTRUCTION INSPECTED (MAINTENANCE):

I have inspected this access and have found the access to have been constructed as per the requirements described by this permit.

Signature

Title

Date

ACCESS ACCEPTANCE:

District personnel have inspected this access described on this permit and attached drawing(s) and have found the access to be constructed in the manner as prescribed on this permit and attached drawing(s).

Signature

(District Engineer / District Traffic Engineer)

Date

references: OPERATING POLICY 21-1 and RULES & REGULATIONS FOR ACCESS FACILITIES TO WYOMING STATE HIGHWAYS.

WYOMING DEPARTMENT OF TRANSPORTATION

APPROACH DESIGN REQUIREMENTS

Some or all of the following design requirements will apply in the construction of your approach. The location, width, and turning radius of your approach(es) has been established and is shown on the access permit and/or attached sheet(s).

The individual applying for access and signing the application will be responsible for meeting the terms outlined on the said permit or attached sheet(s). The signature must be that of the landowner, a copy of the permit must be on hand at the construction site during the construction of your approach(es).

It will be the responsibility of the applicant to notify all utilities when construction work begins in the vicinity of any utility lines and to arrange for a representative of the utility to be present if the applicant's operations are in close proximity to any lines in their existing or relocated positions which could create a hazardous condition.

Requirements	Access Type			
	Field	Residential	Commercial	Major
It will be the responsibility of the applicant to notify all utilities when construction work begins in the vicinity of any utility lines and to arrange for a representative of the utility to be present if the applicant's operations are in close proximity to any lines in their existing or relocated positions which could create a hazardous condition.			X	
All major accesses shall be paved by the grantee. All other accesses which generate <u>50 trip ends</u> or more <u>per day</u> shall be paved by the grantee, or as stipulated in the permit.				
The approach driveway surface will be constructed with a minimum of four (4) inches of asphalt over six (6) inches of crushed base material. Crushed base material must meet WYDOT standards for a class W material. See spec book section 803.4.3				
The approach driveway surface will be constructed with a minimum of (6) inches of crushed base material not to exceed (1) inches in diameter. Crushed base material must meet WYDOT standards for class W material. See WYDOT spec book 803.4.3			X	
Drainage in highway R.O.W. side ditches shall not be altered or impeded. When drainage structures are required, the drainage pipe (culvert) should be aligned to allow natural flow, and the pipe ends should be nearly flush with the approach side slopes. All drainage pipes will be a minimum of (18) inches in diameter but may be sized larger depending on runoff in the area. If an existing drainage pipe is extended, it must be properly banded to prevent leakage under the approach.			X	
The driveway should be sloped down at a two (2) percent grade for a minimum eight (8) feet away from the edge of the roadway pavement in CUT sections to prevent debris from coming out onto the road surface. In urban areas with reduced traffic speeds, the first twenty (20) feet of driveway may slope toward the roadway shoulder at no more than two (2) percent grade. The driveway grade should be no more than five (5) percent for commercial access and ten (10) percent for private access within the department R.O.W.				
The driveway should be sloped down at a two (2) percent grade for a minimum twenty (20) feet in FILL sections to provide vehicles a level area to enter the roadway. The dimension will be increased to match large radii (an access with fifty (50) foot radii would require a fifty (50) foot section of two (2) percent grade.) The driveway grade should be no more than five (5) percent for commercial access and ten (10) percent for private access within the Department R.O.W.			X	

(CONTINUED)

Requirements	Field	Residential	Commercial	Major
The approach side slopes shall conform to the latest safety standards. These standards require side slopes of 1v:8h or flatter.			X	
End panels must be constructed at the R.O.W. fence for each side of the approach opening. The end panels are to be installed prior to cutting the fence or at the same time the approach is being constructed.			X	
A gate or cattle guard must be installed if livestock is within the area. A cattle guard installed on Department R.O.W. must meet the Department's standards for either s standard or heavy duty cattle guard depending on vehicle weights and volumes. The landowner may place a lesser cattle guard off the Department R.O.W. and wing fencing to the R.O.W. fence. The Department will not maintain such a cattle guard. If a gate is installed and the landowner intends to lock the gate, the Department needs to be contacted in order to make arrangements for possible access to maintain the R.O.W. fence.			X	
It is the landowners responsibility to install mailbox (es) and to construct a turnout according to the Department's standards. A mailbox will only be permitted if the installation is at the R.O.W. fence. If a mailbox is installed the landowner must contact the Maintenance Foreman or District Traffic Engineer for assistance with the design of the turnout.			N/A	

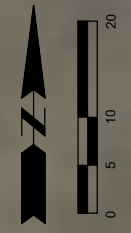
If there are any questions regarding the design of the approach, contact the District Traffic Engineer or the District Traffic Technician in Laramie, (307) 745-2100

If there are any questions regarding the construction of the approach, contact the Maintenance Foreman at the phone number on your approval letter.

Please note that failure to comply with these terms will result in the removal of all work and the cancellation of the access permit.

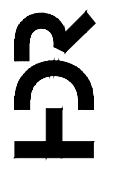
It will be your responsibility to contact the Maintenance Foreman, upon completion of the approach, before your permit expires. This will enable the foreman to inspect the approach and inform you of any additional work that may be required to accept the approach as a legal access. You should allow for enough time to make necessary corrections or changes before the permit expires.

The Wyoming Department of Transportation reserves the right to impose any additional requirements to insure that the roadway is not adversely affected and traffic safety is maintained.



Prepared For:

HDR ENGINEERING INC.
7350 Stockman St., Suite A
Cheyenne, WY 82009



Prepared By:

Scale:

Designed By: D.GOULETTE	Drawn By: D.GOULETTE
Design Date: 5/24/2023	Print Date: 5/24/2023
Internal Job No: 10369959	

Surveyed By: OTHERS	Survey Date: 5/2023
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Revisions:

L.G. EVERIST, INC.
HORSE CREEK QUARRY
CHEYENNE, WYOMING

Project No. 10369959

Sheet Title:

**APPROACH
PERMIT
EXHIBIT**

Sheet:

EX 1.0



INSTALL GRADING 'W' CRUSHED BASE (6" THICK MINIMUM)

INSTALL 60 LF OF 18" RCP WITH FLARED END SECTIONS

INSTALL 34 LF OF BARBED WIRE FENCE

24' WYDOT HEAVY DUTY CATTLEGUARD

INSTALL 34 LF OF BARBED WIRE FENCE

EXISTING WYDOT ROW (APPROX.)

WY RTE 211 - HORSE CREEK RD.

R50'

R50'

60.1

42

60.1

12+00

51+00 51+05

11+00

50+00



Wyoming Game and Fish Department

Conserving Wildlife, Serving People

Governor Mark Gordon • Director Angi Bruce

Commissioners

Ashlee Lundvall, President

Mark Jolovich, Vice President

Rusty Bell

Bill Mai

Carlisle "Fonzy" Haskell

John Masterson

Kenneth D. Roberts

February 12, 2026

WER 15005.02

L. G. Everist, Inc.

Horse Creek Rock Quarry

Conditional Use Permit C

Laramie County

Sonny Pourchot

Associate Planner

Laramie County Planning and Development

Sonny.Pourchot@laramiecountywy.gov

Dear Ms. Pourchot,

The staff of the Wyoming Game and Fish Department (Department) has reviewed the proposed Conditional Use Permit C for the L. G. Everist, Inc. Horse Creek Rock Quarry in Section 32 T18N R70W and Section 5-6 T17N R70W in Laramie County. The Department is statutorily charged with managing and protecting all Wyoming wildlife (W.S. 23-1-103). Pursuant to our mission, we offer the following comments for your consideration.

L. G. Everist currently operates a Limited Mine Operation (LMO) at this site. The proposed Regular Mine permit area would encompass an additional 658 acres on private lands, and the site would be accessed from Wyoming Highway 211/Horse Creek Road via an existing access road approximately 3 miles in length. The expansion area primarily consists of two hill formations, the North Hill and the South Hill, as well as a large loadout area located adjacent to the railroad line near Highway 211. Mining operations would begin at the North Hill and when the resources there are depleted in approximately 20-25 years, mining at the South Hill would commence. Depending on the resources on site, a conveyor belt from the existing LMO site to the loadout area may also be constructed.

The proposed mine expansion project is located in vital habitat for several types of wildlife, including those protected by State of Wyoming Executive Order policy. The North Hill mine site, nearly the entirety of the access road, and a portion of the loadout area are located within the 2-mile Timing Limitation Stipulation (TLS) buffer of an occupied, non-Core area Greater sage-grouse lek. The lek is located approximately 1.1 miles northeast of the existing LMO site and was active in 2025. The majority of the proposed mine, loadout area, and existing access road is also located within mule deer crucial winter range habitat. South Chugwater Creek and Ricker Creek, perennial streams supporting extensive riparian vegetation, run along the northern and western portions of the North Hill and South Hill sites. The project area and surrounding vicinity may contain suitable habitat for a number of Species of Greatest Conservation Need (SGCN) such as

Sonny Pourchot
February 12, 2026
Page 2 of 6 – WER 15005.02

Greater sage-grouse, nesting raptors, other migratory bird species, Preble's meadow jumping mouse, swift fox, various bat species, reptiles and amphibians, and native fishes.

In 2025, the Department provided project recommendations to the permitting consultant Brierley Associates and to the wildlife and environmental consultant Real West Consulting. The recommendations in this letter reiterate the recommendations previously provided to those entities. To date, we have not received additional information from those entities.

We recommend the following measures be considered for conditions of the project's Laramie County permit.

Terrestrial Recommendations:

Comply with the [Wyoming Greater Sage-Grouse Core Area Protection Executive Order 2019-3](#) (SGEO) – Given that the proposed mine site and existing access road is primarily located within the 2-mile TLS buffer of an occupied, non-Core area Greater sage-grouse lek (NLSID 3354), the following stipulations must be followed in order to comply with required state policy via the SGEO:

- For all mine or loadout area sites located within the lek's 2-mile Timing Limitation Stipulation (TLS) buffer, remove all vegetation and topsoil outside of the March 15 – June 30 TLS period.
- For all mine or loadout area sites that are located outside of the lek's 2-mile Timing Limitation Stipulation (TLS) buffer, and are only accessible via the access road that passes through substantial portions of the lek's 2-mile TLS buffer, all traffic related to vegetation and topsoil removal must also occur outside the March 15 – June 30 TLS period.
- Once all vegetation and topsoil removal activities are complete, mining activities at sites within the 2-mile Timing Limitation Stipulation (TLS) buffer and/or accessed via the road located within the 2-mile TLS buffer may occur year-round.

Additionally, the Department recommends the following measures:

- Avoid removing any stands of sagebrush except for what is essential for the mine expansion. Sagebrush provides vital habitat for many sagebrush obligate species and is difficult to restore once removed.
- Facilitate the monitoring of the affected Greater sage-grouse lek. We recommend coordinating with the landowner to continue to allow access for Department personnel to conduct lek monitoring while the mine is in operation or until the lek is determined to be unoccupied.
 - If Department staff are unable to access the site for lek monitoring, we recommend the project's environmental consultant conduct annual lek monitoring.

Avoid disturbance to wintering mule deer – The project site is located within mule deer crucial winter range habitat, which is delineated as such because the use of that habitat is a determining factor in a population’s ability to maintain itself long-term. Big game crucial winter range is considered a vital habitat per the Wyoming Game and Fish Commission [Mitigation Policy](#) (2016) and the Department is directed to recommend no loss of habitat function for crucial winter range. Human activity and industrial/ground-disturbing activity can impact the foraging behavior, stress levels, and energy reserves in big game individuals, particularly during the winter when mortality risk is already high. This can cause increased energy demands, increased winter mortality, and decreased fawn productivity, potentially impacting the viability of local populations. Therefore, the Department recommends:

- Restricting all ground-disturbing activity and other project-related activity, and minimizing traffic and human presence, at the site between November 15 and April 30.
- If this is not feasible, we recommend:
 - Performing all initial topsoil removal at the mine site outside the November 15 – April 30 Timing Limitation Stipulation period.
 - Creating a travel management plan to reduce impacts to wintering big game and submitting it to the Department for review.
 - We recommend including measures for minimizing traffic loads, encouraging carpooling of personnel, avoiding traffic for one hour after dawn and one hour before dusk, and implementing 25 mph speed limits on project roads.

Protect nesting raptors and other migratory birds – The proposed project site and surrounding area contains nesting habitat for raptors. Federal law prohibits the take of raptors, including causing the destruction or abandonment of eggs and young. Raptors can require up to a 1-mile spatial buffer from construction activities during nesting. Additionally, sagebrush-obligate migratory birds and other bird species likely nest in the project area in shrubs, grass, and/or conifers. To avoid losses of birds or occupied nests, the Department recommends:

- Conducting raptor nest surveys in and within 1 mile of the project prior to new surface disturbing activities, if habitat clearing and construction activity is occurring during the breeding season (approximately February 1 – July 31)
- Implementing the U.S. Fish and Wildlife Service (Service) seasonal and spatial buffers for occupied raptor nests. The Service’s breeding season dates and recommendations are located at: <https://www.fws.gov/project/wyoming-ecological-services-field-office-raptor-guidance>.
- Conducting ground clearance surveys for active migratory bird nests, if ground-disturbing activities are planned between April 1 and July 31. If nests are located or other evidence of nesting is detected, we recommend a protective buffer (in consultation with the Department and the Service) be implemented until the young fledge or the nest is no longer occupied, in order to avoid avian take as a result of construction activities.

- Consulting with the Service to avoid take of migratory birds.

Minimize impacts to bat roosts and habitat – A number of SGCN bats may occur in and around the project area. Bats use both live and dead snag trees to roost in during the day, and some species also form maternity (pup bearing and rearing) roosts in trees. To minimize impacts to sensitive bat populations in the project area, the Department recommends:

- Avoiding the removal of any live or dead snag trees that are not essential for the quarry expansion.
- Covering or netting ponds that contain oily wastes or other wastes to exclude use by bats.

Prevent the spread of invasive annual grasses – Invasive annual grasses (IAGs) can cause significant harm to the ecosystem when introduced. Ground-disturbing activities can create an environment that facilitates establishment by unwanted plants. They significantly reduce the quality of wildlife habitat and their presence increases the probability of catastrophic wildfire. The potential economic impacts to the State of Wyoming are severe, and once these species become established, eradication is difficult and costly. Prevention of establishment remains the best way to keep Wyoming's habitats free of IAGs.

The most significant known threat to Wyoming is from cheatgrass, medusahead, and ventenata. To prevent the spread of IAGs, we recommend the following:

- Preventing introduction and establishment by cleaning vehicles and equipment prior to movement to a new location in order to minimize the potential for transporting seeds.
- Working with landowners and land managers to develop and implement a plan to assess, treat, and monitor for invasive plants at the project scale and in the adjacent landscape where they are present.
- Working with the [Laramie County Weed & Pest Control District](#) to implement and fund long-term plans for successful restoration of disturbed sites. Additional information on prevention and treatment options for IAGs can be found at <https://www.invasivegrasses.com>.

Aquatic Recommendations:

Protect riparian and wetland habitat – The perennial South Chugwater Creek runs along the northwestern portion of the project's North Hill site. Its tributary, Ricker Creek, is located along the western portion of both the South Hill and North Hill sites, and fresh emergent wetlands are found along the western portions of the North Hill and South Hill sites. These creeks and wetland habitat are surrounded by steep topography. The project boundary provided to the Department indicates that mining activities may be planned adjacent to the steep stream banks, raising concerns about potential runoff and sedimentation concerns. These creeks are known to contain brown and

brook trout as well as a number of native fish species. The riparian and wetland areas also serve as potential habitat for the federally-threatened Preble's meadow jumping mouse, nesting raptors and other migratory birds, and reptiles and amphibians, including a number of potential SGCN. As such, the Department recommends:

- Mapping all perennial and ephemeral riparian and wetland habitat in and in the immediate vicinity of the project area.
- Maintaining a 500-foot buffer around all perennial and ephemeral riparian and wetland habitat.

Protect watershed and fishery quality – In addition to maintaining appropriate buffers around riparian and wetland habitat as discussed above, the proponent should incorporate other Best Management Practices (BMPs) to protect watershed and fishery quality in this area. Sediment from construction activities, mining activities on surfaces cleared of vegetation, and stockpiles of materials, as well as pollutant runoff, can enter nearby waterways and negatively impact water quality and habitat for aquatic wildlife. The Department recommends:

- Incorporating sufficient overflow capacity into sedimentation ponds so that storm water concentrated flow during extreme precipitation events does not overflow onsite storage ponds.
- Incorporating BMPs to control erosion and prevent sediment from reaching watersheds, including but not limited to:
 - Preserving existing vegetation wherever possible.
 - Properly containing stockpiles of materials and locating them away from riparian areas, wetlands, or areas of potential storm water concentrated flow.
 - Incorporating revegetation, silt fences, siltation berms, rock chuck dams, and other erosion control measures to prevent sedimentation from cleared surfaces and materials piles.
 - Cleaning, fueling, and maintaining vehicles and equipment at designated areas away from aquatic resources or areas of potential storm water concentrated flow.

Prevent the spread of aquatic invasive species – Aquatic invasive species (AIS) are organisms that are not native to Wyoming and can cause significant harm to an ecosystem when introduced. Harmful impacts can occur to municipal water supplies, fishing and boating-related recreation, agriculture, aquaculture, and other commercial activities. The potential economic impacts to the State of Wyoming could be severe if these non-native species are introduced into our water systems. Once these organisms become established in a waterbody, there is very little that can be done to remove them. Prevention is the best way to keep a water body safe from AIS.

The most significant known threat to Wyoming is from zebra and quagga mussels based on their proximity and demonstrated impacts in neighboring states. Other AIS include New Zealand mudsnail, Asian carp, rusty crayfish, and several species of aquatic plants.

Sonny Pourchot
February 12, 2026
Page 6 of 6 – WER 15005.02

The spread of AIS from one body of water to another is a violation of Wyoming state statute (WS § 23-1-102 & §§ 23-4-201 through 205) and Wyoming Game and Fish Commission Regulation. To prevent the spread of AIS, the following is required:

- Equipment that was in contact with a water positive for zebra/quagga mussels (currently none in Wyoming) within the last 30 days is required to undergo inspection by an authorized inspector prior to contacting a Wyoming water.
- From March through November, all water hauling equipment and watercraft entering the state by land must be inspected before contacting a water of the state.
- Equipment used in any Wyoming water that contains AIS, must be Cleaned, Drained and Dried before use in another water. Wyoming waters with AIS can be found at: <https://experience.arcgis.com/experience/fbcba43d51e945cf8ab6eb0fcfe70d00>.
- When equipment that has been in contact with any Wyoming water is moved from one 4th level watershed (8-digit Hydrological Unit Code) to another within Wyoming, it must be Cleaned, Drained and Dried. Specific guidance is available at: <https://wgfd.wyo.gov/watercraft-inspection-information>.

Thank you for the opportunity to comment. If you have any questions or concerns, please contact Lauren Throop, Habitat Protection Biologist, at (307) 721-1396.

Sincerely,



Will Schultz
Habitat Protection Supervisor

WS/lt

cc: U.S. Fish and Wildlife Service
Chris Wichmann, Wyoming Department of Agriculture
Melissa Bautz, Brierley Associates
Amber Travsky, Real West Consulting

Horse Creek Rock Quarry – Landscaping Plan **Prepared for Laramie County Planning Department (Wyoming)**

Reclamation will take place at the completion of mining for each mining section. The mining sections are divided into approximately 3.5 acre increments. The mined areas will be reclaimed in accordance with the Land Quality Division (LQD) reclamation standards. Reclamation will consist of placement of backfill materials (crusher fines) over the entire quarry site to a slope no steeper than 3(H) to 1(V); this will occur via grading combined with removal of benches. The crusher site will be graded to ensure through drainage and will be no steeper than a slope of 3:1. Cover materials will be replaced on the reclamation fill materials and the site will be reseeded (via drill seeder) with the following seed mixture:

The Horse Creek Quarry seed mix will include 13 species (3 shrubs, 5 forbs, 4 grasses) at a rate of 14.1 lbs/acre with the following species breakdown:

- black sagebrush (1.2 lbs/acre), western yarrow (0.3 lbs/acre),
- beardtongue penstemon (0.6 lbs/acre), plains aster (0.4 lbs/acre),
- smoother aster (0.15 lbs/acre),
- Rocky Mountain bee plant (1.0 lbs/acre),
- bluebunch wheatgrass (3.25 lbs/acre),
- western wheatgrass (2.1 lbs/acre),
- needle and thread grass (2.1 lbs/acre),
- Sandberg bluegrass (0.3 lbs/acre),
- yellow rabbitbrush (1.5 lbs/acre),
- rubber rabbitbrush (1.2 lbs/acre).

Prior to seeding, the reclaimed crusher, staging, parking, and stockpile areas will be ripped, disced, and drill seeded. In general, the underlying rock will be fractured and will continue to permeate water as it did during its pre-mining condition. Anticipated cover material replacement depths are indicated below.

Anticipated Cover Material Replacement Depths for the Horse Creek Rock Quarry:

- Access route (not adjacent to the quarry): 2” – 6”
- Access route (adjacent to the quarry): 0” – 1”
- Crusher Site: 2” – 8”
- Quarry Site: 2” - 4”

LGE commits to salvage all cover materials and store them in stockpiles until the site is reclaimed; at that time all salvaged cover materials will be re-placed onto the affected areas. The final reclaimed topography will ensure through-drainage toward the east via well-defined microchannels built during establishment of the final 3(H) to 1(V) slope. The microchannels on the reclaimed quarry site will drain eastward to the head of the natural drainages that are currently present immediately east of the site’s access road. It is anticipated that the access road will remain at the end of mining and reclamation (at the discretion of the landowner). This access road existed pre-mining and will continue to be utilized to provide access to the Site for livestock and recreational use as required by the landowner.



LARAMIE COUNTY LAND USE REGULATIONS

Transportation Assessment Worksheet

The following transportation assessment worksheet shall be completed in association with 5-6-103

Project: Horse Creek Rock Quarry By: Melissa Bautz (Agent)
 Date: Jan-30, 2026 Contact: mbautz@BrierleyAssociates.com
 Owner/Developer: L.G. Everitt, Inc. Phone: (307) 330-7629
 Property Address or Legal Description (lot, block, subdivision): _____
 Legal Description: T18 R70 E 1/2 sec 31, S 1/2 sec 32 AND T18 R69 E 1/2 Sec 6, E 1/4 NE 1/4 sec 5
 Existing Zoning: LU - Land Use Change to: n/a
 Existing Land Use: Lu - Land Use Proposed: n/a
 Above changes if applicable.

Applicant email: mbautz@brierleyassociates.com

All Developments

Provide the following information, to the best of your knowledge, for all projects:

1. Provide existing Land Use and Proposed Land Use for this site.
 - a. Traffic counts need to be included in here... if not existing developer must provide current traffic counts on adjacent public roadways.
 - b. Description of existing Land Use: (If none, use Vacant) If using Peak Hours, multiply by a Rate of 7.44 *current Limited Mining Operation*

Type	ITE Code	Land Use	Unit	Time Period	Rate	Size	Trips/Day
LU	110	General Industrial	Acres	Daily	51.80	1 acre/yr	25
Total:							

- c. Description of proposed Land Use: (If none, use Vacant) If using Peak Hours, multiply by a Rate of 7.44

Type	ITE Code	Land Use	Unit	Time Period	Rate	Size	Trips/Day
LU	110	General Industrial	Acres	Daily	51.80	3.2 Acres/year	166
Total:							

New Land Use: Trips/Day
 Increase (+)/Decrease (-): +141

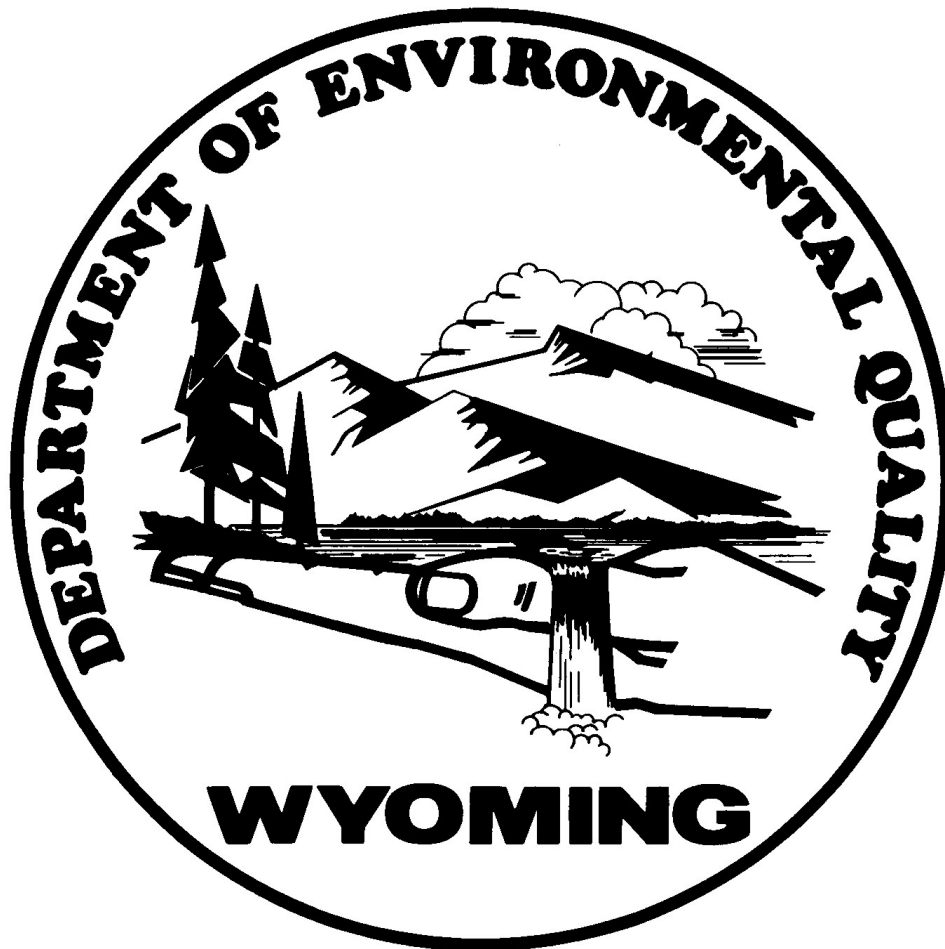
1. Traffic Impact Study - Criteria I	
2. Traffic Impact Study - Criteria II	
3. Traffic Impact Study - Criteria III	
4. Traffic Impact Study - Criteria IV	
5. No Traffic Impact Study Required	n/a

This was waived for existing operation (the LMO #1696)

b. Standards for TIS

Traffic impact studies shall utilize the Institute of Transportation Engineers (ITE) trip generation rates unless better information is available and approved by the County. If there is no available current data regarding existing traffic counts on existing roadways, traffic counts will be required to be obtained when a TIS is required.

**DEPARTMENT OF ENVIRONMENTAL QUALITY
LAND QUALITY DIVISION**



GUIDELINE NO. 8

HYDROLOGY

COAL AND NON COAL

Last Revised: May 2015

TABLE OF CONTENTS

I.	INTRODUCTION	1
II.	DEFINITIONS.....	1
III.	SURFACE WATER.....	2
A.	Premining Studies (to be included in Appendix D-6 (Hydrology)).....	2
1.	Precipitation (can be cross-referenced from Appendix D-4 (Climatology)).....	2
2.	Evapotranspiration (ET) (can be cross-referenced from Appendix D-4 (Climatology)).....	3
3.	Runoff.....	3
4.	Watershed and Stream Channel Characterization	4
5.	Baseline Water Quality.....	5
6.	Water Rights.....	6
B.	Mine Plan	6
1.	Design of Temporary Diversions and Culverts	6
2.	Impoundments and Sedimentation Ponds.....	7
3.	Monitoring Stations	8
4.	Hydrologic Control Map	8
C.	Reclamation Plan.....	8
1.	Topography and Watershed Design	8
2.	Stream Channel Reconstruction and Permanent Diversion Construction	9
3.	Permanent Impoundments	10
4.	Reclamation Monitoring.....	11
IV.	GROUNDWATER.....	11
A.	Premining Studies [Appendix D-6 (Hydrology)].....	12
1.	Geologic Framework	12
2.	Aquifer Hydraulic Characteristics	13
3.	Potentiometric Surface	15
4.	Groundwater Quality	16
5.	Water Rights	16
B.	Mine Plan	17
1.	Impacts of Dewatering or Water Consumption.....	17
2.	Monitoring.....	19
3.	Water Rights.....	22
C.	Reclamation Plan.....	23
1.	Aquifer Reclamation.....	23
2.	Land Surface - Water Table Interactions.....	23
3.	Monitoring.....	24
V.	PROBABLE HYDROLOGIC CONSEQUENCES.....	24
A.	Surface Water Consequences	25
1.	Surface Water Quantity	25
2.	Surface Water Quality	26
3.	Geomorphology (surface water quantity and quality).....	26
B.	Groundwater Consequences.....	26
1.	Groundwater Quantity	27

2.	Groundwater Quality	27
C.	Surface Water/groundwater Interactions.....	27
1.	Water Quantity	27
2.	Water Quality	28
D.	Water Rights.....	28
E.	Important Habitats.....	28
APPENDIX 1		30
PREMINING WATER QUALITY SAMPLING		30
APPENDIX 2		37
STREAM CHANNEL DESIGN		37
APPENDIX 3		39
TEMPORARY AND PERMANENT IMPOUNDMENTS		39
APPENDIX 4		41
MONITOR WELL INSTALLATION AND MAINTENANCE		41
APPENDIX 5		46
RULES AND REGULATIONS CITATIONS		46
APPENDIX 6		53
PLUGGING AND ABANDONMENT		53
APPENDIX 7		54
MINING PHASE SURFACE AND GROUNDWATER MONITORING AT SURFACE COAL MINES		58
APPENDIX 8		54
WYOMING GROUNDWATER PERFORMANCE STANDARDS WHITE PAPER....		57

I. INTRODUCTION

This document is a guideline only. Its contents are not to be interpreted by applicants, operators, or Land Quality Division (LQD) staff as mandatory. If an operator wishes to pursue other alternatives, he or she is encouraged to discuss these alternatives with the LQD staff.

This guideline is not intended to be comprehensive. It clarifies the more important but less specific regulations, and it compliments rather than substitutes for the existing regulations. (See Appendix 5 for appropriate Rules and Regulations.) All headings in the Guideline may not apply to all operators. A table of contents is provided to direct the applicant to the appropriate topic for individual permitting needs. Required hydrology data collected during the annual report period should be presented and analyzed in the annual report submitted by the operator to the LQD. Coal operators are required to follow the Coal Annual Report Format (CARF) for reporting and presentation of all the required hydrology data collected during the annual report period.

II. DEFINITIONS FOR PURPOSES OF THIS GUIDELINE

- A. "**Affected Aquifer**" An aquifer whose natural state or physical properties have been, will be, or may be disturbed as a result of mining operations.
- B. "**Affected Land**" The area of land from which overburden is removed, or upon which overburden, development waste rock, and/or refuse is deposited; where access roads, haul roads, mineral stockpiles, mill tailings, and impoundment basins have been built; and all other lands whose natural state has been or will be disturbed as a result of the operations.
- C. "**Aquifer**" A zone, stratum, or group of strata that stores and transmits water in sufficient quantities for a specific use.
- D. "**Aquitard**" A layer of low permeability that can store groundwater and also transmit it slowly from one aquifer to another. May also be called a leaky confining layer.
- E. "**Confined Aquifer**" An aquifer that is overlain by a confining layer where the water level in a well completed in that aquifer will rise above the top of the aquifer.
- F. "**Diversion**" means a channel, embankment, device, or other man-made structure constructed for the purpose of diverting water from one area to another.
- G. "**Ephemeral Stream**" A stream which flows only in direct response to precipitation in the immediate watershed or in response to snow melt, and which has a channel bottom that is always above the prevailing water table.
- H. "**Impoundment**" means a closed basin formed naturally or artificially built which is dammed or excavated for the retention of water, slurry or other liquid or semi-liquid material. A permanent impoundment is a structure that will remain after final bond release.

- I. **"Intermittent Stream"** A stream or part of a stream that is below the local water table for some part of the year, but is not a perennial stream.
- J. **"Master Stream"** A relative term referring to the highest order stream(s) in the permit area and adjacent lands. Master streams should be determined with the LQD staff during permitting.
- K. **"Perched Aquifer"** An aquifer which is underlain by an aquitard and which is also underlain by geologic strata which are unsaturated or only partially saturated.
- L. **"Perennial Stream"** A stream or part of a stream that flows continuously during all of the calendar year as a result of groundwater discharge or surface runoff.
- M. **"Piezometer"** A well constructed in such a manner that the water level in the well will respond to changes in hydraulic head in one aquifer or a portion of one aquifer.
- N. **"Potentiometric Surface"** The surface that coincides with the static level of water in an aquifer. The surface is represented by the levels to which water from a given aquifer will rise under its full head.
- O. **"Sedimentation pond"** means a sediment control structure designed, constructed, and maintained to slow down or impound precipitation runoff to reduce sediment concentrations in a point source discharge, including dams or excavated depressions. The term does not include straw dikes, riprap, check dams, mulches, collection ditches, toe ditches, vegetative buffers, gabions, contour furrows and other traditional soil conservation techniques and non-point source runoff controls.
- P. **"Unconfined Aquifer"** An aquifer in which there are no confining beds between the zone of saturation and the surface. The water level in a well completed in an unconfined aquifer will be coincident with the top of the aquifer. Also known as a water table aquifer.

III.SURFACE WATER

- A. Premining Studies (to be included in Appendix D-6 (Hydrology))
 - 1. Precipitation (can be cross-referenced from Appendix D-4 (Climatology))

Long-term precipitation data may be obtained from the nearest weather station or from the National Oceanic and Atmospheric Administration (NOAA) map (US Department of Commerce, 1973). Operations more than 50 miles from a permanently staffed official weather station may be required to keep precipitation records. These data should include:

- a. Precipitation (inches) for the 2-, 5- 10-, 25-, and 100-year, 6-, and 24-hour storm events; and

- b. Average monthly and average annual precipitation in inches.

Any storm event precipitation data collected at the mine site should be presented, and the monitoring station equipment and location should be described. The most useful data would include continuous precipitation for each storm event, presented in intervals of ten (10) minutes or less.

2. Evapotranspiration (ET) (can be cross-referenced from Appendix D-4 (Climatology)). ET data may be required based on the design requirements of impoundments or other water retaining structures.
 - a. Actual ET: Where measurements of actual ET are available they should be summarized and referenced.
 - b. Potential ET: Potential ET may be estimated from weather station data or from regional maps.

3. Runoff

- a. Water Quantity Measurements

Surface water quantity measurements should be taken for a minimum of one year prior to application submittal. Permanent continuous recording gages should be established at the up and downstream permit boundaries on all master streams. The monitoring plan should be discussed with the LQD in the early stages of the permitting process and ultimately approved by the LQD.

The following information should be included in the application:

- (1) Monitoring station description: equipment, measurable flows, type of flow control for high and low discharges (weir, flume, channel control), stage discharge relationship, location of monitoring stations on a map, and other appropriate information;
- (2) Description of monitoring station maintenance procedures, including but not limited to: checks for structural, mechanical, and electrical integrity of equipment; and checks for signs of erosion or debris preventing the proper function of any equipment. Where possible, inspections of equipment should take place within 24 hours after each substantial runoff event and at the beginning of the runoff season (early spring). All problems preventing the proper function of a gaging station should be corrected upon discovery. A written log of inspection and maintenance activities should be available at the mine and summarized in the annual report;
- (3) Daily non-zero runoff volumes (missing data should be estimated), event peak flows, representative hydrographs and flow-duration curves (for perennial streams) for all master streams, whether ephemeral, intermittent or perennial;

- (4) The runoff volume and peak flows of 2-yr, 10-yr, and 100-yr frequencies should be estimated near the downstream permit boundary for all master streams. This can be done using a variety of techniques, such as:
 - (a) Relationships based on basin and/or channel characteristics (e.g., Craig & Rankl, 1977; Lowham, 1988; Miller, 2003);
 - (b) Soil Conservation Service Triangular Hydrograph Method; and
 - (c) Estimates using computer models, such as Trihydro, Multsed, SEDCAD+, HEC-1, etc.; and
- (5) Estimates of recharge and discharge due to groundwater interactions within the permit area.
 - a. Empirical Methods

The empirical methods above may be used to determine volume and peak flows on all other streams on the permit area.
 - b. USGS Data

Available USGS gaging data, relevant to the permit area, should be summarized for the period of record.

4. Watershed and Stream Channel Characterization

a. Watershed Network

A drainage network map (scale 1 inch = 1000 feet) of the permit and adjacent areas on the topographic base map should be included in the application. The applicant should:

- (1) Include all streams with defined channels (the extent of stream channels should be checked in the field and/or with aerial photography);
- (2) Distinguish perennial, intermittent, and ephemeral streams;
- (3) Show boundaries of contributing watersheds;
- (4) Locate stream gages; and
- (5) Show areas of alluvium, terraces, playas, groundwater discharge areas, stock ponds, and other hydrologic features.

b. Watershed Delineation

For all basins that will be disturbed by mining activities within the permit area, measure and tabulate:

- (1) Watershed area;
- (2) Basin relief ratio (Strahler, 1964) or average basin slope (Craig and Rankl, 1977);
- (3) Valley and channel slope;
- (4) Channel sinuosity; and
- (5) Drainage density (mi/mi²)

c. Stream Characterization

Plot longitudinal profiles and calculate the slopes for channels that drain areas greater than 100 acres and which will be disturbed by mining activities. Locate any bedrock outcrops and headcuts. Describe vegetation on channel bed and banks, texture of channel materials, bank and bed stability, and presence or absence of sediment deposits.

d. Stream Morphology

Survey and plot cross-sections sufficient to characterize the morphology of the stream channels indicated in point "c." above. The suggested cross-section interval is 2000 feet or less. This information is necessary to characterize the premining condition of the stream channels and can be used in the design of reclaimed stream channels, see Section III.C.2.a. of this guideline.

e. Potential Offsite Changes

Describe any offsite conditions that might be expected to affect reclaimed channels in the future (e.g., major headcuts, dams, etc.).

5. Baseline Water Quality

The Water Quality Division's (Chapter 1) stream classifications for all identified streams should be provided in order to establish the current and postmining uses.

On master streams, well-mixed zones should be sampled both upstream and downstream of the lands to be affected. In addition, a reconnaissance sampling program should be conducted to include samples at groundwater discharge points and on channels draining different geologic units. Surface water quality samples should be collected from benchmarked sampling points where flow can be measured or calculated. Baseline water quality constituent, field preservation techniques, quality control measures, and holding times are referenced in Appendix 1 of this guideline.

On intermittent and perennial streams, samples to be analyzed for constituents listed in Appendix 1 should be collected monthly for one year in order to identify seasonal variation. On ephemeral streams, one sample should be taken as early as possible during snowmelt runoff, and one should be taken during a thunderstorm runoff event. The following information should be submitted:

- a. Sample collection and preservation methods;
- b. Date and time of sample collection;
- c. Discharge at time of sampling; and
- d. Analytical results

6. Water Rights

- a. Within the Permit
A map showing the locations of all surface water rights within the permit area should be submitted.
- b. Within one-half mile
The following information should be tabulated for each surface water right within one-half (½) mile of the permit area:
 - (1) Source;
 - (2) Permit number;
 - (3) Location;
 - (4) Priority date;
 - (5) Facility name (reservoir, ditch);
 - (6) Applicant name;
 - (7) Acre-feet; and
 - (8) Use (industrial, irrigation, stock, etc.).

B. Mine Plan

1. Design of Temporary Diversions and Culverts

a. Design Flow

- (1) Minimum standards require that temporary diversion channels be designed for the 2-yr, 6-hr event or a duration that yields a higher peak flow. However, it is recommended that the design event recurrence interval be chosen based on the structure's expected lifetime and an appropriate probability of failure for the function of the diversion. Recommended design event return periods are:

<u>Life of Diversion</u>	<u>Storm Event Return Period</u>
<3 yrs	10 yr
3-10 yrs	25 yr
11-20 yrs	50 yr
>20 yrs	100 yr

- (2) Suggested methods for calculating flood peaks and/or volumes in Wyoming may be found in Section III.A.3.a.(4) of this guideline.

b. Diversion Design Considerations - greater than 20-year life of diversion (but not permanent)

The operator should:

- (1) Submit the design methodology, criteria, assumptions, and representative calculations (e.g., Manning's "n", velocity, sheer stress, flow depth, bed or energy grade line slope);

- (2) Discuss the erodibility of the channel materials;
- (3) Submit representative cross-section(s); and
- (4) Submit transition zone design(s).

c. Diversion Design Considerations - less than 20-year life of diversion

For a diversion in place less than 20 years, operators should demonstrate that the design discharge will not exceed an appropriate maximum permissible velocity.

d. Culvert Design

- (1) Culverts should pass the design flood peak using the head available at the entrance. Culverts should pass the same peak event described in Section III.B.1.a.(1). The suggested minimum culvert diameter is 18 inches.
- (2) Erosion control measures for culverts should be specified.
- (3) Where appropriate, trash racks should be placed at or near culvert entrances to prevent clogging.
- (4) A culvert maintenance plan should be outlined.

2. Impoundments and Sedimentation Ponds

Runoff from disturbed and reclaimed areas should be controlled either by sediment ponds (see LQD Guideline 13), alternative sediment control measures (see LQD Guideline 15), or a combination of both. Detailed design specifications are required for those structures that are planned to be built during the term of permit. For those impoundments that are planned to be constructed after the term of permit, the applicant only needs to submit the general location and approximate impounding capacity of the structure. For more detail concerning impoundment designs and other considerations, see Appendix 3 of this guideline.

3. Monitoring Stations

a. Wyoming Pollutant Discharge Elimination System (WYPDES)

The WYPDES program, administered by the Department of Environmental Quality, Water Quality Division and overseen by the U.S. Environmental Protection Agency, regulates the discharge of pollutants into surface waters of the State. All discharges into waters of the State are required to be permitted. This includes stormwater discharges. Permits issued under this program establish effluent limitations which specify maximum amounts of pollutants or wastes which may be discharged. Questions concerning permitting, reporting and monitoring requirements for WYPDES permits should be directed to Water Quality Division. The location(s) of all WYPDES discharges and outfalls should be shown on the hydrologic control map. WYPDES sampling requirements may be included as part of the surface water quality and quantity monitoring.

b. Mining Phase Water Quality Monitoring

Surface water quality samples analyzed for Appendix 7 constituents should be:

- (1) Collected quarterly from upstream and downstream stations on through-flowing intermittent and perennial streams;
- (2) Collected twice annually on ephemeral streams; during a snowmelt runoff event, and a thunderstorm runoff event. With adequate justification, this monitoring frequency may be changed or monitoring may be discontinued after approval from the LQD; and
- (3) Collected from all WYPDES discharge points according to the requirements specified by the WQD permit.

When the WQD is informed of an accidental oil or hazardous materials spill within or near the permit area that could potentially affect the quality of surface water or groundwater, the LQD should be notified with a phone call relating the same information.

c. Mining Phase Water Quantity Monitoring

Surface water flows should be monitored during the life of mining. Flow information should include:

- (1) Continuous recorded data from stations on the up and down stream permit boundaries for all master streams;
- (2) Flow data from streams that may be significant to downstream water rights.

The applicant should have a plan approved by the LQD to analyze monitoring station data to determine mining impacts on flow peaks, flow volumes, infiltration, and any rating curves.

4. Hydrologic Control Map

A hydrologic control map should be provided locating and identifying diversions, monitoring locations, culverts, ponds, WYPDES discharge points, alternate sediment control structures and their drainage areas. This map should be at the same scale as the mine plan map.

C. Reclamation Plan

1. Topography and Watershed Design

a. Topography Design

The reclaimed topography should be designed to maximize geomorphic stability and topographic diversity. Slopes should generally be shaped to be concave up, because slopes that are convex up generally have an increased potential for severe erosion. Streams should be designed to avoid abrupt changes in slope between undisturbed and reclaimed channels. Topographic diversity can be enhanced by

shortening designed slope lengths, increasing the drainage density and decreasing drainage basin sizes.

The reclaimed topographic map should show drainage basin boundaries and reclaimed channels with reference to cross-sections and longitudinal profiles. The map should be on the same scale and have a contour interval not greater than the pre-disturbance map.

b. Watershed Design

Drainage areas, basin relief ratios, valley and channel slopes, channel sinuosity, and drainage densities for all reclaimed basins should be tabulated. The table should be constructed such that it can be compared to the same data for premining basins (see Section III.A.4.b. of this guideline). Factors affecting premining channel and landscape stability that may be altered in the reclaimed landscape (e.g., bedrock controlled headcuts and differences in material erodibility) should be discussed.

2. Stream Channel Reconstruction and Permanent Diversion Construction

a. Stream Channel Reconstruction

Stream channels should be designed to maximize geomorphic stability. The channel planimetric, longitudinal, and cross-section design should be explained. Cross-sections representative of any variations along the profile should be provided. Detailed thalweg profiles, including at least 500 feet of undisturbed channel on either end of reconstructed reaches, should be submitted.

The following geomorphic measurements and hydraulic variables (for the design discharge) should be calculated or measured for the reclaimed channel and the undisturbed upstream and/or downstream reaches:

GEOMORPHIC	HYDRAULIC
Channel Depth	Flow Depth
Channel Top Width	Water Surface Width
Channel Cross-Section Area	Cross-Section Area of Flow
Thalweg Slope	Water Surface Slope
Valley Slope	Manning's and/or Vegetal Retardance
Channel Sinuosity	Channel Hydraulic Radius
Bendway Radius of Curvature	Mean Channel Velocity
	Thalweg Shear Stress

Baseline stream channel data, collected as part of Section III.A.4.c. and d. of this guideline, should also be used to evaluate and/or modify the reclaimed channel design.

b. Permanent Diversion Construction

A plan for field-verifying that each reclaimed channel has been constructed according to specification should be included. The applicant should submit and explain graphical or tabular survey data, and the survey technique used to bring the channel to the approved grade. The survey should be conducted after grading but before topsoil replacement in the stream channel. Several representative cross-sections should be surveyed if signs of instability (e.g., headcutting, bank failure, channel avulsion) are anticipated or discovered during inspections or photo surveys. Inspection reports or photo surveys should be included in the Annual Report.

c. Additional References

For more information concerning reclaimed channel design see Appendix 2 of this guideline.

3. Permanent Impoundments

a. Location

All permanent impoundment locations should complement the anticipated final land use. The permanent impoundments should be located on the postmining topography map. Surface owner consent is also required for all permanent impoundments.

b. Expected Life

The expected life of the impoundment should be estimated based on the loss of water storage capacity due to sedimentation.

c. Water Availability

The applicant should demonstrate that enough water is available to fill the impoundment, the onsite transmissivity is sufficient to supply groundwater to the impoundment (if groundwater is a major contributor to total storage), and the anticipated final water quality is suitable for the postmining use. The demonstration should include items listed in Land Quality Division Coal Rules and Regulations Chapter 4, Section 2.(g). These include:

- (1) Aquifer characteristics;

- (2) The rate of groundwater recovery after dewatering within the impoundment area;
- (3) The final water surface elevation and expected water level fluctuations;
- (4) The yearly evaporative rate from the impoundment surface;
- (5) The anticipated final water quality of the impoundment and its relationships to the proposed use of the impoundment;
- (6) Surface water contributions to the impoundment; and
- (7) State Engineer Office approval.

d. Postmine Impoundment Water Quality

4. Reclamation Monitoring

The applicant should continue to monitor surface water following the approved monitoring plan as discussed in Section III.B.3 of this guideline.

IV. GROUNDWATER

The purpose of this introduction is to outline the strategy for designing a groundwater hydrologic monitoring program which will be in place and provide useful information throughout the life of the operation - from premining through Final Bond Release. For more detail concerning groundwater performance standards, see Appendix 8 of this guideline. The information in this introduction applies to all of the groundwater monitoring sections in this guideline. More specific information regarding groundwater monitoring during each stage of the operation can be found in the Premining, Mine Plan and Reclamation Plan sections of this guideline. It is imperative that the reader keep this strategy in mind when designing all stages of the hydrologic monitoring program. The reader should also keep in mind that site-specific hydrogeologic aberrations may require additional information. For this reason, the monitoring strategy should be discussed with the LQD in the early stages of the permitting and revision process and ultimately approved by the LQD.

The goal of premining hydrologic monitoring is to characterize the hydrogeologic system and establish baseline conditions. The goals of during mining and reclamation hydrologic monitoring are to track mine related impacts to the groundwater system and to assure the suitability of the water for current and postmining uses. To efficiently achieve these goals, wells should be located where they will provide useful information for as long as possible. That is, wells should be placed in areas accessible year-round and outside near-term mining areas. The placement of wells for hydrogeologic characterization and tracking of mine related impacts will apply to all potentially affected aquifers including overburden, coal, underburden, clinker and alluvium.

Initial geologic information, obtained through literature searches, exploration drilling and reconnaissance level mapping, should be used to identify the different hydrogeologic environments in and near the permit area. The monitor well network within the permit area should be designed to further characterize these different environments. The designs of this network should also consider the near-term mining sequence so that as many of the wells as

is possible can also be used to track mine related impacts. The monitor well network within the permit area should be incorporated into the design of the long-term monitoring strategy. Sections IV.A.1., 2., and 3. of this guideline discuss the characterization of the local geology and hydrogeology.

The primary goals of the long-term monitoring strategy is to track mine related impacts to, and recoveries of, the groundwater system throughout the mining and the postmining monitoring periods. It is suggested that the long-term monitoring strategy be based on a radial pattern originating at the approximate center of the permit area, with wells located at or near the permit boundary. Water level fluctuations should be used as a first indication of impact and water quality should be used as a second indication. The monitoring network within the permit area should be designed to fit into this pattern as much as possible. Section IV.B.2., of this guideline, discusses the long-term monitoring strategy, including hydrologic monitoring to track mine-induced impacts.

Once baseline has been established, monitoring frequencies will be based on the assumption that water level declines will be a first indication of mine related impacts. Most contaminants, excluding gaseous phase contaminants, cannot move away from a pit, only towards the pit, when water levels indicate the prevailing hydraulic gradient is towards the pit. If water levels demonstrate a hydraulic gradient towards the pit, water quality can be monitored less frequently, after approval from the LQD.

The adoption of this long-term monitoring strategy by existing operations should not necessitate major reworking of the existing monitor well network (i.e., new wells). It is recommended that this strategy be adopted and meshed with the present monitoring network by adjusting monitoring frequencies at existing wells, abandoning unnecessary wells, and/or strategically locating future wells (especially off permit wells). For more detail concerning plugging and abandonment, see Appendix 6 of this guideline.

A. Premining Studies [Appendix D-6 (Hydrology)]

1. Geologic Framework

Note: much of this information can be referenced from Appendix D-5 (Geology/Soils)

a. Stratigraphy

Stratigraphy within the permit area and adjacent areas should be identified and described using lithologic and geophysical logs, geologic maps, and published data. The extent, thickness, and continuity of all aquifers and confining layers should be identified.

b. Geologic Features

Geologic features that could influence aquifer properties such as dip, grain size,

faulting, folding and sorting should be described. Any occurrence of clinker, clay or shale should be described and identified on a map.

c. Hydrologic Boundaries

Potential hydrologic boundaries, recharge and discharge areas (including springs, seeps, sinks and wet areas), and significant perched aquifers should be identified on the potentiometric surface map.

d. Cross-Sections

Cross-sections extending through the affected area should identify:

- (1) Potentiometric surface(s);
- (2) Lithologies;
- (3) The mineral to be mined;
- (4) Geologic features such as faults, paleochannels, etc.;
- (5) Extent of mining;
- (6) Aquifers and aquitards;
- (7) Areas of aquifer communication;
- (8) Hydrologic boundaries;
- (9) Recharge and discharge areas; and
- (10) Wells used for hydrogeologic interpretations.

e. Supporting Data

Supporting information including: geophysical logs (resistivity, gamma ray, self-potential, density) and/or lithologic logs should be referenced from Appendix D-5 of the permit. A structure contour map of the aquifer and the unit directly below it (top of coal and bottom of coal) should be referenced from Appendix D-5 (Geology/Soils). A map showing cross-section and drill hole locations should be referenced or included.

2. Aquifer Hydraulic Characteristics

Hydrogeologic characterization of the permit area requires prior knowledge of the mining method, extent of disturbance, depth of the pit, duration of the mining, and potential impacts to surrounding water resources and water rights. The characterization program should be designed to: 1) determine the hydraulic characteristics of aquifers that may be affected by mining; 2) determine the quantity and quality of groundwater to be dewatered at various stages of mining; 3) estimate the areal extent of static water level declines in potentially affected aquifers; 4) evaluate potential impacts to water resources due to mining, and 5) estimate groundwater conditions and aquifer characteristics likely to exist after reclamation.

a. Hydrogeologic Characteristics

A narrative summary of hydrogeologic characteristics should include the following:

- (1) Number of aquifers and their intercommunication;
- (2) Aquifer characteristics and variability;
- (3) Direction of flow and significance of recharge and discharge areas to the sites;
- (4) Significance of hydrologic boundary conditions;
- (5) Potentiometric surface(s);
- (6) Water quality;
- (7) The effect of any existing adjacent operations on the premining information and data; and
- (8) Regional potentiometric surface(s)

b. Aquifer Tests

Aquifer tests should be used to determine transmissivities, hydraulic conductivities, storage coefficients, hydrologic boundaries, leakage, aquifer homogeneity, and isotropy. For example, a multi-well pump test evaluation, as described by Theis (1935), Cooper and Jacob (1946), Boulton (1954), or a test as summarized by Lohman (1979) is suggested. A data log for each aquifer test should be placed in the application to identify both a chronological order of events and decisions that were made during testing. The location and number of aquifer tests should be sufficient to characterize the different hydrogeologic environments present within the potentially affected area. At a **minimum**, at least one aquifer test should be performed for each potentially affected hydrogeologic environment identified during the preliminary geologic investigation. The geohydrologic characterization plan or strategy should be discussed with the LQD during the early stages of the permitting process in order to facilitate LQD approval. In some instances, a temporary discharge permit may be required from WQD.

Within the data log mentioned in the above paragraph, the following information should be submitted for each aquifer or pump test:

- (1) All data obtained from the aquifer tests and measurements necessary to evaluate the testing results; and
- (2) Methods of analyses:
 - (a) List the methods of analyses and equations used;
 - (b) List the assumptions upon which the equations are based;
 - (c) List how assumptions were met by the physical conditions; and
 - (d) Present sample calculation.
- (3) Graphs which show:

- (a) All drawdown and/or recovery data;
- (b) Curve or line fits;
- (c) Match points, u , $W(u)$;
- (d) Boundary and casing storage effects;
- (e) Pump breakdown;
- (f) Discharge adjustments; and
- (g) t_0 .

(4) Correction factors and their associated supportive data and the method used for data adjustment

(5) Results of analyses:

- (a) Hydraulic conductivity;
- (b) Transmissivity; and
- (c) Storage coefficient or (apparent) specific yield.

3. Potentiometric Surface

a. All Affected Aquifers

The premining potentiometric surface for all aquifers that may be affected by mining should be defined and located on a 1 inch = 1,000 foot scale map(s) which encompass the affected lands and potentially affected aquifers. Potentiometric surfaces should be extended into all units which are in good hydraulic communication with the aquifer, including clinker, alluvium, etc. This map should also show well locations, groundwater recharge and discharge areas, and other hydrogeologic features.

b. Premining Monitoring

Potentiometric surface elevations should be measured quarterly for one year, except for alluvial wells or aquifers in non-static conditions. For alluvial wells or aquifers in non-static conditions, measurement frequencies shall be agreed to by the LQD and the operator. Continuous monitoring should be considered where hydrographs are needed for assessment of groundwater recharge or discharge zones. This is particularly important for determination of alluvial valley floor (AVF) characteristics (see LQD Guideline 9). Closed-in information pressure readings may be necessary in gassy wells and flowing artesian wells.

c. Well Installation and Maintenance Program

A well installation and maintenance program should be thoroughly outlined (see Appendix 4 of this guideline).

4. Groundwater Quality

a. Sampling Frequency

Representative groundwater samples should be taken at a minimum quarterly for one year to characterize potentially affected aquifers. For alluvial wells or aquifers in non-static conditions, sampling frequencies shall be agreed to by the LQD and the operator. Samples should be analyzed for the constituents referenced in Appendix 1 of this guideline. Sample quality assurance procedures should also be followed and are found in Appendix 1.

b. Sampling Method

It should be documented that aquifer water and not borehole water is being collected. This can be done by withdrawing at least three casing volumes of water prior to sampling (document pump rate and purging time) or by pumping until pH, conductivity, temperature, and water level readings remain constant (document changes in each constituent against time in tabular form). If recharge cannot match minimal pumping rates in the low permeability aquifers, then a sample can be retrieved by clearing the borehole once and bailing water that subsequently enters the well.

c. Reporting Results

The results of water quality analyses should be tabulated in the application. The following information should be reported for each sample:

- (1) Sample site identification;
- (2) Laboratory identification;
- (3) Date sampled;
- (4) Date analyzed;
- (5) Constituents and associated units as outlined in Appendix 1 of this guideline (Note whether such analyses represent field or laboratory measurements.);
- (6) Calculated cation-anion balance
- (7) TDS determined at 180°F vs. TDS calculated from major cation-anion analyses; and
- (8) Analytical method

d. Description of Alternative Methods

If methods are used other than those outlined in 40 CFR Part 136, then a brief description of these alternative methods and associated justifications for their use should be included.

5. Water Rights

a. Map

A map showing the locations of all groundwater rights within the permit area and three miles beyond the permit boundary should be submitted.

b. Report Information

The following information should be tabulated for each groundwater right within the permit area and three miles beyond the permit boundary:

- (1) Permit number;
- (2) Location;
- (3) Priority date;
- (4) Facility name;
- (5) Applicant;
- (6) Total depth;
- (7) Depth of water;
- (8) Yield;
- (9) Statement of well log availability; and
- (10) Use (irrigation, stock, domestic, etc.).

c. Discussion of Impacts and Protection

A narrative should be included which discusses the potential and extent of mine related impacts to the quantity and quality of water protected by these water rights.

B. Mine Plan

1. Impacts of Dewatering or Water Consumption

a. Dewatering Methods

- (1) The applicant should specify all methods to be used to dewater all affected aquifers, including the locations and typical designs of dewatering wells, and predicted pumping rates.
- (2) All methods, calculations, and numerical values used in the dewatering assessment should be provided.
- (3) If groundwater is discharged into a stream channel, anticipated discharge flow rate, water quality, and estimated seasonal discharge of the groundwater should be tabulated. The availability and suitability of this water for downstream water users should also be evaluated.

b. Anticipated Water Quality and Quantity

- (1) The quantity and quality of groundwater removed at various stages of mining should be described, including wells supplying water for facilities and dust suppression.
- (2) Ponds should be designed to treat the volume of water pumped from mine pits and underground workings at any given time. Discharges from well heads may not require treatment, however erosion protection measures for well head discharge points should be described. Anticipated discharge rates to stream channels should be discussed.
- (3) The DEQ WQD requires a WYPDES discharge permit for each mine. The WYPDES permit regulates all discharges and discharge points on the mine site.

c. Drawdown Modeling

- (1) The purpose of drawdown modeling is to predict mine related impacts to the hydrologic system. The modeling results should be used to assess probable hydrologic consequences and cumulative hydrologic impacts. The level of sophistication used in estimating drawdown should be proportional to the complexities of the hydrogeologic system.
- (2) A thorough description of the selected model or prediction technique should be submitted and include:
 - (a) An introduction of the problem and the approach chosen for modeling (e.g., finite difference);
 - (b) A written description of all equations;
 - (c) A list of simplifying assumptions, sinks, sources and boundary conditions;
 - (d) The solution techniques for the equations (e.g., strongly implicit procedure (SIP), line successive over-relaxation (LSOR) and alternating direction implicit procedure (ADI)) and associated error tolerances;
 - (e) The grid nodes superimposed on a base map of the same scale as the premining potentiometric map;
 - (f) The selection of time steps;
 - (g) A tabulation of data input; and
 - (h) A sensitivity analysis.
- (3) The drawdown predictions should be evaluated for consistency with the most current potentiometric data at each renewal period for coal. If drastic inconsistencies are observed, adjustments will be required for predicting drawdowns for the subsequent term of permit and life-of-mine. Trend analysis of existing life-of-mine potentiometric data may substitute for

recalibration of the original drawdown model given an adequate data base.

2. Monitoring

a. Monitor Well Network

- (1) The groundwater monitoring strategy during the early phase of the mining operation should take into consideration the initial pit locations. Information provided from the monitoring network within the permit area will be used to track mine related impacts and evaluate drawdown model predictions. Ideally, wells should be located in a radial pattern centered around the projected near-term pit(s) and in locations which will not be mined through in the early phases of the operation. The monitoring network will track impacts for longer periods of time if the wells are located in this manner. The network should be designed to monitor impacts to the overburden, coal, underburden aquifers, and in any other aquifer which may be impacted. This early term monitor network should be incorporated into the design of the long-term monitor network as soon as possible.
- (2) This simple strategy may not be applicable in all mining situations. For example, a mine with multiple operating pits may need to establish a monitoring network around each pit. It may be beneficial to share monitor wells which are located between two pits. These multiple networks should be incorporated into the long-term monitoring network as much as possible. The LQD does not feel that further specification of well locations is beneficial in this guideline because a certain degree of flexibility is needed for site-specific hydrogeologic considerations. The LQD should be consulted in the early stages of the permitting process in order to facilitate approval of the groundwater network.
- (3) It is suggested that the life-of-mine monitor well network be installed in a radial pattern originating at the approximate center of the life-of-mine permit area, as shown in Figure 2. The wells should be located along radii spaced approximately 45 degrees apart near the life-of-mine permit boundary. Additional wells will be necessary off the permit as drawdowns extend beyond the mine boundary. A recommended rule of thumb is that new wells should be installed, further from the permit area and along the same radii, when drawdowns exceed ten feet at any of the permit boundary wells.

The LQD recognizes that access to potential monitor sites off the permit area may be restricted by surface or mineral owners. Off permit wells may require special BLM permits.

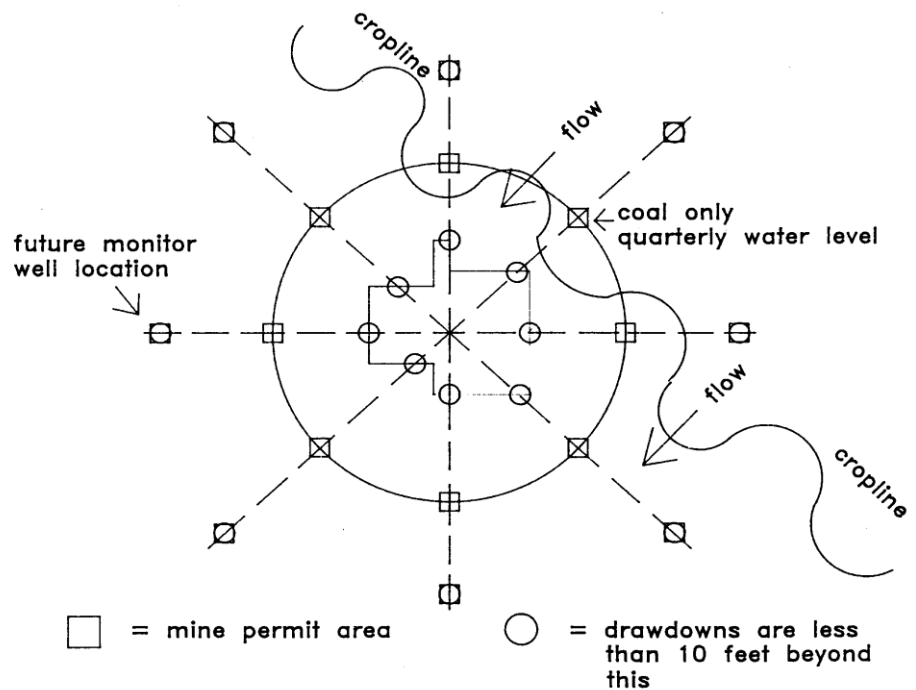
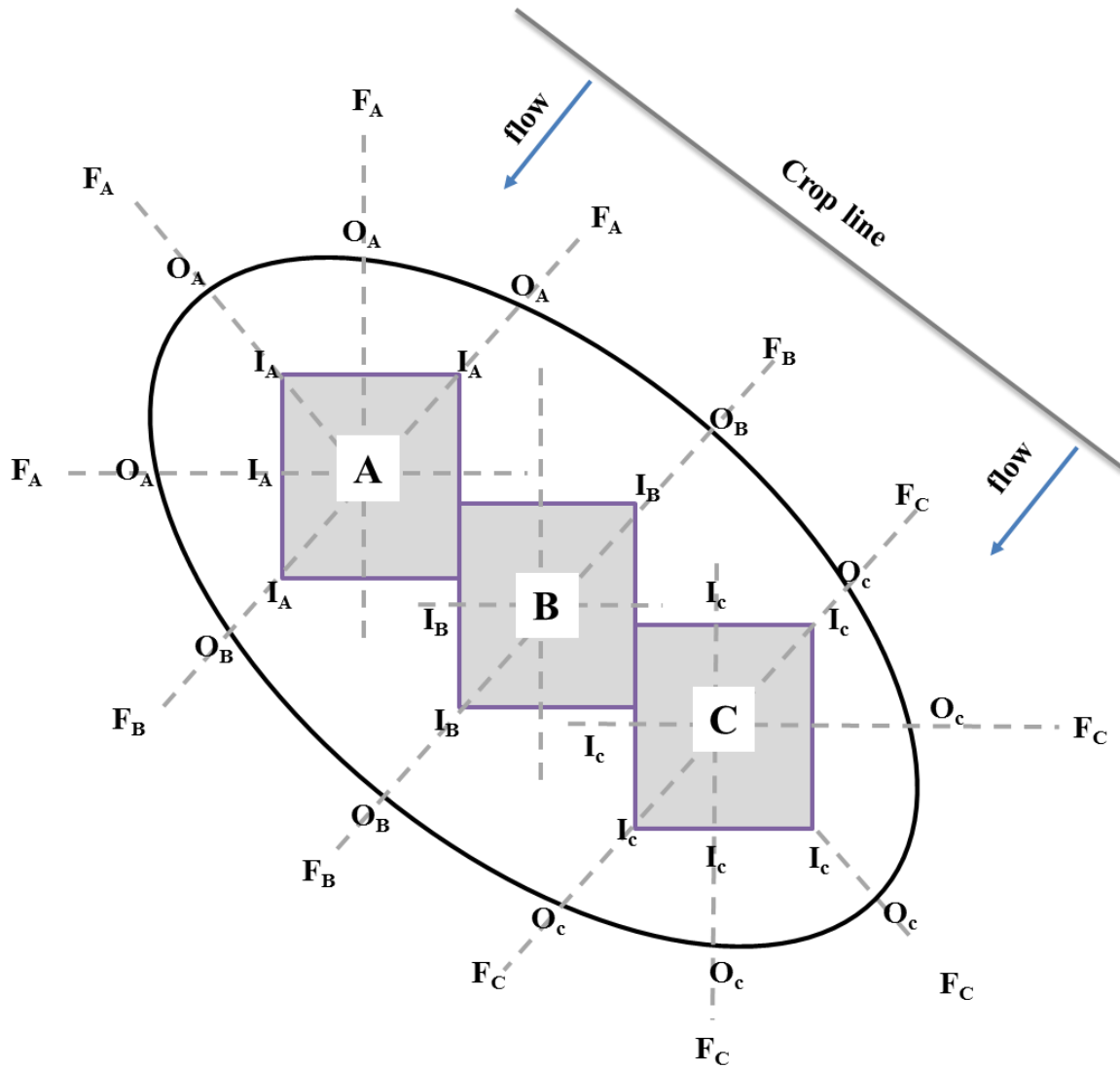


Figure 1: Suggested Groundwater Monitor Well Network

- (4) If pump tests and/or other baseline data indicate a direction of greater transmissivity or any other hydraulic discontinuity, one of the radii should be oriented in that direction. Other adaptations will be necessary in order to fit this general pattern to the specific circumstances at each mine. Some of the anticipated modifications are diagrammed in Figure 1. The possibility exists for cooperating operators to share monitoring responsibilities and/or monitoring data from common monitor wells thereby reducing the overall number of wells needed in any one region. These agreements must be made between the operators. This life-of-mine network should consider the early term, or on permit area monitoring network, as well as the postmining monitoring network.



- I_A, I_B and I_C** Inner ring wells: underburden, coal and overburden: quarterly water levels, annual water quality.
- O_A, O_B and O_C** Outer ring wells: coal only: quarterly water levels.
- F_A, F_B and F_C** Future wells: to be installed when drawdowns exceed ten feet at outer ring well; will become outer ring.
- I_A, O_A and F_A** Approximate location of wells to be monitored by mine A.
- I_B, O_B and F_B** Approximate location of wells to be monitored by mine B.
- I_C, O_C and F_C** Approximate location of wells to be monitored by mine C.
- Line of equal drawdown where drawdown equals ten feet.
- Permit area.

Figure 2: Suggested Groundwater Monitor Well Network for Multiple Adjacent Mines

- (5) Each master stream channel where the stream enters and exits the permit area should be characterized with at least one monitor well located in the alluvium. Other technologies approved by the LQD may also be used for the characterization of the alluvium in the stream channel. Additional alluvial wells may be requested if the overburden aquifer and the stream appear to be hydraulically connected. LQD Guideline 9 should be referenced for monitoring recommendations for declared AVFs.

b. Water Quantity

- (1) Water levels should be obtained quarterly in monitor wells which form the ring closest to the active pit and in which drawdowns have not exceeded ten feet (as shown in Figure 1).
- (2) Water levels should be obtained at least semi-annually from all other monitor wells. The frequency of measurements can be reduced after approval from the LQD.
- (3) Closed-in formation pressure readings may be necessary in gassy and flowing wells.
- (4) Monthly monitoring of alluvial wells may be requested if streamflow losses are anticipated.

c. Water Quality

- (1) Water quality in non-backfill wells should be monitored at least on a semi-annual schedule initially and the frequency can be reduced, if water level measurements indicate no possibility for groundwater flow offsite (i.e., closed cone of depression). If potentiometric surface data indicate that groundwater is flowing offsite (i.e., a closed cone of depression is not maintained), water quality should be monitored more frequently. The monitoring frequency and constituents will depend on site-specific factors such as transmissivity, gradient, overall water quality in adjacent aquifers, and proximity of adjudicated water rights. The applicant should consult with the LQD to determine the frequency and constituents of water quality monitoring.
- (2) Samples should be analyzed for the constituents referenced in Appendix 7 of this guideline.
- (3) Sampling protocol is discussed in Appendix 7 of this guideline.
- (4) Well purging techniques are found in Section IV.A.4.b. of this guideline.

3. Water Rights

a. Potential Effects

Potential effects of mining on existing water rights should be assessed. Examples include effects of drawdowns on surface water flows, degradation of water quality from lateral flow through spoils, and depleted water levels in adjudicated wells.

b. Mitigation

If the quality or quantity of adjudicated water supplies are affected, then an alternative source should be identified as part of the mitigation plan.

C. Reclamation Plan

1. Aquifer Reclamation

a. Description of Expected System

A description of the anticipated post-reclamation groundwater system should be provided by the applicant. The discussions and maps used in this description should be supported by data and referenced material and should include:

- (1) Final aquifer hydraulic properties (e.g., hydraulic conductivity, storativity, saturated thickness, etc.) including those of backfilled overburden;
- (2) Anticipated groundwater quality during and after aquifer restoration;
- (3) Anticipated post-reclamation potentiometric surface and estimated time to resaturate; and
- (4) Post-reclamation effects on adjacent aquifers, wells, springs, and surface waters.

b. Reclamation Plan

The reclamation plan should be designed to minimize the disturbance to the hydrologic balance. This may be accomplished by including:

- (1) An ongoing hydrologic monitoring program of the replaced spoil to determine the best replacement techniques (The initial results may be applied to later reclamation.)
- (2) A program to isolate and bury unsuitable material out of the zone of fluctuation of the estimated post-reclamation potentiometric surface (see LQD Guideline No. 1).
- (3) A plan to segregate and compact suitable spoil material to minimize the impact to the adjacent aquifer and reconstructed drainages.

c. Subsidence Effects

Any post-reclamation subsidence effects on the hydrologic system should be assessed.

2. Land Surface - Water Table Interactions

a. Anticipated Subirrigated Areas

A reclamation plan that proposes to reclaim to a subirrigated condition should consider the effect of salt accumulation and demonstrate that such reclamation will satisfy the postmining land use.

b. AVF Reclamation Plan

In those areas where a declared AVF has been or will be disturbed, a detailed design for reconstruction of subirrigation characteristics will be necessary. LQD Guideline 9 contains AVF reconstruction information.

3. Monitoring

a. Postmining Network

The postmining monitoring network should include the undisturbed monitor wells remaining from the mining phase of the operation as well as a system of backfill monitor wells. The backfill wells should be located as far down gradient as possible within the backfill and at a density adequate to characterize the backfill aquifer as approved by the LQD.

b. Monitoring Frequency

Water levels in each backfill monitor well should be obtained quarterly until final bond release. Once a reasonable trend in the water levels has been established, the frequency of measurements can be reduced after approval from the LQD.

c. Water Quality

Water quality in each backfill monitor well should be analyzed quarterly for the constituents listed in Appendix 7 of this guideline. Once a reasonable trend in the water quality has been established, reductions in sampling frequency and constituents will be considered by the LQD staff.

d. Sampling Procedures

- (1) Sampling protocol, quality assurance, and quality control are discussed in Appendix 1 and Appendix 7 of this guideline.
- (2) Well purging techniques are found in Section IV.A.4.b. of this guideline.
- (3) Well installation and maintenance for backfill monitor wells are discussed in Appendix 4 of this guideline.

V. PROBABLE HYDROLOGIC CONSEQUENCES

The applicant should prepare a narrative describing the probable hydrologic consequences (PHC) of the mining and reclamation operations. The PHC section should demonstrate that

the mining operation has been designed to prevent material damage to the hydrologic balance as required by the Wyoming Environmental Quality Act, W.S. § 35-11-406(n)(iii). In the PHC section, the applicant should predict the areal extent, magnitude, and duration of the impacts to specific components of the surface water and groundwater systems and to these systems as a whole. Potential or anticipated impacts to the premining hydrologic balance should be determined for both during the life of the mine and after final reclamation has been completed. The applicant should also describe preventive and remedial measures taken to minimize hydrologic impacts.

The PHC section should contain a brief discussion of the probable hydrologic impact of any adjacent operations on the hydrologic balance within the proposed permit area.

The PHC section in the initial permit application should synthesize into one discussion the hydrologic information from the Premining, Mine Plan and Reclamation Plan sections of the permit application. In subsequent renewals the PHC section should also include a comparison of measured data to the hydrologic predictions. If the comparisons indicate revisions are necessary, the revised predictions should be included in the updated PHC section.

A. Surface Water Consequences

The applicant should determine and discuss the probable consequences from the mining operation on the surface water hydrologic balance of watersheds which may be impacted. In the discussion, the predicted and/or measured parameters outlined below should be compared to premining, postmining and during mining (if applicable) conditions for each affected watershed. The size of the watershed unit to be considered in the PHC is subject to discretion and should be discussed with the LQD. However, the analysis should focus on the size watershed which most dramatically illustrates the effects of mining

1. Surface Water Quantity

a. Streamflow Characteristics

The discussion for streamflow characteristics should include:

- (1) Base flow;
- (2) Soil infiltration capacity;
- (3) Event peak runoff rate;
- (4) Flood recurrence interval;
- (5) Total event runoff volume; and
- (6) Total annual water yield.

b. Ponded Water Bodies (all sources of ponded water)

This discussion should include:

- (1) Summary of surface areas and volumes; and
- (2) Discussion of spatial distribution.

2. Surface Water Quality

Discussion for this section should include the instantaneous concentrations of important constituents listed in Appendix 7 of this guideline.

3. Geomorphology (surface water quantity and quality)

a. Watershed Geomorphology

A discussion of the watershed geomorphology should include:

- (1) Topographic diversity;
- (2) Drainage density; and
- (3) Watershed geometry
 - (a) Drainage area;
 - (b) Slope gradient; and
 - (c) Slope length.
- (4) Watershed erosional stability
 - (a) Percent vegetation cover; and
 - (b) Soil erodibility

b. Stream Channel Geomorphology

The following parameters should be included to define the stream channel geomorphology:

- (1) Channel geometry
 - (a) Cross-section dimensions;
 - (b) Slope and channel profile; and
 - (c) Sinuosity and planimetric shape.
- (2) Channel erosional stability
 - (a) Channel material erodibility;
 - (b) Natural bedrock grade control;
 - (c) Channel vegetation;
 - (d) Hydraulic characteristics during peak discharge; and
 - (e) Channel geometry.

B. Groundwater Consequences

For groundwater, the PHC should describe how the mining operation will affect the suitability of the water for the current and postmining uses for each specific aquifer and the groundwater system as a whole in the following areas:

1. Groundwater Quantity

The areal extent, magnitude, and duration of static water level declines expected in potentially affected aquifers should be predicted. This should include a description of the drawdown model results, the extent of the five-foot drawdown contour, and, in permit renewals, measures verification of the drawdown predictions.

The final predicted postmining groundwater flow should be compared to the premining groundwater flow and discussed with respect to the potential for impacts to the local and regional groundwater system. The comparison and discussion should include those hydraulic properties listed in Section IV.C.1.a. (items 1, 3 and 4) of this guideline for aquifers both premining and postmining, the backfill aquifer, and any other potentially affected aquifers.

2. Groundwater Quality

The projected postmining groundwater quality should be estimated. A detailed description of potential changes in water quality from flow through backfill should be included. Any potential changes to water quality in adjacent aquifers should be discussed with respect to the potential for offsite material damage.

C. Surface Water/Groundwater Interactions

The applicant should discuss changes in the interaction between the surface water and groundwater systems from the premining through the postmining phases of the operation. The discussion should include, but not be limited to, the following:

1. Water Quantity

a. Drawdown and Pit Water Discharge

Describe how drawdown and pit water discharge may affect baseflow in streams.

b. Infiltration Rate

Describe how potential changes to the infiltration rate in reconstructed stream channels and diversion channels may affect groundwater recharge and stream baseflow. The changes in surface infiltration rates should be discussed with reference to changes in slope and soil structure.

c. Postmining Potentiometric Surfaces

Describe how the intersection of the postmining topographic and potentiometric surfaces may affect the location and size of groundwater-fed water bodies.

2. Water Quality

a. Streams and Poned Water Bodies

Describe the extent to which backfill groundwater and pit discharge may affect the quality of streams and ponded water bodies.

b. Potentiometric Surfaces

Describe how the intersection of the postmining topographic and potentiometric surfaces may affect the location and size of groundwater-fed water bodies.

D. Water Rights

The applicant should evaluate the potential contamination, interruption or diminution of surface water and groundwater within and adjacent to the permit area that may affect legal water rights. This evaluation should be based on the predictions made in response to items A, B, and C of this section of this guideline.

E. Important Habitats

The applicant should identify and address the specific probable hydrologic consequences that may positively or negatively impact important habitats with emphasis on wetland areas.

REFERENCES

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APPENDIX 1

PREMINING WATER QUALITY SAMPLING

I. INTRODUCTION

Water quality constituents that should be included in connection with premining (baseline) water quality sampling are listed below. Site-specific conditions, mining operations, and the purposes of collecting water quality data may warrant modifications to this list. An explanation for such modifications should be provided with the monitoring program submitted to the LQD.

II. FIELD MEASUREMENTS¹

pH (report to nearest 0.1 standard units)

temperature (°C)

conductivity, umhos/cm corrected to 25°C

water level, reported to the nearest 0.1 foot AMSL (above mean sea level) (ground water only)

number of casing volumes purged prior to sampling (ground water only)

instantaneous discharge, ft³/second (surface water only)

III. QUALITY ASSURANCE/QUALITY CONTROL

Quality control during sampling should be implemented to detect any data errors that may result from improper sampling or analytical methods, poor sample preservation, or collection of nonrepresentative samples. The following quality control samples should be collected, analyzed and reported for every twenty (20) samples or once every sample collection round, whichever is less, to help verify that the sample collection system is producing reliable information.

- A. Duplicate Samples. At randomly selected stations duplicate samples are collected by filling two separate bottle sets from any one station and preserving, storing and shipping the sets in an identical manner. This provides a check of precision.
- B. Sample Preservation Blanks. Field blanks are essentially low standards produced in the field. The same quantity of appropriate preservative should be added to sample bottles filled with distilled water. Field blanks check for analytical recognition of zero values, any positive bias from contaminated sample bottles or preservatives, and any contamination from atmospheric sources (e.g., airborne dust).
- C. Analytical Data. Analytical data should include cation-anion balances and TDS determined at 180°F vs. TDS calculated from major cation-anion analyses.

IV. WATER QUALITY CONSTITUENTS AND SAMPLE PREPARATION¹

Listed below are parameters for which each water quality sample should be analyzed. Samples should be kept on ice (4°C) and stored in the dark until analysis. The operator is responsible for applying all sample preparation, handling and preservation procedures required for the analytical method used.

Constituents (reported in mg/l unless noted)	Analytical Method	Max Holding Time ²	Rational for Analysis
Ammonia Nitrogen as N	EPA 350.1	28 days	LQD Non-Coal R&R, Ch. 2, Sec. 2(a)&(b) LQD Coal R&R, Ch. 2, Sec. 4(a)(xi),(xii),(xiv)
Nitrate + Nitrite as N	EPA 353.2	28 days	LQD Non-Coal R&R, Ch. 2, Sec. 2(a)&(b) LQD Coal R&R, Ch. 2, Sec. 4(a)(xi),(xii),(xiv)
Bicarbonate	EPA 310.1/310.2	14 days	LQD Non-Coal R&R, Ch. 2, Sec. 2(a)&(b) LQD Coal R&R, Ch. 2, Sec. 4(a)(xi),(xii),(xiv)
Boron	EPA 212.3/200.7	180 days	LQD Non-Coal R&R, Ch. 2, Sec. 2(a)&(b) LQD Coal R&R, Ch. 2, Sec. 4(a)(xi),(xii),(xiv)
Carbonate	EPA 310.1/310.2	14 days	LQD Non-Coal R&R, Ch. 2, Sec. 2(a)&(b) LQD Coal R&R, Ch. 2, Sec. 4(a)(xi),(xii),(xiv)
Fluoride	EPA 340.1/340.2/340.3	28 days	LQD Non-Coal R&R, Ch. 2, Sec. 2(a)&(b) LQD Coal R&R, Ch. 2, Sec. 4(a)(xi),(xii),(xiv)
Sulfate	EPA 375.1/375.2	28 days	LQD Non-Coal R&R, Ch. 2, Sec. 2(a)&(b) LQD Coal R&R, Ch. 2, Sec. 4(a)(xi),(xii),(xiv))
Total Dissolved ³ Solids (TDS) @ 180°F	EPA 160.1/SM2540C	7 days	LQD Non-Coal R&R, Ch. 2, Sec. 2(a)&(b) LQD Coal R&R, Ch. 2, Sec. 4(a)(xi),(xii),(xiv))
Dissolved Arsenic	EPA 206.3/200.9/200.8	180 days	LQD Non-Coal R&R, Ch. 2, Sec. 2(a)&(b) LQD Coal R&R, Ch. 2, Sec. 4(a)(xi),(xii),(xiv))

Dissolved Cadmium	EPA 200.9/200.7/200.8	180 days	LQD Non-Coal R&R, Ch. 2, Sec. 2(a)&(b) LQD Coal R&R, Ch 2, Sec 4(a)(xi),(xii),(xiv))
Dissolved Calcium	EPA 200.7/215.1/215.2	180 days	LQD Non-Coal R&R, Ch. 2, Sec. 2(a)&(b) LQD Coal R&R, Ch 2, Sec 4(a)(xi),(xii),(xiv))
Dissolved Chloride	EPA 300.0	28 days	LQD Non-Coal R&R, Ch. 2, Sec. 2(a)&(b) LQD Coal R&R, Ch 2, Sec. 4(a)(xi),(xii),(xiv))
Dissolved Chromium	EPA 200.9/200.7/200.8	180 days	LQD Non-Coal R&R, Ch. 2, Sec. 2(a)&(b) LQD Coal R&R, Ch 2, Sec. 4(a)(xi),(xii),(xiv))
Total and Dissolved Iron	EPA 236.1/200.9/200.7/200.8	180 days	LQD Non-Coal R&R, Ch. 2, Sec. 2(a)&(b) LQD Coal R&R, Ch.2, Sec. 4(a)(xi),(xii),(xiv))
Dissolved Magnesium	EPA 200.7/242.1	180 days	LQD Non-Coal R&R, Ch. 2, Sec. 2(a)&(b) LQD Coal R&R, Ch. 2, Sec. 4(a)(xi),(xii),(xiv))
Total Manganese	EPA 200.9/200.7/200.8/243.1/243.2	180 days	LQD Non-Coal R&R, Ch. 2, Sec. 2(a)&(b) LQD Coal R&R, Ch.2, Sec. 4(a)(xi),(xii),(xiv))
Dissolved Molybdenum	EPA 200.7/200.8	180 days	LQD Non-Coal R&R, Ch. 2, Sec. 2(a)&(b) LQD Coal R&R, Ch. 2, Sec. 4(a)(xi),(xii),(xiv))
Dissolved Potassium	EPA 200.7/258.1	180 days	LQD Non-Coal R&R, Ch. 2, Sec. 2(a)&(b) LQD Coal R&R, Ch. 2, Sec. 4(a)(xi),(xii),(xiv))
Dissolved Selenium	EPA 270.3/200.9/200.8	180 days	LQD Non-Coal R&R, Ch. 2, Sec. 2(a)&(b) LQD Coal R&R, Ch. 2, Sec. 4(a)(xi),(xii),(xiv))
Dissolved Sodium	EPA 200.7/273.1	180 days	LQD Non-Coal R&R, Ch. 2, Sec. 2(a)&(b) LQD Coal R&R, Ch. 2, Sec. 4(a)(xi),(xii),(xiv))
Dissolved Zinc	EPA 200.9/200.7/200.8	180 days	LQD Non-Coal R&R, Ch. 2, Sec. 2(a)&(b) LQD Coal R&R, Ch. 2, Sec. 4(a)(xi),(xii),(xiv))

V. SUPPLEMENTAL ANALYSIS

Listed below are additional constituents for which water quality samples may be analyzed depending on site-specific or mining process specific conditions. Samples should be kept on ice (4°C) and stored in the dark until analysis.

A. Uranium Mines

For all open pit and in-situ mines, applicants should utilize the list of constituents described in Table 2, Reference Document 10 within WDEQ/LQD – Guideline 4. Tailings pond water quality analyses at these operations should include Thorium and Beryllium in addition to the constituents described in Table 2.

B. In-situ Coal Gasification

Constituents (reported in ug/l unless noted)	Analytical Method	Max Holding Time	Rational for Analysis
Cyanide (mg/l)	EPA 335.2/335.3/335.4	14 days	W.S. §§ 35-11-103(f)(iii)&428(a)(ii)&(iii) LQD Coal R&R, Ch. 18, Sec. 3(b)(v)&(d)(i)
Base/Neutral and Acid Extractable Semi-Volatile Organic Compounds	EPA 625/8270	14 days	
Volatile Organic Acids	EPA 8260/1624	7 days	

C. Trona Mines, Underground and In Situ

Constituents (reported in mg/l unless noted)	Analytical Method	Max Holding Time	Rational for Analysis
Total Phosphorous	EPA 200.7/365.1/3565.2/365.3/365.4	28 days	Underground LQD Non-Coal R&R, Ch. 2, Sec. 2(a)&(b) In Situ W.S. §§ 35-11-103(f)(iii)&428(a)(ii)&(iii) LQD Non-Coal R&R, Ch. 11, Sec. 3(a)(xv)

D. Surface Water

Constituents (reported in mg/l unless noted)	Analytical Method	Max Holding Time	Rational for Analysis
Dissolved Oxygen	EPA 360.1/360.2	8 hours	LQD Coal R&R, Ch. 4, Sec. 2(i) WQD R&R, Ch. 1, Sec. 24
Total Suspended Solids (TSS) as mg/l Residue@103-105°C	EPA 160.2	7 days	30CFR§780.21, LQD R&R, Ch. 4 (a)(xi)(D)(II), WQD R&R, Ch. 1, Sec. 16
Turbidity (NTU)	EPA 180.1	48 hours	LQD Coal R&R, Ch. 4, Sec. 2(i) WQD R&R, Ch. 1, Sec. 23

E. Additional Trace Metals

Constituents (reported in ug/l unless noted)	Analytical Method	Max Holding Time	Rational for Analysis
Dissolved Aluminum	EPA 200.7/200.8/200.9/202.1/202.2	180 days	LQD Non-Coal R&R, Ch. 2, Sec. 2(a)&(b) LQD Coal R&R, Ch. 2, Sec. 4(a)(xi),(xii),(xiv)
Dissolved Barium	EPA 200.7/200.8/208.1/208.2	180 days	LQD Non-Coal R&R, Ch. 2, Sec. 2(a)&(b) LQD Coal R&R, Ch. 2, Sec. 4(a)(xi),(xii),(xiv)
Dissolved Copper	EPA 200.7/200.8/200.9/220.1/220.2	180 days	LQD Non-Coal R&R, Ch. 2, Sec. 2(a)&(b) LQD Coal R&R, Ch. 2, Sec. 4(a)(xi),(xii),(xiv)
Dissolved Lead	EPA 200.7/200.8/200.9/239.1/239.2	180 days	LQD Non-Coal R&R, Ch. 2, Sec. 2(a)&(b) LQD Coal R&R, Ch. 2, Sec. 4(a)(xi),(xii),(xiv)
Dissolved Mercury	EPA 200.7/200.8/245.1/245.2	28 days	LQD Non-Coal R&R, Ch. 2, Sec. 2(a)&(b) LQD Coal R&R, Ch. 2, Sec. 4(a)(xi),(xii),(xiv)
Dissolved Nickel	EPA 200.10/200.12/1638/1639/1640	180 days	LQD Non-Coal R&R, Ch. 2, Sec. 2(a)&(b) LQD Coal R&R, Ch. 2, Sec. 4(a)(xi),(xii),(xiv)

VI. FIELD SAMPLING SHEETS

For each well sampled for water quality, a field sampling sheet should be prepared. The field sampling sheet should contain the following items:

- A. Identification of the well;
- B. Well depth;
- C. Static water level depth and measurement techniques;
- D. Well yield (if measured);
- E. Purge volume, pumping rate and volume per casing volume;
- F. Time well purged;
- G. Collection methods (bail or pump);
- H. Field observations (such as well condition, sample color, sample smell, sound);
- I. Name of collector; and
- J. Climatic conditions, including air temperature.

FOOTNOTES

1. All measurements should follow EPA approved methods of analysis according to 40 CFR 136, as amended "Guidelines Establishing Test Procedures for the Analysis of "Pollutants" under the Clean Water Act.
2. The holding times listed are the maximum times that samples may be held before analysis and still considered valid. All samples must be kept cool (4°C) and in the dark regardless of holding time.
3. The term "dissolved" is defined as those constituents which pass through 0.456 micro membrane filter.

REFERENCES

American Public Health Association. 1985. Standard methods for the examination of water and wastewater. 16th Edition. Published jointly by: American Public Health Association, American Water Works Association, and Water Pollution Control Federation. Available from: American Public Health Association, 1015 Fifteenth Street NW, Washington, DC 20005.

Code of Federal Regulation, Title 40 Part 136. Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act. Environmental Protection Agency. U.S. Government Printing Office. Washington.

- EPA. 1983. Methods for Chemical Analysis of Water and Wastes. EPA - 600/4-79-020. Available from: Center for Environmental Research Information (CERI), EPA, Mail Drop G-70, Cincinnati, Ohio 45268.
- EPA. 1982. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA-600/4-82-057. Available from: Center for Environmental Research Information (CERI), EPA, Mail Drop G-70, Cincinnati, Ohio 45268.

APPENDIX 2

STREAM CHANNEL DESIGN

A design specification should be submitted to the LQD for every stream channel that will be constructed within the permit area. The operator and the LQD should determine the necessary design detail for each particular channel. The design detail should first be based on the drainage area upstream of the channel to be constructed. A larger drainage area would in general require a larger structure and a more detailed design specification. A second consideration is the steepness of the stream channel to be constructed. Steep stream channels, which may require artificial liners, will require more design detail. A third consideration is the function of the particular stream channel. For example, a small temporary diversion ditch would require less design detail than would a permanently reconstructed intermittent stream channel.

Every unique reach of a stream channel should have its own design specification. Unique channel reaches should be defined by significant changes in the channel slope, drainage area, or physical characteristics of the channel material. Also, channel transition zones, or where the reconstructed/constructed channels are graded into and out of native channels, require a separate design specification. The LQD may also need design specifications for important channel bendways.

The operator should calculate and justify the stream channel design discharge and its estimated recurrence interval and duration. The operator should calculate the design discharge based on an empirical technique or on a computer rainfall-runoff model applicable to Wyoming's hydrologic conditions. For larger stream channels, the operator should compare methods to determine the range of potential design discharges.

Each stream channel design specification should be accompanied with a demonstration that it will not erode substantially during the design peak discharge event. The operator should use maximum permissible velocity, maximum permissible shear stress, stream power, equilibrium slope, sediment balance or another well-established method to demonstrate that the channel will not erode substantially during the design peak runoff event. As a last resort, the operator may need to use riprap on the stream channel bed and/or banks to reduce erosion.

The operator should demonstrate that each channel is geomorphically compatible with its adjoining stream channel network. Abrupt changes in slope, cross-section dimensions, design discharge velocity, vegetation and material erodibility should be avoided between the native and designed channel. The operator should discuss how the particular channel design specification accounts for such changes. Complex stream channels, that incorporate inner "pilot" channels capable of conveying the 2-year peak discharge, are encouraged when they increase geomorphic compatibility with the native stream channel. The LQD realizes that some stream channel bed and bank erosion is to be expected, but the channel slope and cross-sectional dimensions should not change substantially during the design discharge event. Channel network rejuvenation upstream or excessive sediment aggradation downstream of a reconstructed stream channel is unacceptable. Likewise, unusually rapid lateral migration of a stream channel is also unacceptable.

The operator is responsible for demonstrating that the channel has been properly constructed in the field. To make this demonstration, reclaimed stream channels should be surveyed to ensure that the slope and cross-section dimensions were properly emplaced. This survey information should be represented in the annual report. Regular LQD inspections will be conducted in lieu of detailed surveys to verify that, for example, small temporary diversion channels have been adequately constructed.

The operator should present a specific timetable for returning flow to reclaimed stream channels. Flow should be returned once subsidence has largely ceased and the vegetation is sufficiently established. Flows may be incrementally returned into reclaimed stream channels to enhance vegetation growth and consolidate channel sediments.

The following references contain several of the most widely accepted and comprehensive sources for channel design.

REFERENCES

- Barfield, B.J., Warner, R.C., and C.T. Haan, 1985. Applied Hydrology and Sedimentology for Disturbed Areas. Oklahoma Technical Press, Stillwater, Oklahoma, p. 603.
- Chow, Ven Te, 1959. Open Channel Hydraulics. McGraw-Hill New York, Toronto, Londs, p. 680.
- Corps of Engineers, Department of the Army, 1970. Hydraulic Design of Flood Control Channels - Engineering Manual No. 1110-Z-1601. Washington, D.C. - U.S. Government Printing Office.
- Fortier, S. and F.S. Scobey, 1926. Permissible Canal Velocities Transactions American Society of Civil Engineers, v.89, pp. 940-984.
- Simons, D.B., and Senturk, F., 1977. Sediment Transport Technology. Water Resource Publications, Fort Collins, CO, p. 807.
- Simons, Li & Associates, 1982a. Engineering Analysis of Fluvial Systems. Published by Simons, Li & Associates.
- Simons, Li & Associates, 1982b. Design Manual for Water Diversions on Surface Mine Operations. Prepared for Office of Surface Mining, U.S. Department of the Interior, Contract No. J5101050 (OSM Technical Report TR-82-2).
- U.S. Department of Agriculture, Soil Conservation Service, 1977. Design of Open Channels. Technical Release No. 25. Engineering Division, U.S. Government Printing Office, Washington, D.C.
- U.S. Department of Agriculture, Agricultural Research Service, 1987. Stability Design of Grass-lined Open Channels. Agriculture Handbook Number 667. U.S. Government Printing Office, Washington, D.C.
- U.S. Department of Transportation, Federal Highway Administration, 1961. Design Charts for Open Channel Flow. Hydraulic Design Series No. 3, U.S. Government Printing Office, Washington, D.C.

APPENDIX 3

TEMPORARY AND PERMANENT IMPOUNDMENTS

Key points regarding impoundment construction are outlined below. The reader should refer to Guidelines 13 and 17 for more complete information pertaining to sedimentation ponds and other types of impoundments, as well as citations to appropriate rules and regulations. The primary requirements for temporary and permanent impoundments are found in Chapter 4, Section 2(g) of the Land Quality Division Coal Rules and Regulations (LQDRR). Requirements for permanent impoundments are also found in the same rules in Chapter 2, Section 2(a)(v)(A)(III); Chapter 4, Section 2(g)(ii) and in W.S. § 35-11-407 of the Environmental Quality Act.

I. PERMITTING

Permits must be obtained from agencies which regulate the construction of embankments. The size of the embankment will determine which agencies must issue permits.

- A. The Wyoming State Engineer's Office (SEO) must always be contacted regardless of the size of the embankment.
- B. For embankments greater than 20 acre-feet in capacity or 20 feet in height, the following information is required:
 1. An application must be filed with the Mine Safety Health Administration (MSHA). The operator should initiate the process by phoning MSHA and obtaining a project identification number.
 2. A stability analysis of the embankment should be completed. The operator should contact the reviewing agencies (such as SEO and MSHA) to identify currently applicable analyses and procedures.
 3. Dam height is defined differently by various agencies. For example, the SEO currently defines it as the height from the downstream toe of the embankment to the crest of the dam. For temporary impoundments LQD and MSHA define it as the upstream toe of the dam to the crest of the emergency spillway. The dam height for permanent impoundments is defined as the downstream toe of the embankment to the top of the embankment. The operator should become familiar with the most recent definitions and ensure that they are compatible.
- C. For small temporary sediment ponds, the SEO application may contain several ponds on a single application as long as the aggregate volume does not exceed 20 acre-feet.
- D. Permit applications and accompanying maps must be certified by a professional engineer registered in the State of Wyoming. The certification should include the P.E. seal and a statement about the design.
- E. For permanent impoundments, the operator must obtain written consent of the surface land owner. Additional requirements may be necessary if the impoundment is an MSHA pond.

II. SPILLWAY SIZING

- A. The spillway sizing is dependent upon the size and life of the impoundment and the downstream level of risk. The Dam Safety Section of the Wyoming State Engineer's Office should be contacted to identify the appropriate design event. However, temporary impoundments must be designed for at least a 25-year, 6-hour event and permanent impoundments must be designed for at least a 100-year, 6-hour event to meet the LQDRR.
- B. For grass lined spillways, the velocity and depth of flow should be determined for both active vegetation growth (springtime) and dormant vegetation growth (fall). This analysis will evaluate the adequacy of spillway depth for high vegetal retardance (spring conditions) and the velocity of flow through the spillway for low vegetal retardance (fall conditions).

III. RIPRAP AS EROSION PROTECTION

When utilizing riprap as an erosion control feature, the operator must adequately size the riprap. Sizing of the riprap is important in order to prevent the maximum flow from carrying the riprap downstream. Information regarding size, shape, and gradation of riprap can be found in the following references:

- A. Draft Staff Technical Position, Design of Erosion Protection Covers for Stabilization of Uranium Mill Tailings Sites. U.S. Nuclear Regulatory Commission, August, 1989.
- B. Development of Riprap Design Criteria by Riprap Testing in Flumes: Phase I/ Colorado State University, Fort Collins, CO, 82523, May, 1987.
- C. Applied Hydrology and Sedimentology for Disturbed Areas. Barfield, Warner and Haan, 1985.

The operator should contact the WDEQ-LQD for additional references.

IV. MONITORING/INSPECTION REQUIREMENTS OF EMBANKMENTS

Various agencies have specific monitoring requirements associated with embankments, including WDEQ-LQD, the SEO and MSHA. The operator should contact the appropriate agencies to identify the most current monitoring requirements.

APPENDIX 4

MONITOR WELL INSTALLATION AND MAINTENANCE

I. INTRODUCTION

Proper monitor well installation is critical to the recovery of accurate groundwater level and water quality information at the mine sites. Routine maintenance is also necessary to keep the wells in good working condition. The following discussion offers suggestions on how to properly install and maintain wells under a variety of conditions. The references listed at the end of this appendix should be consulted for more detailed information on monitor well design, installation and maintenance.

II. DESIGN CONSIDERATIONS

Design considerations should include:

- A. The purpose of the monitoring program.
- B. Geology, aquifer physical characteristics (e.g., hydraulic conductivity), aquifer interrelationships and potentiometric elevation.
- C. The anticipated depth and screened interval of the well. A well should be constructed of materials designed to withstand the load to which it will be subjected.
- D. Characteristics of known or anticipated contaminants (e.g., chemistry, density, viscosity, reactivity, concentration).
- E. Man-induced changes in hydraulic conditions.
- F. Regulatory requirements from other agencies (e.g., State Engineer's Office if applicable, U.S. Environmental Protection Agency).

III. RECOMMENDED WELL CONSTRUCTION

A. Casing

Suggested casing materials for wells include PVC, plastic coated steel, stainless steel or fiberglass/plastic combinations. Galvanized steel should not be used. It is recommended that well head be closed with a locking cap.

B. Well Diameter

A minimum casing diameter (inside) of four inches is recommended. This should allow sufficient room for pumping mechanisms to travel downhole. The annular space should

be large enough to allow a minimum grout of two inches around the largest outside casing diameter.

C. Screening and Packing

For wells used in aquifer testing (excluding well efficiency tests) a sized, prefabricated screen should be used. Machine slotted casing is acceptable for water quality and water level monitor wells. The perforations/screen should be sized for surrounding geologic conditions or the type of filter pack being used. The screen length should be maximized to monitor as much of the aquifer thickness as possible without allowing for cross-connection between aquifers. It is also recommended that each well contain an open space or sump below the screened interval. The screened slot size should be chosen to hold greater than 85% of the filter pack materials.

Two types of filter packs commonly used include: 1) naturally packed wells in which the formation has collapsed around the screened interval during well development and 2) artificially packed wells where a filter pack is introduced into the hole. Use of an artificial filter pack is recommended when the screened interval spans geologic units of varying grain size, or the effective grain size of a formation is less than .01 inch diameter and the uniformity coefficient is less than three (3). The filter pack materials should be made of chemically inert silica sands and should not be emplaced by gravity or free fall methods unless the well is very shallow or periodic depth tagging is used to ensure complete emplacement. The annular space above the filter pack must be sealed to prevent cross-contamination. Typically, it is recommended that the filter pack would extend two to five feet above the top of the screen. Techniques used to determine filter pack size and screen/slot selection are thoroughly outlined by (Driscoll, 1986) in Chapter 13. Figure 3 of this guideline shows the basic design components of a groundwater monitoring well.

D. Annular and Surface Seals

Acceptable materials used to create annular seals include bentonite, neat cement or combinations of the two materials. Because bentonite requires water to hydrate and create a seal, it should not be used in unsaturated zones. As with filter packs, materials used in annular seals should not be emplaced by gravity or free fall methods.

A five-foot granular bentonite packer should be placed on top of the filter pack, prior to emplacement of the annular seal. The packer should be allowed to saturate before constructing the seal. Once saturated, the seal should be emplaced by grouting or cementing the borehole to the surface.

A concrete surface seal should be placed at the surface of all wells. This seal may be installed directly on top of, or be an extension of, the annular seal. It should extend vertically to a depth below the zone where seasonal frost heaving may occur and extend one to two feet around the well head. The concrete should be sloped away from the borehole.

E. Well Efficiency Tests

Efficiency tests should be performed on all new wells during development. The results of these tests will be used as a baseline value against which future efficiency tests should be compared.

An elaborate well efficiency test is not required for the baseline value. Drawdown-recovery tests, slug (or bail) tests, specific capacity tests, etc. may be used. A 50 percent drop in efficiency from the baseline value is an indication that the integrity of the well is suspect and the well needs maintenance or redevelopment.

F. The following well completion information should be reported:

1. Field identification number and the Wyoming State Engineer's Office permit number if applicable.
2. Location, date drilled, and aquifer represented.
3. Ground elevation and elevation of the measuring point.
4. Drill bit and casing diameter.
5. Packer base depth and elevation.
6. Casing depth and total depth.
7. Perforation, screened, or open interval depth and elevation.
8. Total hydraulic head elevation (i.e., closed-in formation pressure if well is gassy or flowing; otherwise, static water level).
9. Method of measuring formation pressure.
10. Gravel pack - yes or no.
11. Casing material.
12. Well development techniques.

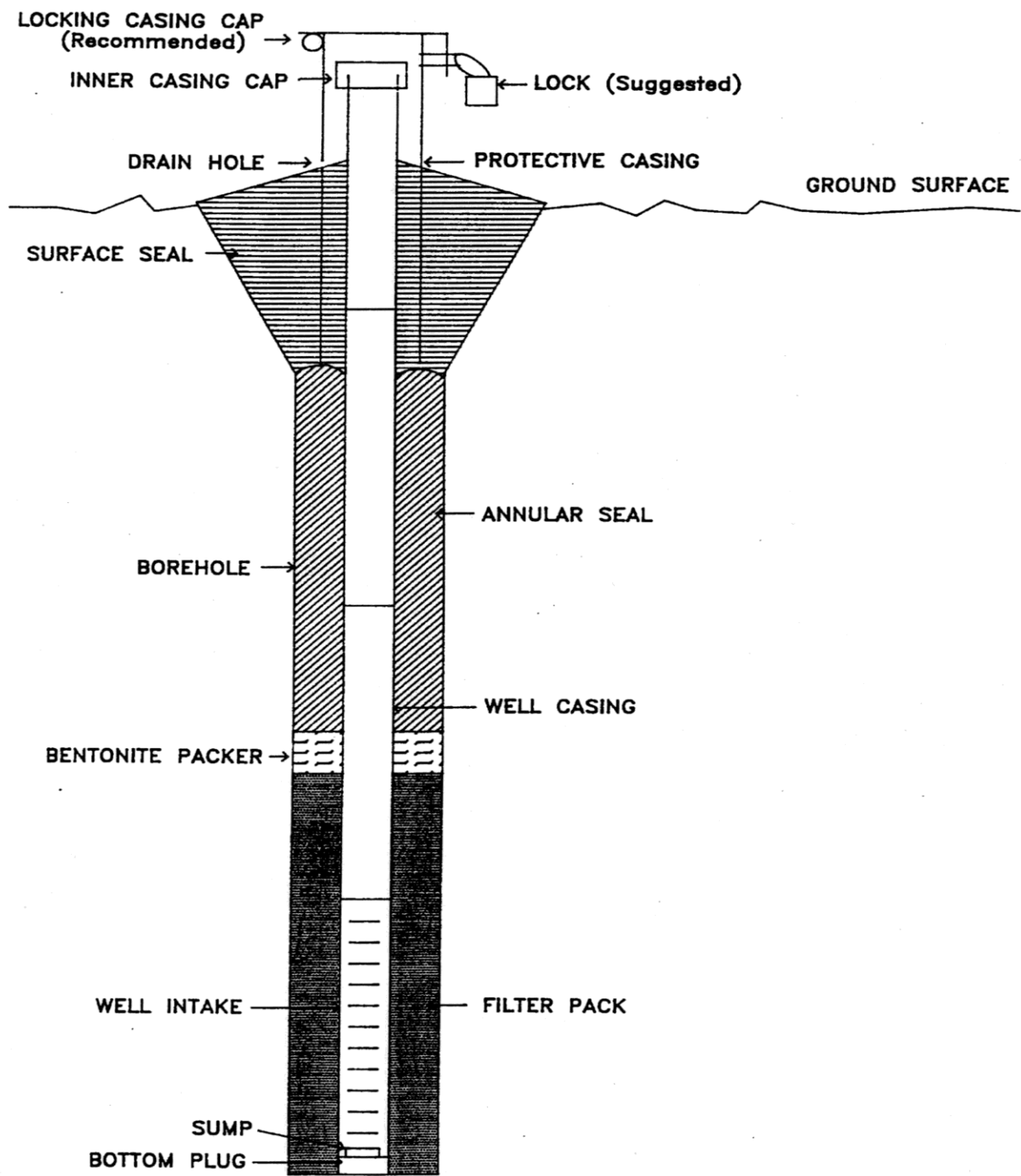


Figure 3: Basic Design Components of a Ground Water Monitoring Well

IV. WELL INSPECTION AND MAINTENANCE PLAN

All operational monitor wells should be inspected once a year for completion problems. Well plugging, cracked or sheared casing, iron bacteria, chemical incrustation and corrosion can cause deterioration of well performance. The following steps should be undertaken during annual well inspection:

- A. Measurement of total depth compared with original completion depth to determine whether the well has silted up or the casing has failed.
- B. Check surface seal and casing integrity which includes shaking the well to check for seal integrity, inspecting the seal for cracks and animal burrows, and checking ventilation/drain holes for plugging.
- C. Listen for trickling, bubbling or gas venting sounds.
- D. Check historic data for abnormal water level trends.
- E. Conduct well efficiency tests on wells suspected of blocked perforations or screens.

The date and results of the above mentioned maintenance check should be included in each annual report.

REFERENCES

- Aller, L., et al., 1989 Handbook of Suggested Practices for the Design and Installation of Ground-Water Monitoring Wells, National Water Well Association, Dublin, Ohio, p. 398.
- Driscoll, F.G., 1986 Groundwater and Wells, 2nd ed., Johnson Filtration Systems Inc., St. Paul, Minnesota, p. 1089.

APPENDIX 5

RULES AND REGULATIONS CITATIONS

I. PREMINING CITATIONS

A. Surface Water

CITATION	KEYWORD
Noncoal Chapter 2 Section 2.(a)(i)(C) Coal Chapter 2 Section 4.(a)(iii)	precipitation data
Noncoal Chapter 2 Section 2.(a)(i)(G)(I) Coal Chapter 2 Section 4.(a)(xi)(A)	list and describe surface waters
Noncoal Chapter 2 Section 2.(a)(i)(G)(II) Coal Chapter 2 Section 4.(a)(xi)(B)	drainage area description
Noncoal Chapter 2 Section 2.(a)(i)(I) Coal Chapter 2 Section 4.(a)(xiii)	water rights
Coal Chapter 2 Section 4.(a)(ix)(D)	premining topography slope measurements
Coal Chapter 2 Section 4.(a)(ix)(E)	water supply intake; receiving waters
Coal Chapter 2 Section 4.(a)(ix)(H)	elevation and location premining monitoring
Coal Chapter 2 Section 4.(a)(xi)	complete information on surface water
Coal Chapter 2 Section 4.(a)(xi)(C)	baseline monitoring
Coal Chapter 2 Section 4.(a)(xi)(D)	water quality data
Coal Chapter 2 Section 4.(a)(xiv)	description for PHC assessment
Coal Chapter 2 Section 4.(a)(xvi)	location of reservoirs
Coal Chapter 19 Section 2.(a)(i)	cumulative hydrologic impact studies

B. Groundwater

CITATION	KEYWORD
Noncoal Chapter 2 Section 2.(a)(i)(H) Coal Chapter 2 Section 4.(a)(viii)(A)	groundwater survey
Noncoal Chapter 2 Section 2.(a)(i)(I) Coal Chapter 2 Section 4.(a)(xiii)	water rights
Coal Chapter 2 Section 4.(a)(vii),(xii)	aquifer description
Coal Chapter 2 Section 4.(a)(xii)	groundwater location
Coal Chapter 2 Section 4.(a)(xii)	monitor station information

Coal Chapter 2 Section 4.(a)(xii)	complete information on groundwater
Coal Chapter 2 Section 4.(a)(xiv)	groundwater description for PHC
Coal Chapter 2 Section 4.(a)(xv)	alluvial valley floors
Coal Chapter 2 Section 4.(a)(xii)(B)	location of wells
Coal Chapter 2 Section 4.(a)(xv)(B)	survey of springs, seeps
Coal Chapter 19 Section 2.(a)(i)	studies of cumulative impact

II. MINE PLAN CITATIONS

A. Surface Water

CITATION	KEYWORD
Noncoal Chapter 2 Section 2.(b)(iii)(D) Coal Chapter 2 Section 5.(a)(i)(D)(IV)	description diversion systems
Noncoal Chapter 2 Section 2.(b)(iii)(F) Coal Chapter 2 Section 6.(b)(vii)	plan for tailing impoundments
Coal Chapter 2 Section 2.(a)(v)(A)(I)	WQD application information
Coal Chapter 2 Section 2.(a)(v)(A)(III)	SEO reservoir application
Coal Chapter 2 Section 5.(a)(i)(D)(I)	location of water treatment and monitoring location
Coal Chapter 2 Section 5.(a)(i)(D)(IV)	location of hydrologic control methods
Coal Chapter 2 Section 5.(a)(i)(D)	term of permit hydrology narrative
Coal Chapter 2 Section 5.(a)(viii)	adverse impact minimization
Coal Chapter 2 Section 5.(a)(ix)	protection plan
Coal Chapter 2 Section 5.(a)(ix)(A)	control/treatment plan
Coal Chapter 2 Section 5.(a)(ix)(B)	sediment removal plan
Coal Chapter 2 Section 5.(a)(ix)(C)	recharge capacity restoration plan
Coal Chapter 2 Section 5.(a)(ix)(D)(I)	monitoring plan
Coal Chapter 2 Section 5.(a)(ix)(E)	alternate sources plan
Coal Chapter 2 Section 5.(a)(x)	PHC determination
Coal Chapter 2 Section 5.(a)(xi)	mining impact and alternative sources
Coal Chapter 2 Section 5.(a)(xii)	coal processing waste bank, hydrologic impact
Noncoal Chapter 3 Section 2.(c)(iv)(B) Coal Chapter 4 Section 2.(c)(xi)(B)	overburden, spoil, stockpile placement
Noncoal Chapter 3 Section 2.(c)(iv)(B) Coal Chapter 4 Section 2.(c)(xi)(G)	permanent spoil piles, contouring, and drainage

Noncoal Chapter 3 Section 2.(c)(iv)(D) Coal Chapter 4 Section 2.(c)(xi)(D)	pollution through leach, stockpiles
Noncoal Chapter 3 Section 2.(e)(i-iv) Coal Chapter 4 Section 2.(e)(iv)(A-D)	diversion systems ephemeral (streams and unchannelized water)
Noncoal Chapter 3 Section 2.(e)(iv) Coal Chapter 4 Section 2.(e)(iv)(D)	permanent diversions
Noncoal Chapter 3 Section 2.(f)(i-vii) Coal Chapter 4 Section 2.(e)(v)(A-H)	diversions, intermittent and perennial streams
Noncoal Chapter 3 Section 2.(g)(i-iv) Coal Chapter 4 Section 2.(g)(ii)(A-D)	permanent impoundments
Noncoal Chapter 3 Section 2.(h)(i-ii) Coal Chapter 4 Section 2.(g)(viii)(A-B)	tailings impoundments
Noncoal Chapter 3 Section 2.(i)(i-iv) Coal Chapter 4 Section 2.(j)	hydrology, and roads, and railroads
Noncoal Chapter 3 Section 2.(i)(vi) Coal Chapter 4 Section 2.(j)(ii)	drainage structures maintained
Noncoal Chapter 3 Section 2.(i)(vii)	hydrology and other transport systems
Noncoal Chapter 3 Section 2.(k)(ii)(A)(IV)	interim stabilization and water quality
Noncoal Chapter 3 Section 2.(k)(ii)(C)	continue monitoring through mine stabilization
Coal Chapter 4 Section 2.(c)(xi)(G)(I)	location of excess spoil piles
Coal Chapter 4 Section 2.(c)(xi)(G)(III)(1)(a)	control pollution from excess spoil piles
Coal Chapter 4 Section 2.(c)(xi)(G)(III)(1)(a)	spoil pile contouring to allow surface drainage
Coal Chapter 4 Section 2.(c)(xi)(G)(III)(6)	cover spoil to prevent water pollution
Coal Chapter 4 Section 2.(c)(xi)(G)(IV)(1)(c)	installation of final surface drainage
Coal Chapter 4 Section 2.(c)(xii)(A)	coal mine waste cannot be used in construction
Coal Chapter 4 Section 2.(c)(xii)(C)(II-III)	coal mine waste - drainage
Coal Chapter 4 Section 2.(c)(xii)(D)(I-V)	coal mine waste - dams
Coal Chapter 4 Section 2.(c)(xiii)(A)	acid material pollution
Coal Chapter 4 Section 2.(c)(xiii)(B)	flood plain protection - acid material
Coal Chapter 4 Section 2.(e)(i) and (iv)	temporary diversion design
Coal Chapter 4 Section 2.(e)(i)(A)	diversion-hydrologic balance
Coal Chapter 4 Section 2.(e)(i)(C)	diversions compatible with natural drainage system
Coal Chapter 4 Section 2.(e)(ii)	control of drainage or discharge
Coal Chapter 4 Section 2.(e)(ii)(A)	discharges must minimize disturbance of hydrologic balance
Coal Chapter 4 Section 2.(f)(i-vii)	sediment reservoir requirements
Coal Chapter 4 Section 2.(g)(i-iv)	temporary impoundments - design, construction, inspection
Coal Chapter 4 Section 2.(i)(ii)	monitoring of "hydrology balance"

Coal Chapter 4 Section 2.(j)(ii)	roads
Coal Chapter 4 Section 2.(j)(vii)(C)(II)	stream fords and road drainage
Coal Chapter 4 Section 2.(r)(i)(C)	habitat protection and mitigation
Coal Chapter 4 Section 2.(r)(ii)	buffer zone
Coal Chapter 4 Section 2.(r)(ii)(A)(I)	mining within 100 feet of stream will not affect water quality or quantity
Coal Chapter 4 Section 2.(r)(ii)(A)(II)	performance standards for permanent diversions
Coal Chapter 4 Section 2.(t)	control water pollution near abandoned underground mine
Coal Chapter 4 Section 2.(w)	hydrologic balance; material damage

B. Groundwater

CITATION	KEYWORD
Noncoal Chapter 2 Section 2.(b)(iii)(D) Coal Chapter 2 Section 5.(a)(ix)(D)(II)	monitoring information
Coal Chapter 2 Section 2.(a)(v)(A)(I,III)	SEO and WQD application information
Coal Chapter 2 Section 5.(a)(i)(D)(IV)	hydrologic control methods
Coal Chapter 2 Section 5.(a)(ix)	groundwater protection plan
Coal Chapter 2 Section 5.(a)(ix)(A)	control/treatment plan
Coal Chapter 2 Section 5.(a)(ix)(C)	recharge capacity restoration
Coal Chapter 2 Section 5.(a)(ix)(D)(II)	monitoring plan
Coal Chapter 2 Section 5.(a)(ix)(E)	alternate water source plan
Coal Chapter 2 Section 5.(a)(x)	PHC determination
Coal Chapter 2 Section 5.(a)(xi)	mining impact/alternative
Coal Chapter 2 Section 5.(a)(xii)	coal processing waste bank
Noncoal Chapter 3 Section 2.(b)(i)(B) Coal Chapter 4 Section 2.(c)(xi)(G)(III)(6)	prevent diminution of groundwater through drainage
Noncoal Chapter 3 Section 2.(c)(iv)(D) Coal Chapter 4 Section 2.(c)(xi)(G)(III)(1)(a)	water pollution from leaching
Noncoal Chapter 3 Section 2.(e)(i)(D) Coal Chapter 4 Section 2.(iv)(A)(IV)	protect water rights
Noncoal Chapter 3 Section 2.(g)(iii) Coal Chapter 4 Section 2.(g)(ii)(C)	mineral seams as water contaminants
Noncoal Chapter 3 Section 2.(k)(ii)(A)(IV)	interim mine stabilization to prevent subsurface water pollution
Noncoal Chapter 3 Section 2.(k)(ii)(C)	continue monitoring through mine stabilization

Noncoal Chapter 3 Section 2.(l)(ii)(B) Coal Chapter 4 Section 2.(l)(ii)(B)	unanticipated significant flow of groundwater
Coal Chapter 4 Section 2.(b)(ii)	backfilling to minimize water pollution
Coal Chapter 4 Section 2.(c)(xi)(G)(I)(1)(b)	excess spoil location - springs and seeps
Coal Chapter 4 Section 2.(c)(xi)(G)(I)	excess spoil location to prevent water pollution
Coal Chapter 4 Section 2.(c)(xi)(G)(III)(2)	spoil pile design to allow subsurface drainage
Coal Chapter 4 Section 2.(c)(xi)(G)(III)(6)	cover excess spoil prevent pollution
Coal Chapter 4 Section 2.(c)(G)(III)(6)	cover toxic material to prevent water pollution
Coal Chapter 4 Section 2.(e)(ii)(B)(I-III)	drainage from acid-forming and toxic forming materials
Coal Chapter 4 Section 2.(h)	protection of groundwater recharge capacity
Coal Chapter 4 Section 2.(i)	monitoring of groundwater
Coal Chapter 4 Section 2.(i)(i)	groundwater monitoring plan
Coal Chapter 4 Section 2.(p)	returning process water and groundwater monitoring
Coal Chapter 4 Section 2.(t)	control water pollution near abandoned underground mine
Coal Chapter 4 Section 2.(w)	hydrologic balance and material damage

III. RECLAMATION CITATIONS

A. Surface Water

CITATION	KEYWORD
Noncoal Chapter 2 Section 2.(b)(iii)(B)(III) Coal Chapter 2 Section 2.(b)(iv)(B)(III)	permanent impoundments
Noncoal Chapter 2 Section 2.(b)(iii)(D) Coal Chapter 2 Section 2.(b)(iv)(D)	description of permanent diversions; monitoring
Noncoal Chapter 2 Section 2.(b)(iii)(E) Coal Chapter 2 Section 2.(b)(iv)(E)	permanent impoundments
Coal Chapter 2 Section 5.(a)(ix)	surface water protection
Coal Chapter 2 Section 5.(a)(ix)(D)(I)(1)	postmining land use
Noncoal Chapter 3 Section 2.(a)(iii) Coal Chapter 4 Section 2.(a)(iii)	water impoundments as land use
Noncoal Chapter 3 Section 2.(b)(i)(B) Coal Chapter 4 Section 2.(b)(iii)	through drainage
Noncoal Chapter 3 Section 2.(b)(i)(D) Coal Chapter 4 Section 2.(b)(viii)	creation of impoundments
Noncoal Chapter 3 Section 2.(b)(ii)(A)	preserve original drainage

Noncoal Chapter 3 Section 2.(b)(ii)(B) Coal Chapter 4 Section 2.(c)(xi)(G)(III)(5)	erosion protection for terraces
Noncoal Chapter 3 Section 2.(b)(ii)(C) Coal Chapter 4 Section 2.(b)(viii)	permanent impoundments
Noncoal Chapter 3 Section 2.(b)(iii)(B)	permanent impoundments
Noncoal Chapter 3 Section 2.(c)(iv)(B)(II) Coal Chapter 4 Section 2.(c)(xi)(B)	placement of stockpiles
Noncoal Chapter 3 Section 2.(c)(iv)(B)(II) Coal Chapter 4 Section 2.(c)(xi)(G)(I-IV)	drainage system for stockpiles
Noncoal Chapter 3 Section 2.(c)(iv)(D) Coal Chapter 4 Section 2.(c)(xi)(D)	water pollution from stockpiles
Noncoal Chapter 3 Section 2.(d)(vii-viii) Coal Chapter 4 Section 2.(d)(i)(G),(K),(M)(IV),(M)(V)	irrigation
Coal Chapter 4 Section 2.(e)(i)(E)(II)	restore stream characteristics
Noncoal Chapter 3 Section 2.(e)(iv) Coal Chapter 4 Section 2.(e)(iv)(D)	permanent diversions - requirements
Noncoal Chapter 3 Section 2.(f)(i-vii) Coal Chapter 4 Section 2.(e)(v)	permanent diversion - design criteria
Noncoal Chapter 3 Section 2.(g)(i-iv) Coal Chapter 4 Section 2.(g)(ii)(A-D)	permanent impoundments
Coal Chapter 4 Section 2.(b)(i-viii)	backfilling, grading, contouring
Coal Chapter 4 Section 2.(b)(ii)	pollution and backfilling
Coal Chapter 4 Section 2.(b)(iii)	AOC
Coal Chapter 4 Section 2.(b)(v)	postmining slopes, stable drainage reconstructions
Coal Chapter 4 Section 2.(b)(viii)	permanent impoundments
Coal Chapter 4 Section 2.(c)(i)(A-F)	topsoil replacement
Coal Chapter 4 Section 2.(c)(v)(B)	topsoil placement for water infiltration
Coal Chapter 4 Section 2.(c)(vi)	rill and gully repair
Coal Chapter 4 Section 2.(c)(xi)(G)	location of excess spoil piles, drainages
Coal Chapter 4 Section 2.(c)(xi)(G)(III)(1)(a)	control pollution from excess spoil piles
Coal Chapter 4 Section 2.(c)(xi)(G)(III)(2)	spoil piles design to allow subsurface drainage
Coal Chapter 4 Section 2.(c)(xi)(G)(III)(3)	no impoundments on excess spoil piles
Coal Chapter 4 Section 2.(c)(xi)(G)(III)(4)	slope protection erosion of excess spoil piles
Coal Chapter 4 Section 2.(c)(xi)(G)(III)(6)	cover spoil to prevent water pollution
Coal Chapter 4 Section 2.(c)(xi)(G)(IV)(1)(c)	installation of final surface drainage
Coal Chapter 4 Section 2.(c)(xiii)(A)	acid material pollution
Coal Chapter 4 Section 2.(c)(xiii)(B)	flood plain protection from acid material

Coal Chapter 4 Section 2.(e)(i-iii)	diversions and drainage control
Coal Chapter 4 Section 2.(g)(i-iv)	permanent impoundments
Coal Chapter 4 Section 2.(i)(ii)	monitoring for hydrologic balance
Coal Chapter 4 Section 2.(r)(ii)(A)(II)	performance standards for permanent diversions
Coal Chapter 4 Section 2.(w)	hydrologic balance material damage

B. Groundwater

CITATION	KEYWORD
Noncoal Chapter 2 Section 2.(b)(iii)(D) Coal Chapter 2 Section 5.(a)(ix)(D)(II)	groundwater monitoring
Noncoal Chapter 3 Section 2.(b)(i)(B) Coal Chapter 4 Section 2.(b)(iii)	through drainage to prevent diminution of groundwater
Noncoal Chapter 3 Section 2.(g)(iii) Coal Chapter 4 Section 2.(g)(ii)(C)	mineral seams as water contaminants
Coal Chapter 4 Section 2.(b)(ii)	backfilling to prevent water pollution
Coal Chapter 4 Section 2.(c)(v)(B)	topsoil placement for water filtration
Coal Chapter 4 Section 2.(c)(vii)	fertilizer to prevent pollution of groundwater
Coal Chapter 4 Section 2.(c)(xi)(G)(I)	excess spoil location
Coal Chapter 4 Section 2.(c)(xi) (G)(III)(1)(a)	excess spoil location to prevent pollution
Coal Chapter 4 Section 2.(c)(xi) (G)(III)(2)	spoil pile design to allow subsurface drainage
Coal Chapter 4 Section 2.(c)(xi) (G)(III)(6)	cover spoil to prevent water pollution
Coal Chapter 4 Section 2.(c)(xiii)(A-B)	cover toxic material to prevent water pollution
Coal Chapter 4 Section 2.(h)(i-iii)	protection of groundwater recharge capacity
Coal Chapter 4 Section 2.(i)	monitor groundwater until final bond release
Coal Chapter 4 Section 2.(i)(i)	groundwater monitoring plan
Coal Chapter 4 Section 2.(w)	hydrologic balance and material damage

APPENDIX 6

PLUGGING AND ABANDONMENT

Wells must be properly abandoned to prevent adverse changes in water quality or quantity and to prevent a hazard to people, livestock, wildlife and machinery. The Water Quality Division (WQD), State Engineers Office (SEO), and Land Quality Division (LQD) Rules and Regulations describes acceptable well abandonment procedures. Please see the references listed below to determine the appropriate plugging and abandonment procedures. Consult with LQD to determine the appropriate plugging and abandonment procedures.

In general WQD, SEO and LQD requirements consist of placement of impermeable material (material with a permeability of 10^{-7} cm/sec or less), such as neat cement, sand-cement grout, concrete, or bentonite clay, (use of drilling muds is not acceptable) in the same interval as confining units and in screened or perforated zones (see LQD, Noncoal, Chapter 8, Section 2). Material containing drilling muds or organic matter are not acceptable. In some instances it is preferable to fill the entire hole from bottom to top with impermeable material.

In all wells the upper 30 feet are filled with impermeable material, as defined above. Typically the casing is cut off approximately 2 feet below ground surface and the upper 2 feet is filled to the surface with suitable material. A permanent tag showing the well name and any other pertinent information should be affixed to the top of the plug.

References:

State Engineers Office, Regulations and Instructions Part III, Water Well Minimum Construction Standards, Chapter 4, Well Completion and Maintenance, Section 4, Water Well Plugging and Abandonment.

Wyoming Department of Environmental Quality, Water Quality Division, Rules and Regulations, Chapter 26, Well Construction Standards, Section 11, Plugging and Abandonment.

Wyoming Department of Environmental Quality, Land Quality Division, Noncoal, Rules and Regulations, Chapter 8, Noncoal Exploration by Drilling, Section 2, General Drill Hole Abandonment Requirements.

APPENDIX 7

MINING PHASE SURFACE AND GROUNDWATER MONITORING AT SURFACE COAL MINES

A. Surface Water

Note: Upon completion of the permitting phase and following establishment of baseline surface water characteristics, surface coal mining operations are permitted (via a formal permit change) to transition to a “mining phase” surface water monitoring program similar to the following:

Constituents (reported in mg/l unless noted)	Analytical Method	Holding Time	Rational for Analysis
Ammonia Nitrogen as N	EPA 350.1	28 days	LQD R&R, Ch. 4, Sec. 2(i) WQD R&R, Ch. 1, Sec. 21(a)
Turbidity (NTUs)	EPA 180.1	48 hours	LQD R&R, Ch. 4, Sec. 2(i) WQD R&R, Ch. 1, Sec. 23
Field Conductivity (micromhs/cm)	EPA 120.1	Analyze Immediately	Good comparison with TDS
Dissolved Oxygen	EPA 360.1	Analyze Immediately	LQD R&R, Ch. 4, Sec. 2(i) WQD R&R, Ch. 1, Sec. 24
Field Water Temperature (degrees Celsius)	EPA 170.1	Analyze Immediately	LQD R&R, Ch. 4, Sec. 2(i) WQD R&R, Ch. 1, Sec. 25
Field Water pH (standard units)	EPA 150.1	Analyze Immediately	30CFR§780.21, LQD R&R, Ch.2(a)(vi)(L)(IV), WQD R&R, Ch.1, Sec. 26
Oil and Grease	EPA 413.1	28 days	LQD R&R, Ch. 4, Sec. 2(i) WQD R&R, Ch. 1, Sec. 29
Total Dissolved Solids (TDS) @ 180°F	EPA 160.1/SM2540C	7 days	30CFR§780.21, LQD R&R, Ch.2(a)(vi)(L)(IV), WQD R&R, Ch.1, Sec. 31
Total Suspended Solids	EPA 160.2	7 days	30CFR§780.21, LQD R&R, Ch.2(a)(vi)(L)(IV), WQD R&R, Ch. 1,Sec. 16
Dissolved Chloride	EPA 300.0	28 days	LQD R&R, Ch. 4, Sec. 2(i) WQD R&R, Ch. 1, Sec. 31
Dissolved Arsenic	EPA 206.3/200.9/200.8	180 days	LQD R&R, Ch. 4, Sec. 2(i) WQD R&R, Ch. 1, Appendix B

Dissolved Cadmium	EPA 200.9/200.7/200.8	180 days	LQD R&R, Ch. 4, Sec. 2(i) WQD R&R, Ch. 1, Appendix B
Dissolved Chromium	EPA 200.9/200.7/200.8	180 days	LQD R&R, Ch. 4, Sec. 2(i) WQD R&R, Ch. 1, Appendix B
Total and Dissolved Iron	EPA 236.1/200.9/200.7/200.8	180 days	30CFR§780.21, LQD R&R, Ch.2(a)(vi)(L)(IV), WQD R&R, Ch. 1, Appendix B
Total Manganese	EPA 200.9/200.7/200.8/243.1/243.2	180 days	30CFR§780.21, LQD R&R, Ch.2(a)(vi)(L)(IV), WQD R&R, Ch. 1, Appendix B
Dissolved Selenium	EPA 270.3/200.9/200.8	180 days	LQD R&R, Ch. 4, Sec. 2(i) WQD R&R, Ch. 1, Appendix B
Dissolved Zinc	EPA 200.9/200.7/200.8	180 days	LQD R&R, Ch. 4, Sec. 2(i) WQD R&R, Ch. 1, Appendix B

This table simply provides a recommendation of test constituents for mining phase surface water quality monitoring which should ensure mining:

- minimizes disturbance to the hydrologic balance in the permit and adjacent areas
- prevents material damage to the hydrologic balance outside the permit area
- minimizes impacts to all surface waters affected so they remain suitable for all uses for which they were suitable prior to mining (i.e., WQD Chapter 1).
- protects the water rights of other users

A few constituents may need to be added to recommended constituents based on site-specific conditions such as important water resources, alluvial valley floors (AVF), wetlands, mine facilities or domestic water supplies.

Instantaneous discharge (ft³/second) must also be determined and recorded at each surface water sample point.

B. Groundwater

All wells should be analyzed for the constituents outlined in Appendix 1, Table 1 of this guideline until the operator can demonstrate to the satisfaction of LQD that a reduced constituents list is acceptable. The sampling results and analysis should demonstrate:

- minimal disturbance to the hydrologic balance in the permit and adjacent areas

- prevention of material damage to the hydrologic balance outside the permit area
- minimal impacts to all aquifers affected so they remain suitable to support approved postmining land uses (i.e., WQD Class III livestock use).
- protection of the water rights of other users

For each well sampled for water quality, a field sampling sheet should be prepared. The field sampling sheet should contain the following items:

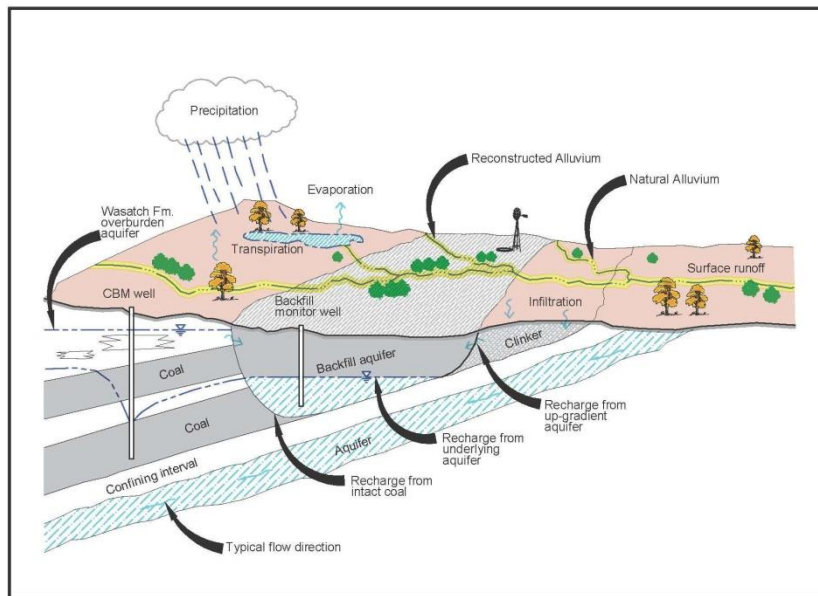
1. Identification of the well;
2. Well depth;
3. Static water level depth and measurement techniques;
4. Well yield (if measured);
5. Purge volume, pumping rate and volume per casing volume;
6. Time well purged;
7. Collection methods (bail or pump);
8. Field observations (such as well condition, sample color, sample smell, sound);
9. Name of collector; and
10. Climatic conditions, including air temperature.

Appendix 8

Wyoming

Groundwater Performance Standards

White Paper



Land Quality Division Industry/


Agency Coal Working Group and WWC Engineering

November 2013

The contents of this White Paper were thoroughly discussed and agreed to by members of the Coal Work Group, and represent the groups combined best efforts to capture and simplify this complex issue.



Nancy Nuttbrock



Date

Administrator, Land Quality Division

Department of Environmental Quality

WYOMING GROUNDWATER PERFORMANCE STANDARDS WHITE PAPER

Purpose and Need

Chapter 4 Section 2 (h) and (i) of WDEQ/LQD Rules and Regulations (Environmental Performance Standards) provide reclamation performance standards for coal mine operations in mined areas. The Chapter 4 Section 2 (h) performance standards pertaining to groundwater require restoration of the recharge capacity of reclaimed land to a condition which:

- Supports the approved postmining land use which typically includes livestock grazing, wildlife use, pasture and cropland;
- Minimizes disturbances to the prevailing hydrologic balance¹ in the permit area and in adjacent areas; and
- Provides a rate of recharge that approximates the premining recharge rate.

Chapter 4 Section 2 (i) requires a groundwater monitoring program to determine:

- Infiltration rates, subsurface flows, and storage characteristics of the reclaimed land and adjacent areas; and

¹ Reference to the hydrologic balance invokes Chapter 1, Section 2 (bp) which defines hydrologic balance as "the relationship between the quality and quantity of inflow to, outflow from, and storage in a hydrologic unit such as a drainage basin, aquifer, soil zone, lake or reservoir. It encompasses the quantity and quality relationships between precipitation, runoff, evaporation, and the change in ground and surface water storage." Therefore, water quality in this regulatory context is a component of the hydrologic balance addressed in postmine groundwater recovery analysis.

The LQD Industry/Agency working group (Coal Working Group) has concluded that evaluations of groundwater performance compared to criteria outlined in Chapter 4 can be made on an ongoing basis in the annual report process. With this change in focus there will no longer be a need to conduct a separate groundwater verification for a Phase 3 bond release request.

WWC Engineering prepared this paper third-party assessment of the current postmine groundwater monitoring programs being conducted by the Wyoming coal industry to determine whether the ongoing data collection and analysis methods are sufficient to demonstrate compliance with the Chapter 4 Section 2 groundwater performance standards, and evolved through subsequent review and comment from both LQD staff and operators.

Scope of Work

This study's focus is on areas of coal removal and groundwater recovery in backfilled areas, which is common to all surface mining operations. Those portions of mine areas containing mine facilities (e.g. repair shops, loadout facilities, shipping areas, fuel storage areas and office buildings) and coal preparation plant areas (e.g. storage and stockpile areas, settling basins and impoundments) were not addressed. These areas are usually located where coal is not present and groundwater level recovery is not monitored. These areas can be, however, the subject of regulatory action pertaining to leaks and spills of fuel, antifreeze, solvents and other products. Cleanup activities addressing spills, although under the purview of LQD, are generally not addressed in bond calculations and therefore would typically be considered individually, as not all operations will be addressing environmental cleanups during bond release.

Description of the Monitoring Programs

All permits have or will have backfill monitoring wells on a density of approximately one backfill well per square mile. Additionally, postmining groundwater monitoring programs include wells completed in undisturbed aquifer units. Exceptions to the one backfill well per square mile standard usually consist of more than one well per section in reclaimed alluvial valley floors and areas of special regulatory attention (see Murphree, (2005)). Backfill monitoring wells are typically installed after vegetation has been established and are screened across a large portion of the backfill material. All operations have installed backfill wells which are routinely measured for static water levels and sampled for quality. Additionally, each operator has committed to conduct aquifer tests on backfill wells when sufficient saturation has occurred and most operators have conducted aquifer tests on one or more backfill wells.

Previous Studies

The studies cited below are not a comprehensive list of all work conducted on the topic of groundwater recovery in mined areas, but a listing of work reviewed in the preparation of this paper.

Early work on the influences of mining on the hydrogeologic system was conducted by Van Voast et al. (1977) and Van Voast and Reiten (1988). Both papers were published by the Montana Bureau of Mines and Geology and discussed the Montana portion of the PRB using information collected in the vicinity of Colstrip and Decker. Van Voast and Reiten (1988) indicate that, in addition to infiltrating precipitation, backfill resaturation is also driven by lateral flow from adjacent undisturbed aquifers and in some instances, vertical flow from deeper aquifers.

Hoy et al. (2003), compared water level and quality trends in coal mine backfill aquifers from ten mines located on the eastern margin of the PRB. The mines included in the study were divided into a northern group of seven mines (Buckskin, Dry Fork, Eagle Butte, Fort Union, KFx, Rawhide and Wyodak) and a southern group of three mines (Jacobs Ranch, Black Thunder and North Rochelle). The study evaluated the influence of the backfill aquifer's depositional and hydrologic characteristics on fluctuations in these trends. Hoy et al. hypothesized that site specific factors such as backfill placement methods, hydraulic conductivities, proximity and communication with adjacent aquifers, etc. all affect recharge rate. However, the report notes significant difficulties associated with quantifying the effects of these aquifer properties on recharge trends caused by ongoing anthropogenic stresses (e.g. CBM development). The authors concluded that backfill aquifers can meet the WDEQ/WQD livestock water quality standards, which was proposed as a performance standard by Martin, et al. (1988) in one of the early cumulative hydrologic impact analyses conducted on the Wyoming coal industry.

Murphree (2005) evaluated the findings of numerous studies on backfill water quality conducted at the Caballo Mine and compared the updated backfill water quality results with premining water quality and geology for the same locations. Although Murphree's study focused primarily on the quality of backfill groundwater, valuable insight to the recharge mechanism is also provided. As do Van Voast and Reiten (1988), Murphree suggests that recharge occurs from adjacent undisturbed aquifers and from deeper units. Murphree's findings also indicate that the backfill areas can be quite heterogeneous, with large variations in lithology. The backfill texture affects the rate of resaturation, with areas dominated by sand showing more rapid recovery than those containing a large percentage of clay.

Mining in the southern portion of Wyoming predates the Surface Mining Control and Reclamation Act (SMCRA) of 1977 and continues to this day. There is long history of coal mining in the southern portion of Wyoming, beginning in the 1860s with the Union Pacific Railroad. Numerous underground mines were located in the vicinity of Hanna and Rock Springs and were in operation until the 1950s when locomotives converted to diesel fuel. Surface mining continued in these areas after closure of the underground mines. Currently, the Abandoned Mine Land Division of the WDEQ conducts extensive groundwater monitoring of the Rock Springs area and also monitors groundwater and surface water in the vicinity of Hanna. The purpose of these monitoring programs is to assess mining-related impacts.

In the Rock Springs area, coal was removed primarily from the Mesa Verde Group of Late Cretaceous age. In the Hanna area, the primary mining target was the Hanna Formation of Paleocene Age. Bartos, et al. (2006) reported that most wells completed in the Hanna Formation, are for stock use or monitoring near coal mines. Bartos et al. (2006) advised that groundwater from the Hanna Formation is generally suitable for livestock use, based on 34 analyses.

Conceptual Model

Based on the 30 years of data collection since installation of the first backfill monitoring wells in the early 1980s, the general consensus in the mining industry is that the backfill receives recharge from three sources:

- Infiltration from precipitation and ponded surface water and streams when they flow – during snowmelt they can run for days or weeks,
- Lateral flow from adjacent aquifers, and
- Vertical leakage from aquifers beneath the pit floor that may have been in communication with the coal prior to mining or due to the mining process are now in communication with areas of coal removal.

Although the sources of backfill resaturation have been identified, the relative contribution of each source to backfill recovery has not been quantified and would be very location dependent. In general, the data indicate that water levels in areas consisting of sandy backfill recover more quickly than those completed in backfill that is clay-rich; backfill immediately adjacent to unmined areas typically recovers more quickly than areas distant from the mining limits, and areas near surface water impoundments constructed in the backfill also show accelerated recovery. Figure 1 is a sketch of the conceptual hydrogeologic regime in mined areas showing the various sources of recharge to the backfill.

Prior to mining, three aquifers typically exist in the Wyoming coal fields. From the surface down, these aquifers include: alluvium (limited extent, water table conditions and can be hydraulically connected with the overburden), overburden (heterogeneous mix of sandstone lenses in a claystone matrix, highly variable aquifer properties, mixed water table to confined conditions, recharged by infiltration) and coal (regional aquifer, confined except near outcrop areas, recharged at the outcrop, particularly in areas of clinker, and from overlying aquifers).

Postmining the resaturated backfill contains the blended potentiometry of the overburden and coal. In many areas, postmining alluvial aquifers are constructed with clay liners and are perched on the reclaimed surface. Surface impoundments located on the reclaimed surface also exist, which have been noted to enhance the rate of recovery in the backfill aquifer.

Compliance with Chapter 4, Section 2

Although details vary, the postmining groundwater monitoring programs of the various permittees contain these common components:

- One existing or planned backfill monitoring wells located approximately every square mile,
- A varying number of completed backfill wells along with bedrock and alluvial monitoring wells at various levels of saturation, which are measured for static water level quarterly and sampled at least annually for quality, and
- Commitments to conduct pumping tests on selected backfill wells.

As stated previously, the rules and regulations in Chapter 4 Section 2 focus on the postmine recharge capacity. Historically, the premine baseline studies did not include a direct measurement of the recharge rate. Recharge is a parameter that may be more effectively considered qualitatively than quantitatively due to the difficulty in direct measurement, particularly over wide extents such as permit areas. Anderson and Woessner (1992), in their popular textbook on groundwater modeling, state that “No one has yet devised a universally applicable method for estimating groundwater recharge. Numerous methods have been proposed but most have met with limited success”. In groundwater modeling, recharge is typically adjusted to achieve model calibration. Due to the inability to measure recharge, the lack of hard data gives the modeler freedom to adjust recharge more than other parameters such as permeability and storage coefficient, which are measured directly through pumping tests. Because of these difficulties and inherent inaccuracies, postmining recharge capacity is best demonstrated through the upward trending water levels in the backfill aquifer.

A demonstration that the groundwater recharge capacity to the backfill is sufficient to support the postmining land use (wildlife and livestock grazing) in compliance with Chapter 4, Section 2, (h) and (i) can be included in annual reports by showing that there is water of sufficient quantity and quality, on average, to support wildlife use and livestock grazing in reclaimed areas. The regulations do not prohibit use of alternative water sources if there is not sufficient water quality or quantity from the backfill wells in a reclaimed area. Alternate sources may include, but are not limited to, surface water and groundwater from aquifers undisturbed by mining activities.

The demonstration of minimization of impacts to the hydrologic balance is accomplished during the permitting process as part of the evaluation of the probable cumulative hydrologic (PHC) impacts. This is required prior to permit issuance by the regulatory authority in compliance with Wyoming statutes. Monitoring is then conducted to verify PHC predictions. If monitoring results are contrary to PHC predictions then the PHC may be updated through the permit revision process. In reclaimed areas, measuring water levels and sampling for quality in monitoring wells

included in the postmining monitoring network and reporting these measurements in annual reports also tracks the impacts to the hydrologic balance through the life of mine.

Evaluation of the recharge rate can be made through a qualitative assessment of the water level recovery in the postmining monitoring network; re-establishment of the recharge capacity is implied through recovering water levels. Site specific factors such as spoil volume, porosity and rate of resaturation over time must be known or assumed in order to estimate recharge rate.

Compliance with the remaining portions of Chapter 4 Section 2 (i) is demonstrated through the existing postmining groundwater monitoring network. Subsurface flow in the backfill aquifer is quantified using potentiometric and pumping test data. Additionally, multi-well pumping tests have been used to measure storage characteristics of the backfill aquifer.

Though determination of infiltration is a requirement of Chapter 4, Section 2 (i), of the permit documents reviewed for this paper, only one baseline infiltration analysis is presented (measurement of infiltration is not a regulatory requirement for baseline studies, nor are infiltration studies discussed in Guideline 8). Reynolds (2012) compared infiltration rates between native and reclaimed areas at the Wyodak and Antelope mines and found that the rate of infiltration on reclaimed areas increased with time, and the infiltration rates at areas reclaimed 20-25 years earlier are similar to infiltration rates on native areas. It is the thought of the Coal Working Group that when postmine vegetative cover is comparable to premine vegetative cover, the postmine infiltration rate is similar to the premining infiltration rate.

Reclaimed alluvial valley floors and restored wetlands, both important postmining features, are designed to utilize infiltration of surface water, primarily in the form of runoff, to re-establish hydrologic functions. Establishment of the postmining hydrologic function within these areas is verified through monitoring data collected by the postmining monitoring network.

Measurement of infiltration is technically difficult and results can be affected by a number of variables including the way a particular method or instrument is used, by alterations in the soil conditions as a function of land management, and also due to the manipulation of the soil before and during the measurement (Pla, 2013). Field infiltration measurement methodology consists of infiltrometer tests that measure the area covered by the test equipment, which is several square feet or square yards at most. Infiltration rates are site specific, susceptible to local topsoil characteristics and compaction history and may not be representative of the backfill as a whole. From an agronomic perspective, the relative health of vegetative growth on reclaimed areas can be an indicator of the infiltration capacity. Further, because potential evapotranspiration (ET) exceeds precipitation (Lenfest, 1987), vertical infiltration past the root zone in reclaimed areas may be negligible and of little significance with respect to groundwater recharge. Therefore, measurement of the infiltration capacity in reclaimed areas may be of little use in demonstrating achievement of the postmining land use as it is a very minor component of recharge unless the backfill is shallow and the water table close to the surface.

Tables 1 and 2 provide the groundwater performance standards presented in Chapter 4, Section 2 and the methods used to evaluate performance.

Table 1. Chapter 4 Section 2 (h) groundwater reclamation performance standards and methods of evaluation.

Recharge Capacity Which:	Evaluation Method
Supports the postmining land use	Evaluated by measuring water levels, sampling for quality in the postmining groundwater monitoring network and presenting the water level trends and analytical results in annual reports. In areas where groundwater quality and quantity are not trending toward baseline and/or WDEQ/WQD Chapter 8 groundwater uses, alternate water sources (e.g. surface water and groundwater from aquifers intact after mining) can be used to meet postmine land use requirements.
Minimizes disturbances to the prevailing hydrologic balance	Evaluated in the permit review process through permit issuance and compliance, and through groundwater quality analysis of sampled postmining monitoring wells.
Provides a rate of recharge that approximates the premining recharge	Assessed through measurement of the rate of recovery in postmining groundwater monitoring wells (i.e. change in storage over time).

Table 2. Chapter 4 Section 2 (i) Items determined through postmining groundwater monitoring programs.

Groundwater Monitoring Program to Determine:	Evaluation Method
Infiltration rates	Indirectly evaluated through vegetative health (i.e. vegetation establishment implies favorable infiltration).
Subsurface flows	By monitoring groundwater levels and through pumping tests.
Storage characteristics	Through pumping tests. Calculations of saturated backfill vs. time can be used to estimate the recharge rate from all sources.
Effects of reclamation on the recharge capacity of reclaimed land	Through recovering water levels in groundwater monitoring wells.

Conclusions/Path Forward

Measurement of groundwater levels and sampling for groundwater quality have been and will be used to demonstrate that groundwater in reclaimed areas is capable of supporting postmining land uses. Backfill groundwater quality can be compared to existing baseline measurement to demonstrate that disturbance to the hydrologic balance is minimized. To date, the average groundwater quality in reclaimed areas meets postmining land use standards (Class III groundwater). Areas that do not appear to be on trend to meet postmining land use due to limited quantity or poor quality can be mitigated through utilization of alternative sources including, but not limited to, surface water captured in postmine stock reservoirs or groundwater from alternative sources such as wells completed in undisturbed aquifers.

It is the intent of the Coal Working Group to use this paper as a reference in future bond release activities. This paper memorializes LQD's policy decision to use groundwater performance standards required by Chapter 4 Section 2 (h) and (i). The performance standards will be evaluated in annual reports. Bond release will be achieved by demonstrating that the postmining land use can be met. References to this white paper will be added to Guidelines 20 and 25 and the Coal Annual Report Format (CARF).

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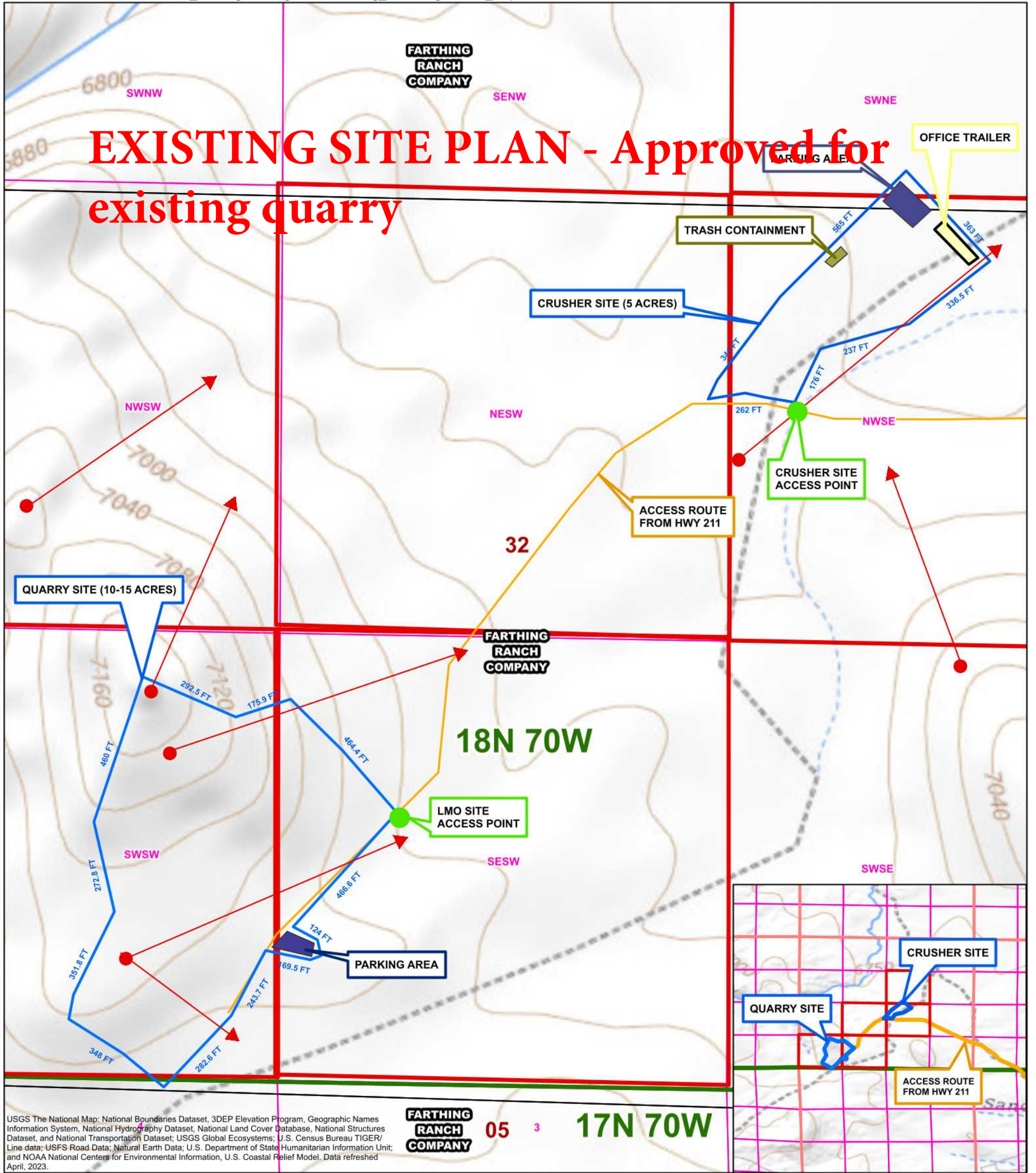
Preliminary Drainage Plan for the Horse Creek Rock Quarry

The Drainage Plan for the Horse Creek Quarry involved the installation of sediment control structures (such as berms, wattles, silt fences) as depicted in the project's existing Site Plan on file with Laramie County as well as depicted in the project's existing Storm Water Pollution Prevention Plan. Those two documents' maps are attached. Also attached are the following:

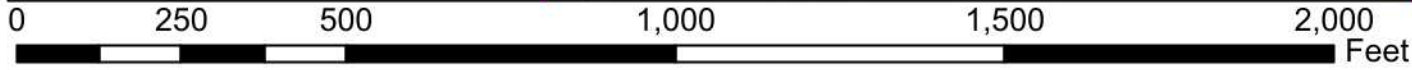
- Flowline map for the Horse Creek Project Area
- Map (engineer drawings) showing the proposed locations of retention ponds for the site, when in operation.

Note: The SWPPP for the Horse Creek Rock Quarry will be updated to reflect the new (larger) permit boundary in mid-May 2026. It is in progress as of the submittal of this document.

EXISTING SITE PLAN - Approved for existing quarry



USGS The National Map; National Boundaries Dataset, 3DEP Elevation Program, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset; USGS Global Ecosystems; U.S. Census Bureau TIGER/Line data; USFS Road Data; Natural Earth Data; U.S. Department of State Humanitarian Information Unit; and NOAA National Centers for Environmental Information, U.S. Coastal Relief Model, Data refreshed April, 2023.



*The current land use zoning of the site is agricultural. All surrounding and adjacent land use within a 5 miles radius is agricultural.

- PLSS Township & Range
- Parking Area
- PLSS Section
- Office Trailer (contains fire suppression)
- PLSS Quarter-Quarter Section
- Trash Containment (Trash Bins with Covers)
- Laramie and Albany County Parcel Boundaries (Greenwood Mapping)
- Access Route to Horse Creek Quarry
- Crusher Site
- Flow Lines
- 10-15 Acres – Quarry Location
- Site Access Point
- LMO Boundary

Approved

Date: July 7, 2023

By:

Laramie County Planning

**This work product represents only generalized locations of features, objects or boundaries and should not be relied upon as being legally authoritative for the precise location of any feature, object or boundary"





 BRIERLEY ASSOCIATES <i>Creating Space Underground</i> 1482 Commerce Dr Unit T Laramie, WY 82070 Phone: 307-343-1148	CLIENT L.G. EVERIST, INC.	TITLE HORSE CREEK ROCK QUARRY SITE PLAN MAP	FIGURE
	PROJECT NAME OR NUMBER 121327-000	REPORT	DATE 5/25/2023

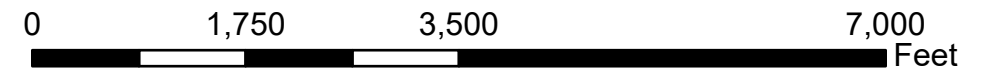


Flowlines Map - Orthomosaic background



Horse Creek Quarry 2026 Boundaries

-  Boundary - Proposed Large Mine Permit
-  Reserves - North Hill Outline V3
-  Reserves - South Hill Outline V3
-  Flow Lines



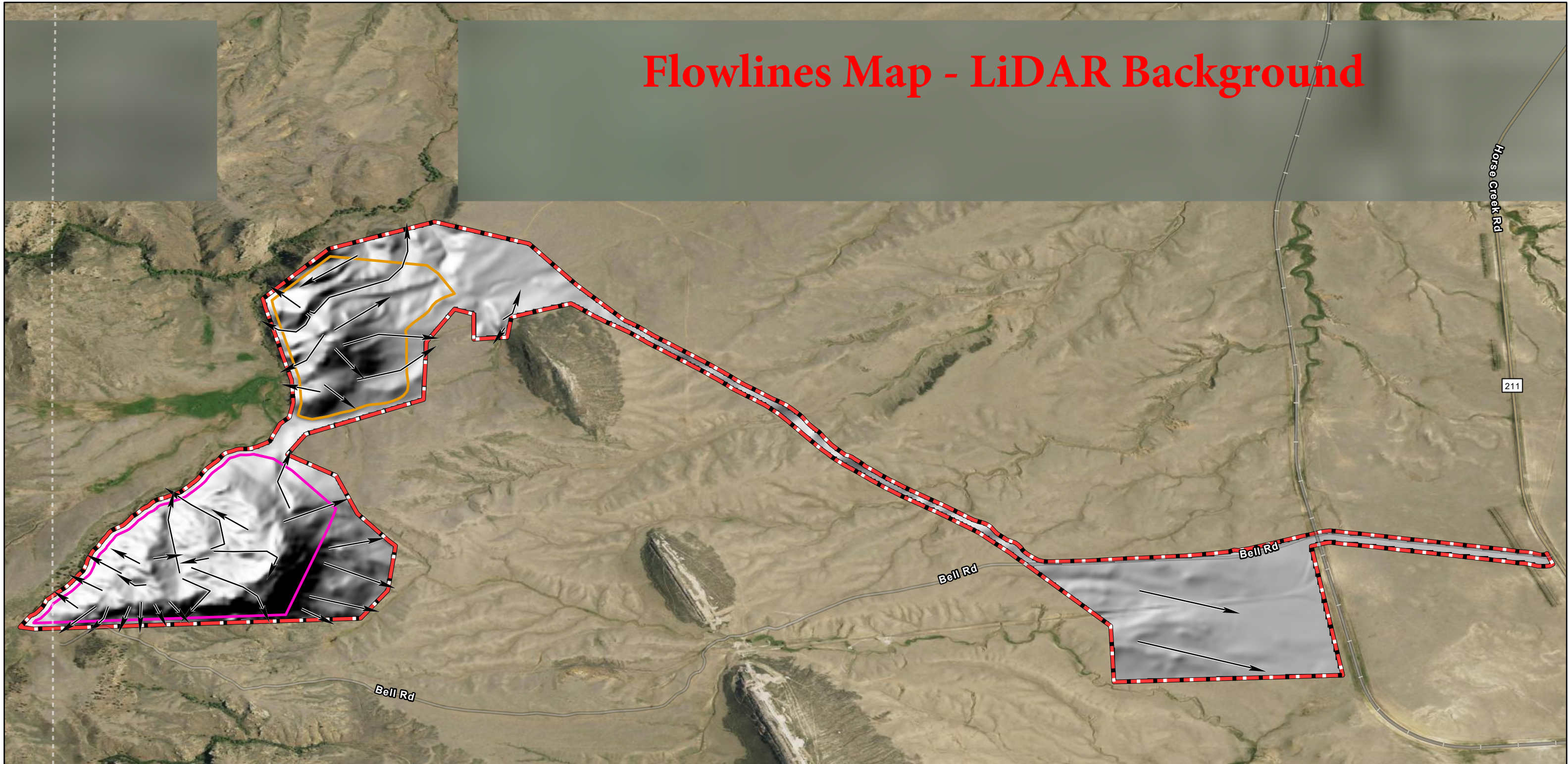
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
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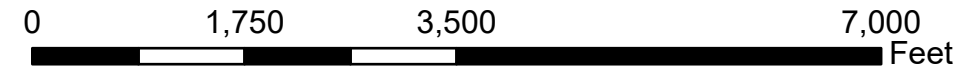


CLIENT L.G. EVERST INC.	TITLE HORSE CREEK ROCK QUARRY SWPPP USGS ORTHO	MAP 2
PROJECT NAME OR NUMBER 121327-008	REPORT HORSE CREEK ROCK QUARRY SWPPP	DATE 3/17/2026

Flowlines Map - LiDAR Background



- Horse Creek Quarry 2026 Boundaries
-  Boundary - Proposed Large Mine Permit
 -  Reserves - North Hill Outline V3
 -  Reserves - South Hill Outline V3
 -  Flow Lines



*Imagery sourced from ESRI: World Imagery

**This work product represents only generalized locations of features, objects or boundaries and should not be relied upon as being legally authoritative for the precise location of any feature, object or boundary"



CLIENT L.G. EVERST INC.	TITLE HORSE CREEK ROCK QUARRY SWPPP USGS LiDAR	MAP 1
PROJECT NAME OR NUMBER 121327-008	REPORT HORSE CREEK ROCK QUARRY SWPPP	DATE 3/6/2026



Source: Esri, Vantor, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community Powered by Esri

Legend

Large Mine Permit Boundary	Trash, Fuel, and Maintenance Area
Project Access Road - Bell Road	Haul Roads
Flow Lines	Sump Areas
North & South Hill Mine Area	Proposed Location of Rail Loadout Area
Ricker Creek Approximate Location	BNSF Railway
Stockpile Locations	
New Traffic Pattern	
Processing Plant & Mineral Stockpiles	
Plant Area Berms	
Parking & Administration Trailer	
Weigh Scale	
Portable Toilet	

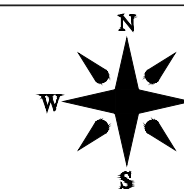
Drawn By:

ARW

Checked By:

GDC

**HORSE CREEK ROCK
QUARRY SITE PLAN MAP**



Scale:

As Shown

Date:

04/24/26



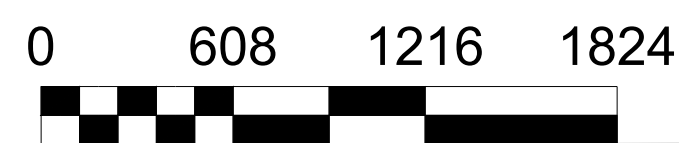
L. G. EVERIST, INC. 350 S Main Ave, Suite 400
Delivering Solutions Sioux Falls, SD 57104

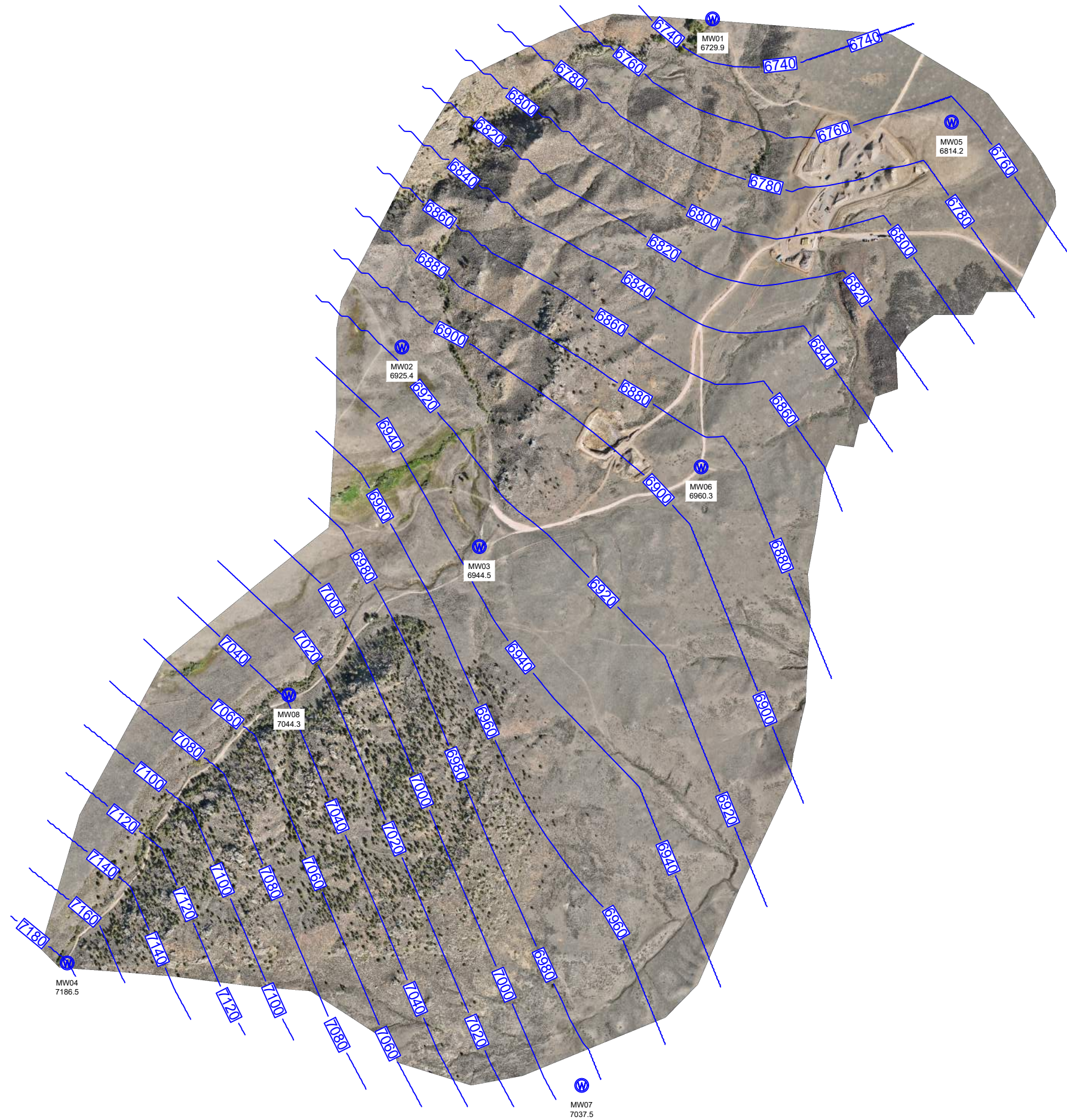
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2026-02-28 Horse Creek Potentiometric Surface

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03/20/26

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Delivering Solutions Sioux Falls, SD 57104

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One retention pond is anticipated for the Horse Creek Quarry. It will be located along the east side of the South Hill's Spoils Storage Area.

Proposed Large Mine Permit

Phase 3 Mining Area Outline

Ricker Creek

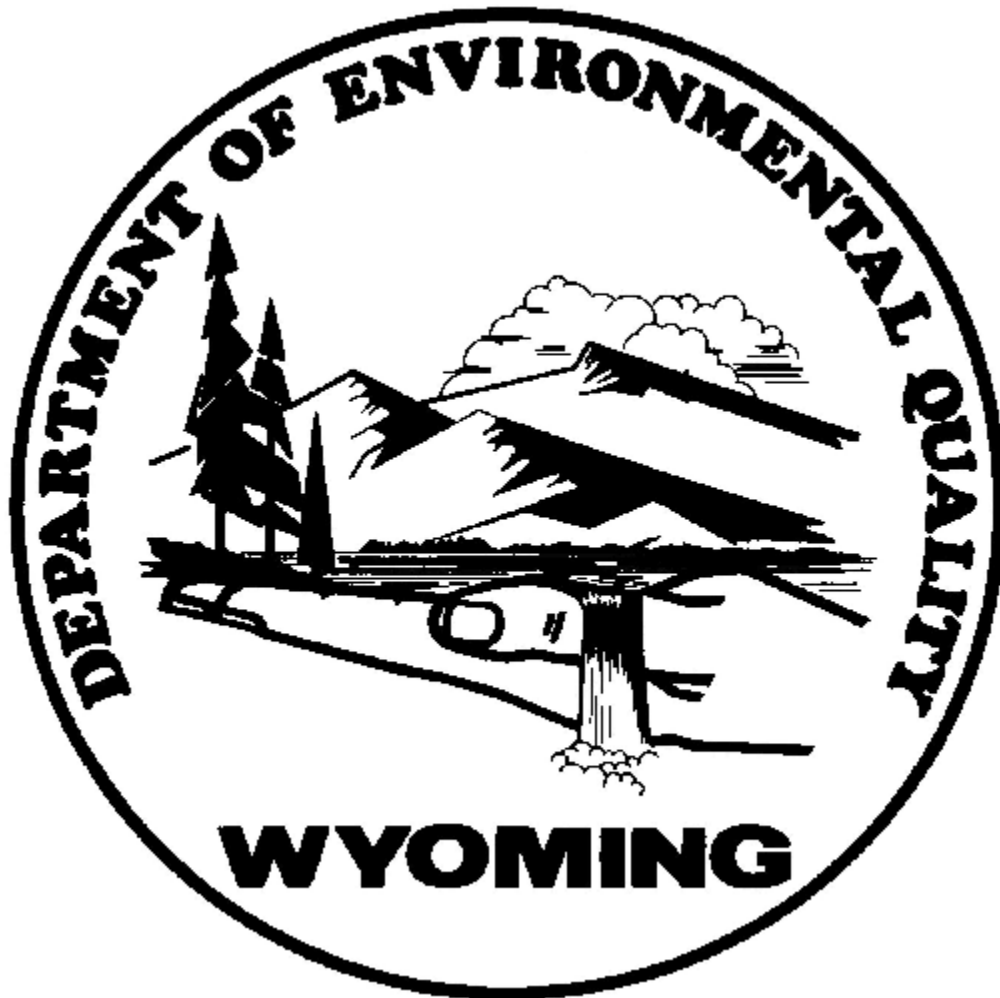
South Hill Pit Development - Phase 3

Spoils Retention Pond

Spoils Storage Area & Contours



**DEPARTMENT OF ENVIRONMENTAL QUALITY
LAND QUALITY DIVISION**



**HARD ROCK MINING PERMIT
HANDBOOK**

INTRODUCTION	5
GENERAL INFORMATION.....	6
COMPLETENESS CRITERIA.....	6
MAPS and AERIAL PHOTOGRAPHS.....	7
Permit Application Format and organization.....	9
I. ADJUDICATION.....	11
A. Form 1.....	11
B. Form 3.....	11
C. Reclamation Bond.....	12
D. Certificate of Public Liability Insurance.....	14
E. Landowner Consent.....	14
F. Appendix A (For lands within the permit area).....	15
G. Appendix B (For lands adjacent to the permit area).....	15
H. Appendix C.....	15
I. Appendix E (Appendix D, Description of the Land is Detailed in Section II).....	16
J. Proof of Filing.....	17
K. Proof of Notice.....	17
L. Proof of Publication.....	17
M. Proof of Notification.....	18
N. Written verification of City or County (appropriate zoning or planning department).....	18
O. Listing of Other Permits or Construction Approvals.....	18
II. APPENDIX D - DESCRIPTION OF THE LAND.....	20
A. Appendix D-1 - Land Use.....	20
B. Appendix D-2 - Brief History of the Area.....	20
C. Appendix D-3 - Archaeological and Paleontological Resources (See Guideline 11, Guideline for Reporting Cultural and Paleontological Resources within Mine permit Areas).....	20
D. Appendix D-4 - Climatology.....	21
E. Appendix D-5 - Topography, Geology, and Overburden Assessment (See Guideline No. 1, Soils and Overburden).....	21
F. Appendix D-6 - Hydrology (See Guideline No. 8, Hydrology).....	23
G. Appendix D-7 - Soil Assessment (See Guideline 1, Soils).....	24
H. Appendix D-8 - Vegetation Inventory (See Guideline 2, Vegetation).....	25
I. Appendix D-9 – Wildlife (See Guideline 5, Wildlife).....	25

J.	Appendix D-10 – Wetlands	26
K.	Appendix D-11 - Premining Radiological Assessment	26
III.	MINE PLAN	28
A.	General Description of Mining Operation	28
B.	Mining Method and Schedule	28
C.	Mining Hydrology (see Guideline No. 8)	29
D.	Refuse Disposal	31
E.	Public Nuisance and Safety	31
F.	Mill and Tailings Disposal System.....	32
G.	Compliance Documentation.....	32
IV.	RECLAMATION PLAN	33
A.	Postmining Land Uses.....	33
B.	Contouring Plan for Affected Lands	33
C.	Surface Preparation for Topsoil or Subsoil Replacement.....	33
D.	Revegetation Practices (see Guideline No. 2)	34
E.	Final Hydrologic Restoration.....	35
F.	Special Reclamation Standards.....	36
G.	Decommissioning, Stabilization, and Reclamation of Mill Site and Tailings Disposal System	36
H.	Site Protection Management Plan	36
I.	Reclamation Schedule - Annual Progress of Reclamation in Accordance with Mine Sequence Map	36
J.	Reclamation Costs (See Guideline 12)	37
K.	Results of Consultation with the Local Conservation District – if pursued	37
V.	Reference Guideline	38
	ADJUDICATION	38
A.	Form 1	38
B.	Form 3.....	38
C.	Reclamation Bond	38
D.	Certificate of Public Liability Insurance	38
E.	Landowner Consent	38
F.	Appendix A (For lands within the permit area).	38
G.	Appendix B (For lands adjacent to the permit area)	39
H.	Appendix C.....	39

I.	Appendix E (Appendix D, Description of the Land is Detailed in Section II)	39
J.	Proof of Filing	39
K.	Proof of Notice.....	39
L.	Proof of Publication	39
M.	Proof of Notification	39
N.	Written verification of City or County (appropriate zoning or planning department)	39
O.	Listing of Other Permits or Construction Approvals.....	39
APPENDIX D - DESCRIPTION OF THE LAND.....		40
A.	Appendix D-1 - Land Use	40
B.	Appendix D-3 - Archaeological and Paleontological Resources (See Guideline 11, Guideline for Reporting Cultural and Paleontological Resources within Mine permit Areas).....	40
C.	Appendix D-4 - Climatology	40
D.	Appendix D-5 - Topography, Geology, and Overburden Assessment (See Guideline No. 1, Soils and Overburden)	40
E.	Appendix D-6 - Hydrology (See Guideline No. 8, Hydrology)	40
F.	Appendix D-7 - Soil Assessment (See Guideline 1, Soils)	41
G.	Appendix D-8 - Vegetation Inventory (See Guideline 2, Vegetation)	41
H.	Appendix D-9 – Wildlife (See Guideline 5, Wildlife).....	41
I.	Appendix D-10 – Wetlands	41
J.	Appendix D-11 - Premining Radiological Assessment	41
MINE PLAN		41
A.	General Description of Mining Operation	41
B.	Mining Method and Schedule	41
C.	Mining Hydrology (see Guideline No. 8)	42
D.	Refuse Disposal	42
E.	Public Nuisance and Safety	42
F.	Mill and Tailings Disposal System.....	42
G.	Compliance Documentation.....	42
RECLAMATION PLAN.....		42
A.	Postmining Land Uses.....	42
B.	Contouring Plan for Affected Lands	42
C.	Surface Preparation for Topsoil or Subsoil Replacement.....	42
D.	Revegetation Practices (see Guideline No. 2)	43

E.	Final Hydrologic Restoration.....	43
F.	Special Reclamation Standards.....	43
G.	Decommissioning, Stabilization, and Reclamation of Mill Site and Tailings Disposal System	43
H.	Site Protection Management Plan	43
I.	Reclamation Schedule - Annual Progress of Reclamation in Accordance with Mine Sequence Map	43
J.	Reclamation Costs (See Guideline 12)	43
K.	Results of Consultation with the Local Conservation District – if pursued	43

HARD ROCK MINING HANDBOOK

INTRODUCTION

This handbook is intended to assist applicants in the preparation of a comprehensive initial application containing all required information. The design of this handbook is basic to application requirements of an average large-scale surface mine. As such, more or less information may be required depending on the specific operation. Separate guidelines are available for small operators, bentonite miners, and in-situ operations. This handbook is subject to change.

Prior to resource inventory or development of a mining and reclamation plan an applicant should review the following documents which can be obtained from the Land Quality Division upon request or from the websites referenced below:

- Wyoming Statute Title (W.S. §) 35 (Wyoming Environmental Quality Act)
<http://legisweb.state.wy.us/LSOWeb/wyStatutes.aspx>
 - Article 1, General
 - Article 4, Land Quality

- Land Quality Noncoal Rules and Regulations and revisions.
<http://soswy.state.wy.us/Rules/>
 - Chapter 1, Definitions
 - Chapter 2, Permit Applications
 - Chapter 3, Environmental Protection Standards
 - Chapter 4, Underground Mining
 - Chapter 6, Self-Bonding Program

- Land Quality Guidelines:
<http://deq.state.wy.us/lqd/guidelines.asp>
 - No. 1 - Soil and Overburden.
 - No. 2 - Premining and Post-mining Vegetation Inventory.
 - No. 3 - Radiological Survey.
 - No. 5 - Terrestrial Wildlife Resource Assessment.
 - No. 6 - Noncoal; Application for a "Permit to Mine" or an "Amendment"
 - No. 8 - Hydrology.
 - No. 10 - Guideline for Fencing.
 - No. 11 - Cultural and Paleontological Resources.
 - No. 12 - Reclamation Performance Bond Calculations.
 - No. 13 - Sediment Ponds.
 - No. 15 - Alternate Sediment Control Measures.
 - No. 17 - Permanent Postmine Impoundments

- State of Wyoming - BLM Memorandum of Understanding (1975) and its supplement (2003), regarding mining of federal minerals on federal land covered by 43 CFR 3600 regulations,
<http://deq.state.wy.us/eqc/orders/Land%20Closed%20Cases/11-4803%20Lost%20Creek%20ISR,%20LLC/Exhibit%2026.pdf>
- Land Quality Division Noncoal Standard Operating Procedures
 - No. 2.1 – Interim Mine Stabilization for Noncoal Mines
<http://deq.state.wy.us/lqd/Guidelns/ncsop21.pdf>
 - No. 1.4 – Procedures Pertaining to Public Notices, Proof of Notice and Sworn Statement of Mailing for all Types of Noncoal Permitting Actions
<http://deq.state.wy.us/lqd/Guidelns/ncsop144.pdf>

GENERAL INFORMATION

The application, once approved, will constitute the enforcement or contractual document which the Department of Environmental Quality (DEQ), Land Quality Division (LQD), will refer to during compliance inspections of the mining operation. The design of the Mine and Reclamation Plans must be based on site specific conditions. In situations where the efficacy of specific prescribed techniques may be questionable, alternative actions should be discussed under the appropriate sections of the application. In addition, such other information as the administrator deems necessary or as good faith compliance with the provisions of the Wyoming Environmental Quality Act may be required (W.S. § 35-11-406(a)(xv)). While not required, scheduling a pre-application consultation with the LQD is highly recommended.

COMPLETENESS CRITERIA

This document contains an outline of the criteria that will be used in determining the “completeness” of a permit application by the LQD staff. Completeness is defined by the Wyoming Environmental Quality Act in W.S. § 35-11-103(e)(xxii) which states that a “Complete application under W.S. § 35-11-406(e) means the application contains all essential and necessary elements and is acceptable for further review for substance and compliance with the provisions of this chapter.” The “essential and necessary elements” are presented in Sections I through IV of this handbook, and Section V contains a listing of the regulatory citations from which these essential and necessary elements arise.

The essential and necessary elements presented in this document represent the information required by the statutes and regulations to obtain the Administrator’s decision for a complete Noncoal Hard Rock Mine permit application. Applications that are deemed complete will be thoroughly evaluated during the technical review process using all applicable LQD and Water Quality Division Rules and Regulations pertaining to hard rock permit applications. All portions of application permit that may be technically inadequate, inaccurate, or do not comply with all appropriate regulations are subject to review and comment under this technical review process.

MAPS AND AERIAL PHOTOGRAPHS

- Maps (Plates, Figures, Diagrams, etc.)
 - Title Block located in lower right hand corner with the following information as a minimum:
 - Applicant's name and address.
 - Title of map.
 - Permit number if applicable.
 - Date map was drawn (or date of photography, if based from aerial photo).
 - Each date map was revised.
 - Map sheet page number, exhibit number, etc.
 - Scale and contour interval.
 - North arrow.
 - Section, Township, and Range lines and numbers
 - Must have an accurate delineation of Section, Township, and Range lines and numbers.
 - Permit Boundary
 - The permit boundary must be clearly outlined and identified on all maps.
 - Any amendment areas should be clearly differentiated from the original permit boundary and other amendment boundaries
 - At a minimum, amendment boundaries must be clearly identified on the Appendix C Mine Operations Plan and Restoration/Reclamation maps.
 - All permit and amendment boundaries should agree with the written legal description in Appendix "C" of adjudication files.
 - Legend
 - Legend clearly describing information on map (all symbols and lines identified).
 - Map Location Key
 - If only a portion of permit or amendment area is shown, a map location key showing area with respect to total permit or amendment area should be on map.
 - Consecutive Map Sheets
 - If more than one map sheet is used for a specific subject, each sheet should be numbered consecutively, 1 of 4, 2 of 4, etc.

- Reference to Other Information
 - Reference on the map any enlarged view, cross sections, or more detailed information contained elsewhere
 - Contours
 - Contour intervals should normally not exceed ten (10) feet, but will depend on the nature of topography in the area.
 - Contour intervals must be the same for premining and postmining maps.
 - Distinct contour lines with contour elevations identified along the contour lines at a reasonable interval and frequency across the map.
 - Map Clutter
 - Map sheets should not include excessive information to the point of not being able to clearly recognize the features presented. If necessary, additional map sheets should be included to separate information in a rational manner and to accommodate a reasonable map size.
 - Map Scale
 - Appendix A, B, C and E maps can be submitted at a scale of 1"=2000'.
 - All other maps must be at a scale of 1"=1000' or greater (e.g., 1"=500'). To show greater detail, scales maybe increased by even multiples of the original scale. For example, for a 1"=1000' scale map, detailed maps should be at 1"=200', 1"=400 and 1"=500'.
 - Premine and postmine contour maps must be at the same scale and
 - Baseline vegetation and soils maps must be at the same scale.
- Aerial Photographs
- Date
 - Any aerial photographs should be current and show the date the photograph was taken.
 - Edge Distortions
 - Eliminate edge distortions on mosaics.
 - Additional Information
 - If used in place of a map, it should contain, at a minimum, all information required in items 1 -7 for maps (above).

WyLQD Guideline 4, W.S. § 35-11-406(b)(v)

PERMIT APPLICATION FORMAT AND ORGANIZATION

Introduction/Format

A single application (consisting of 2 copies, 3 copies if BLM surface or mineral) (note: for operations in District I, the number of copies are 1 and 2 respectively) for a permit to mine or a research and development testing license should be submitted to the Administrator of the Land Quality Division. Once the application is determined to be technically complete, an additional copy will be required for LQD to forward to the US EPA (Chapter 11, Section 2(c)). It should consist of five sections as described below. The administrator requires the format and order of all applications follow this guideline to promote consistency and efficiency of staff review.

The first section of the application is the adjudication file, containing the "Permit to Mine" and "License to Mine" forms, bonds, notification, receipts, consent forms, and Appendices A through C. Items in Section II, A through H of the adjudication file section should be submitted in a loose form and not be bound. This information will be placed in the File-1-Of. The File -1-Of is the first file folder that LQD maintains in their file cabinets for the permit. The remaining items of the adjudication section should be submitted as discussed in the next paragraph.

The second section of the application contains baseline supporting information. The third through fifth sections are the aquifer exemption, mine or operations plan and the reclamation plan, respectively. Information for these sections should be submitted as follows:

In loose leaf 3 ring binders to allow easy substitution of pages for revisions or additions.

- The binders should be no larger than 4 inches thick.
- The text should be printed on 8.5 x 11 inch paper with standard margins and unique page numbers on all pages.
- The pages should also include the submittal or revision date. The paper should be about 20 pound weight or better.
- All figures and tables larger than 8.5 x 11 inch paper should be folded to fit into the application and should be physically attached to the appropriate location in the application or folded into a labeled map pocket.
- All figures and tables should be numbered and referenced in the text.
- In addition to the hard copy, the applicant shall submit water-quality and water-quantity data in an electronic format as described in Addendum 17

The applicant is strongly encouraged not to repeat information from different parts of the application with the exception of Appendix C. For example, Appendix D-5 will contain a thorough discussion of the geology and ore body. The mine operations plan requires a description of the ore body that is going to be mined. The applicant should not repeat the entire discussion in D-5 in the mine operations plan. A summary and reference to D-5 will suffice along

with any additional detail not included in D-5 that specifically addresses the ore body to be mined.

Each 3-ring binder should have its own table of contents for that volume. Volume 1 should contain a master table of contents that covers the entire application. Each binder or volume should be clearly labeled and include the sections of the application included in that volume. (i.e., Nuclear Power, Inc. Bright Lights Project, Big County, Wyoming, Volume 3, Appendix D-6 through Appendix D-11) This information should be placed on the front of the binder and on the spine.

The Land Quality Division will be the primary reviewing agency for WDEQ. The Water Quality Division will review specific portions of the application to reclassify the groundwater near the end of the LQD technical review. A single permit or license will be granted by the department upon the recommendation of the LQD administrator. The application should contain a section devoted to the information required to support the aquifer reclassification. Near the end of the technical review process, LQD will forward the section to WQD. WQD will review this information only to the extent to allow the classification of the groundwater. When the application is deemed technically adequate, the LQD informs the operator to initiate final public notice. This notice will also contain the necessary information for the aquifer exemption. When the LQD declares the application to be technically adequate, the WQD will forward this section/package to the U.S. EPA with a request for an aquifer exemption. The U.S. EPA will issue an interim decision within 45 days. If there are no objections to the LQD public notice process, the U.S. EPA interim decision becomes final. If there are objections, the U.S. EPA will await resolution of the objections before deciding if the interim decision requires modification. Additional information concerning the aquifer exemption can be found in Addendum 10.

Organization

The following is a listing of the major headings for the application. It is not meant to be all inclusive but to give the applicant guidance of the content and the preferred order of the application. It is anticipated that appropriate subheadings will be added by the applicant to address all the items discussed in this guideline.

File-1-0f: The following adjudication materials shall be submitted in a loose format in the following order: (the applicant may wish to place a second copy of all but number 3 in the 3-ring binders with the rest of the application).

- Form 1 UIC
- Form 3
- Proof of Publication (to be filed later once notified by LQD to commence the public notice process)
- Bond Instrument (to be filed once dollar amount is set by LQD)

WyLQD Guideline 4

I. ADJUDICATION

A. FORM 1

a) *Form 1 Application for Permit to Mine*

- (1) *Application for Permit to Mine* must be completed in full, with the affiant's signature and corporate seal as witnessed by a Notary Public or the Secretary if a Corporation, and submitted in duplicate.
- (2) A minimum fee of one hundred dollars (\$100.00) plus ten dollars (\$10.00) for each acre in the requested permit, but the maximum fee for any single permit shall not exceed two thousand dollars (\$2,000.00). The fee for a permit amendment shall be two hundred dollars (\$200.00) plus ten dollars (\$10.00) for each acre not to exceed two thousand dollars (\$2,000.00)
- (3) Additional application requirements to be submitted as attachments are described in the sections below.

W.S. § 35-11-406, W.S. § 35-11-406(a)(xii), W.S. § 35-11-406(a)(ii-iii)

B. FORM 3

a) *Form 3 Application for License to Mine*

- (1) Application for License to Mine must be completed in full, with the affiant's signature and corporate seal as witnessed by a Notary Public or the Secretary if a Corporation, and submitted in duplicate.
- (2) Copy of mining permit
- (3) If the applicant is other than the permit holder, a copy of the instrument of permission from the permit holder granting to the applicant the rights thereto
- (4) Mine Location Map
- (5) A fee of twenty-five dollars (\$25.00)

W.S. § 35-11-410(b), W.S. § 35-11-410(b)(ii), W.S. § 35-11-410(b)(vi)

C. RECLAMATION BOND

Before commencing any mining operations underneath a limited mining operations permit, the operator shall file a bond to insure reclamation in accordance with the purposes of this act in the amount of one thousand dollars (\$1,000.00) per acre of affected land. Within ninety (90) days after mining operations commence, the administrator may require the operator to post an additional bond of one hundred dollars (\$100.00) per acre of affected land if he determines that such amount is necessary to insure reclamation. The operator shall post the additional bond not later than thirty (30) days after receipt of such notification;

W.S. § 35-11-401(e)(vii)

The initial bond amount for a permit should equal to the estimated cost of reclaiming the affected land and restoring any groundwater disturbed by mining during the first year of operation under each permit as defined in W.S. § 35-11-103(f)(iii). The estimated cost shall be based on the operator's cost estimate submitted with the permit plus the administrator's estimate of the additional cost to the state of bringing in personnel and equipment should the operator fail or the site be abandoned. In no event shall the bond be less than ten thousand dollars (\$10,000.00), except for sand and gravel, pumice, scoria or jade mining or any mine, except surface coal mines, the affected land of which, excluding roads, is ten (10) acres or less, in which case the bond amount shall be set by the administrator with approval of the director to cover the cost of reclamation, and in no event less than two hundred dollars (\$200.00) per acre, for affected land;

W.S. § 35-11-417(c)(i)

In those instances in which the surface owner is not the owner of the mineral estate proposed to be mined by mining operations, a permit shall not be issued without the execution of a bond or undertaking to the state, whichever is applicable, for the use and benefit of the surface owner or owners of the land. This bond amount should be in an amount sufficient to secure the payment for any damages to the surface estate, to the crops and forage, or to the tangible improvements of the surface owner. This amount shall be determined by the administrator and shall be commensurate with the reasonable value of the surrounding land, and the effect of the overall operation of the landowner. This bond is in addition to the performance bond required for reclamation by this act. As damage is determined it shall be paid. Financial loss resulting from disruption of the surface owner's operation shall be considered as part of the damage. A bond for surface damage shall not be required when the agreement negotiated between the surface owner and the mineral owner or developer waives any requirement therefor. Payment of damages shall be paid annually unless otherwise agreed to by the surface owner and the operator.

W.S. § 35-11-416(a)

All bonds shall be signed by the operator as principal, by a good and sufficient corporate surety licensed to do business in the state, and be made payable to the state of Wyoming. At the discretion of the director, the record mineral owner of the land to be mined may also be required to join as principal.

W.S. § 35-11-417(b)

In lieu of a bond, the operator or its principal may deposit federally insured certificates of deposit payable to the Wyoming Department of Environmental Quality, or cash or government securities, or irrevocable letters of credit issued by a bank organized to do business in the United States, or all four.

W.S. § 35-11-418

Conditions for self-bonding are set forth in Chapter 6 of the Land Quality Division Noncoal Rules and Regulations. Initial application to self-bond shall be made at the time the operator makes written application to the Administrator for a license to mine. The application shall be on forms furnished by the Administrator.

WyLQD-NC Ch.6 Sec.2(a)

The following forms may be required:

- a) Form P Form NCSB 9/20/06, Initial Application to Self-Bond – If applicable
- b) Form 2OTH1 Reclamation Performance Bond – If applicable
- c) Form 2SF1 State/BLM Reclamation Performance Bond – If applicable
- d) Completed Noncoal Letter of Credit Format – If applicable

Note: *For minerals covered by the State of Wyoming – BLM Memorandum of Understanding and 43 CFR 3600 regulations where the surface and mineral ownership is “federal” (BLM) the applicant must provide two copies of the application. Bonds other than cash bonds must be made payable to the Wyoming Department of Environmental Quality and U.S. Secretary of the Interior. Corporate surety bonds must be executed on the Land Quality State – BLM bond form. Cash bonds (checks, etc.) must be payable to only the Department of Environmental Quality.*

The administrator shall promptly review the license application and if he finds the application in order and consistent with the terms of the permit and any other

provisions of this act, the administrator will determine the size of the bond to be posted for the purpose of insuring reclamation of the lands affected during the first year of operation and upon receipt of said bond will promptly issue the license.

W.S. § 35-11-410(c)

For additional instructions on filing reclamation performance bonds, please contact the LQD Bonding Specialist.

W.S. § 35-11-401(e)(vii); W.S. § 35-11-410(c); W.S. § 35-11-416(a); W.S. § 35-11-417(c)(i); W.S. § 35-11-418; WyLQD-NC Ch.6 Sec.2(a)

D. CERTIFICATE OF PUBLIC LIABILITY INSURANCE

A certificate of public liability is required that demonstrates the applicant has a public liability policy in force for the surface mining and reclamation operations for which this permit is sought or evidence that the applicant has satisfied other state and federal self-insurance requirements.

W.S. § 35-11-406(a)(xiii)

E. LANDOWNER CONSENT

If different from the owner of the mineral estate, an instrument of consent to the mining plan and reclamation plan from the surface landowner as well as approval by the resident or agricultural landowner is required. In this circumstance, an instrument of consent from the resident or agricultural landowner granting the applicant permission to enter and commence surface mining operation is also required. If the applicant proposes to affect any land which lies within 300 feet of an existing occupied dwelling, home, public building, school, church, community or institutional building, park or cemetery, then written consent of said landowners must be obtained and placed in the permit application. *W.S. § 35-11-406(m)(viii)* provides that the director may deny a mining permit application unless consent is obtained. Completion of Form 8 – Surface Owner Consent for all identified entities is required

W.S. § 35-11-406(b)(xi-xii), W.S. 35-11-406(m)(viii)

F. APPENDIX A (FOR LANDS WITHIN THE PERMIT AREA)

- a) List of names, in alphabetical order, and last known addresses of:
 - (1) Owners of record of surface rights within permit area
 - (2) Owners of record of mineral rights within permit area
- b) Maps showing
 - (1) Ownership locations identified in a)(1) above
 - (2) Ownership locations identified in a)(2) above.

W.S. § 35-11-406(a)(iv), W.S. § 35-11-406(a)(ix)(A)

G. APPENDIX B (FOR LANDS ADJACENT TO THE PERMIT AREA)

- a) List of names, in alphabetical order, and last known addresses of:
 - (1) Owners of record of surface rights immediately adjacent to the proposed permit area
 - (2) Any other persons within one-half mile having a valid legal estate of record
- b) Map showing
 - (1) Ownership locations identified in a)(1) above

W.S. § 35-11-406(a)(v), W.S. § 35-11-406(a)(ix)(A)

H. APPENDIX C

- a) Identify lands in the proposed permit area utilizing one of the forms below and submit along with a certified surveyor statement:
 - (1) Form C-1 - Appendix C Location of Lands
 - (2) Form C-2 - Appendix C Bearing & Distance – If applicable

- b) In the same manner as a), identify lands within the proposed permit area, for which the applicant does not possess the right to mine, listing the number of acres for each legal subdivision
- c) Identify lands within the proposed permit area which intersect other permit areas. Attach a copy of the land use agreement with the other permittee as part of this application
- d) A United States Geological Survey topographic map, clearly outlining and identifying the lands within the proposed permit area.

W.S. § 35-11-406(a)(vi)(A-D), W.S. § 35-11-406(a)(ix)(C), W.S. § 35-11-406(a)(viii)

I. APPENDIX E (APPENDIX D, DESCRIPTION OF THE LAND IS DETAILED IN SECTION II)

A map or maps based upon public records showing the boundaries of the land to be affected and:

- a) Surrounding immediate drainage area
- b) Location and names, where known, of all roads, railroads, public or private rights-of-way and easements, utility lines, buildings, lakes, streams, creeks, springs, and other surface water courses, oil wells, gas wells, and water wells
- c) Outline of the probable limits of all areas previously disturbed or to be disturbed by underground or surface mining, whether active or inactive, on or immediately adjacent to the proposed permit area.
- d) Names, last known addresses and boundary lines of the present surface landowners and occupants on the adjacent land to be affected
- e) The location, ownership, and uses of all buildings on, or on lands adjacent to, the land to be affected
- f) Any political boundaries of special districts on or near the land to be affected
- g) Electronic permit boundary file

W.S. § 35-11-406(a)(ix)

J. PROOF OF FILING

File a copy of this application for public inspection at the office of the administrator and in the offices of the county clerks of the counties in which the proposed permit area is located. Those parts of the application which contain confidential trade secrets whose disclosure would be harmful to the applicant are exempt from these filings. The County Clerk will provide an affidavit of filing, which must be attached to this section of the application.

W.S. § 35-11-406(d)

K. PROOF OF NOTICE

After the application is determined complete, publish a notice of the filing of the application once each week for two (2) consecutive weeks in a newspaper of general circulation in the locality of the proposed mining site. The newspaper will provide an affidavit of publication, which must be attached to this section of the application.

W.S. § 35-11-406(g)

L. PROOF OF PUBLICATION

Land Quality Division will provide publication notice format. The administrator will provide written notification to the applicant when the application is suitable for publication. Publication should meet the following criteria:

- a) Notice of the application to be published in a newspaper of general circulation in the locality of the proposed mining site once a week for four (4) consecutive weeks commencing within fifteen (15) days after being notified by the administrator.
- b) The notice shall identify:
 - (1) The applicant
 - (2) Location of the operation
 - (3) Proposed dates of commencement and completion of the operation
 - (4) Proposed future use of the affected land
 - (5) Location at which information about the application may be obtained
 - (6) Location and final date for filing objections to the application

- c) Attach proof of notice to final application

W.S. § 35-11-406(j)

M. PROOF OF NOTIFICATION

- a) Applicant shall also mail a copy of the notice within five (5) days after first publication to:

- (1) Surface owners of record of the land within the permit area
- (2) Surface owners of record of immediately adjacent lands
- (3) Surface owners within ½ mile of the proposed mining site

- b) Applicant shall also mail a copy of the Mine Plan map within five (5) days after first publication to:

- (1) The Wyoming Oil and Gas Conservation Commission

- c) Attach a sworn statement of mailing to the final application. Such proof consists of a notarized "Affidavit of Notice," the format for which is included with the Second (Final) Public Notice Format.

W.S. § 35-11-406(j)

N. WRITTEN VERIFICATION OF CITY OR COUNTY (APPROPRIATE ZONING OR PLANNING DEPARTMENT)

If the mining operation will affect new lands, provide written approval for the proposed operation from the appropriate local zoning or planning department. .

O. LISTING OF OTHER PERMITS OR CONSTRUCTION APPROVALS

Provide a listing of activities to be conducted by the applicant which require permits or construction approvals and the status of those permits or construction approvals under the following programs:

- a) Hazardous Waste Management program under RCRA including underground storage tanks and hazardous waste identification number (HW ID); (Wyoming DEQ Solid and Hazardous Waste Division (307) 777-7752) (EPA Region VIII, Denver, Colorado (800) 227-8917)

- b) WYPDES program under the Clean Water Act (CWA) to include point source discharge, storm water discharge (construction surface disturbances and industrial facility), temporary discharges (aquifer testing); (Wyoming DEQ Water Quality Division (307) 777-7781)
- c) Spill Prevention, Control, and Countermeasures Plans for threshold storage of petroleum products; (SPCC - EPA Region VIII, Denver Colorado (800) 227-8917)
- d) Air Quality for stationary internal combustion engines, fugitive dust; Prevention of Significant Deterioration (PSD) program under the Clean Air Act (CAA); and Nonattainment program under the CAA; National Emission Standards for Hazardous Pollutants preconstruction approval under the CAA; (Wyoming DEQ Air Quality Division (307) 777-7391)
- e) Dredge and fill permits under Section 404 of the CWA; (US Army Corp of Engineers, Omaha District, Wyoming Regulatory Office, Cheyenne, Wyoming (307) 772-2300)
- f) Radioactive Materials, U.S. Nuclear Regulatory Commission Source Material License; (NRC Regional Office, Arlington, Texas (817) 860-8100)
- g) Wyoming Dam Safety Program for dams or storage reservoirs above threshold, beneficial use of surface waters of the State, Registration of wells and groundwater rights not associated with stock or domestic water and well registration; (State Engineers Office, Cheyenne, Wyoming (307) 777-6150).
- h) Other relevant environmental permits (such as County – Septic Drainfields).

II. APPENDIX D - DESCRIPTION OF THE LAND

A. APPENDIX D-1 - LAND USE

- a) Identify the major past uses of the proposed permit area and adjacent lands
- b) Identify the major present uses of the proposed permit area and adjacent lands
- c) Rank the previous uses of affected land according to overall economic or social value of the land use to the landowner, community, or area in which these lands are found (may consult with Land Quality Advisory Board regarding ranking)
- d) Provide an aerial photo (hardcopy and electronic copy) of the proposed permit area and adjacent lands.

WyLQD-NC Ch.2 Sec.2(a)(i)(A)

B. APPENDIX D-2 - BRIEF HISTORY OF THE AREA

This section should briefly describe the history of the permit area in context of the regional historic setting. This section may utilize and/or refer to useful elements of the cultural resource inventory for the permit area.

C. APPENDIX D-3 - ARCHAEOLOGICAL AND PALEONTOLOGICAL RESOURCES (SEE GUIDELINE 11, GUIDELINE FOR REPORTING CULTURAL AND PALEONTOLOGICAL RESOURCES WITHIN MINE PERMIT AREAS)

- a) Describe any significant artifacts, fossils, or other articles of cultural, historical, archaeological or paleontological value on the lands to be affected within the permit area.
- b) If professional evaluation of the proposed permit area is recommended by the Administrator, submit the findings of a qualified archaeologist or qualified paleontologist.
- c) Submit results of consultation with Wyoming State Historical Preservation Office

WyLQD-NC Ch.2 Sec.2(a)(i)(J)

D. APPENDIX D-4 - CLIMATOLOGY

This section should address the climatic characteristics of the general permit area. Below are the minimum reporting requirements. If the proposed mine plan includes surface diversion or impoundment structures, a more detailed analysis is required to ensure integrity compliance during specified interval precipitation events. See *WyLQD-NC Ch.3* for additional details.

- a) Document the total estimated annual precipitation near the permit area, either:
 - (1) Estimated from nearest official weather reporting station or
 - (2) If nearest official weather reporting station is greater than 50 miles away, on site precipitation measurement may be required
- b) Document the average wind direction and velocity near the permit, either:
 - (1) Estimated from the nearest official weather station or
 - (2) If nearest official weather reporting station is greater than 50 miles away, on site measurement may be required

W.S. § 35-11-406(a)(vii); WyLQD-NC Ch.2 Sec.2(a)(i)(C-D)

E. APPENDIX D-5 - TOPOGRAPHY, GEOLOGY, AND OVERBURDEN ASSESSMENT (SEE GUIDELINE NO. 1, SOILS AND OVERBURDEN)

This section should provide a comprehensive description of the physical composition and properties of all involved strata, from surface to the total depth of development, consisting of:

- a) Comprehensive description of overburden, to include:
 - (1) Thickness
 - (2) Geologic nature
 - (3) Examination of properties that may influence the mining or reclamation activities
- b) Comprehensive description of topsoil (if any), to include:
 - (1) Thickness and nature of soil

- (2) Soil survey if required by the Administrator
 - (3) Soil analysis if required by the Administrator
- c) Comprehensive description of soil (if any), to include:
 - (1) Thickness, nature and distributions
 - (2) Soil analysis if required by the Administrator
- d) Comprehensive description of mineral seams and alteration zones including all toxic acid forming or radioactive material within and near the mine that constitute a threat of pollution to surface or ground water, to include:
 - (1) Depth, thickness, orientation and type of rock
 - (2) Map
 - (3) Geologic cross-section
- e) Provide the following information related to drillholes within the proposed permit area:
 - (1) Comprehensive list of all known drillholes in the proposed permit area
 - (2) Drillhole location map
 - (3) For all drillholes used to construct the hydrogeologic cross-sections provide:
 - i. Electronic copies of drillers' logs
 - ii. Electronic copies of geophysical logs
- f) Premining slope condition map
- g) Analytical results from any required sampling
- h) Discussion of regional and local seismology

- i) Professional Geologist or Professional Engineer certification of interpretations

W.S. § 35-11-406(a)(vii); WYLQD-NC Ch.2 Sec.2(a)(i)(F)(I); WYLQD-NC Ch.2 Sec.2(a)(i)(F)(IV); WYLQD-NC Ch.2 Sec.2(a)(i)(F)(IV)

F. APPENDIX D-6 - HYDROLOGY (SEE GUIDELINE NO. 8, HYDROLOGY)

The following hydrologic information should be included in the application.

- a) Regarding surface water in and adjacent to the proposed permit area,
 - (1) List and describe name and location of rivers, creeks, lakes, reservoirs, springs, and marshes in addition to any other identifiable surface water features
 - (2) Classify streams as ephemeral, intermittent, or perennial
 - (3) Describe the immediate drainage area which includes the permit area
 - (4) Classify surface water use as domestic, municipal, industrial, agricultural or wildlife
 - (5) Present a surface water baseline monitoring plan
 - (6) Discuss the results of the baseline surface water quality monitoring , including sediment loading
 - (7) Complete surface water runoff estimates
 - (8) Calculate the pre-mining water budget
- b) Regarding groundwater down to and including the strata immediately below the lowest mineral seam to be mined, provide the following information:
 - (1) List by name and owner all wells on the proposed permit area and adjacent lands including wells filed with the State Engineers Office within 3 miles of the proposed permit area
 - (2) Display the wells listed in (1) on a map.
 - (3) Design and implement a plan for determining baseline groundwater quality and quantity

- (4) Present a discussion of the results of the groundwater monitoring and drilling programs, including depth, quantity, and quality of groundwater
- (5) Produce potentiometric maps for each aquifer likely to be affected by mining operations,
- (6) Provide a comprehensive description of the properties and characteristics of the potentially affected aquifers

c) Water rights

- (1) List by name and owner all known adjudicated and permitted water rights on the proposed permit area and adjacent lands
- (2) Provide a map depicting location of all identified water rights
- (3) Conduct a water level survey of identified wells if required by the Administrator

d) Professional Geologist or Professional Engineer certification of interpretations

W.S. § 35-11-406(a)(vii); W.S. § 35-11-406(a)(ix); WYLQD-NC Ch.2 Sec.2(a)(i)(G)(I-II); WYLQD-NC Ch.2 Sec.2(a)(i)(H); WYLQD-NC Ch.2 Sec.2(a)(i)(I)(I); WYLQD-NC Ch.2 Sec.2(b)(iii)(D)

G. APPENDIX D-7 - SOIL ASSESSMENT (SEE GUIDELINE 1, SOILS)

Provide soils assessment information as outlined in guideline 1 for soils.

- a) Comprehensive description of topsoil – If any
- b) Soil map
- c) Soil survey – If required by the Administrator
- d) Soil analysis – If required by the Administrator
- e) Comprehensive description of subsoil
- f) Subsoil analysis – If required by the Administrator

W.S. § 35-11-406(a)(vii); WYLQD-NC Ch.2 Sec.2(a)(i)(F)(II); WYLQD-NC Ch.2 Sec.2(a)(i)(F)(III); WYLQD-NC Ch.2 Sec.2(a)(i)(F)(III); W.S. § 35-11-406(a)(vii); WYLQD-NC Ch.2 Sec.2(a)(i)(F)(III); WYLQD-NC Ch.2 Sec.2(a)(i)(F)(III)

H. APPENDIX D-8 - VEGETATION INVENTORY (SEE GUIDELINE 2, VEGETATION)

A survey of vegetative cover and species diversity on the proposed affected land determined by scientifically acceptable sampling procedures, as described in Guideline 2, Vegetation.

- a) Predominating species
 - (1) Grasses, forbs, trees and shrubs
 - i. Common names
 - ii. Scientific names
 - iii. Estimated abundance within the proposed permit area
 - iv. Estimated range of heights and diameters of trees
 - (2) Noxious weeds listed by the local weed and pest control district, if any, and provide
 - i. Common names
 - ii. Scientific names
 - iii. Estimated abundance
 - (3) Identify State or Federally listed endangered or threatened plant species known to exist within the permit area or in adjacent areas, if any, and provide
 - i. Description of species location
 - ii. Evaluation of potential habitats within or adjacent to the permit area
- b) Vegetation Map
- c) Vegetation Area Acreage Table
- d) Raw Data

W.S. § 35-11-406(a)(vii);WyLQD-NC Ch.2 Sec.2(a)(i)(B)

I. APPENDIX D-9 – WILDLIFE (SEE GUIDELINE 5, WILDLIFE)

The following information should be included:

- a) Identify indigenous vertebrate wildlife species (including aquatic species) by both scientific and common names, noting the presence of wildlife on or adjacent to the proposed permit area which are listed on the Threatened or Endangered Species List.

- b) Actual and potential fauna distribution map
- c) Results of consultation with Wyoming Game and Fish Department
- d) Results of consultation with United States Fish and Wildlife Service

W.S. § 35-11-406(a)(vii), WyLQD-NC Ch.2 Sec.2(a)(i)(E)(I); WyLQD-NC Ch.2 Sec.1(f)

J. APPENDIX D-10 – WETLANDS

Regional and permit area wetlands inventory in consultation with US Army Corps of Engineers. Appendix D-10 must contain copies of wetland delineation, descriptions, of proposed disturbances, and mitigation information.

The following information should be included:

- a) Provide a copy of National Wetlands Inventory (NWI) map, with permit area and mining areas delineated.
- b) If potential wetlands do not exist in permit area, no further information is required.
- c) If potential wetlands exist in the permit area, identify each wetland type and provide a brief description of each wetland type. No further information is required if the wetland is not within the areas to be disturbed by mining or mining-related activity.

If potential wetlands exist within areas to be disturbed by mining or mining-related activity, contact with the United States Army Corps Of Engineers (USACE) is required (copies of correspondence must be included with Appendix D-10). A more detailed ground investigation and field delineation of wetlands may be required. A mitigation plan for replacement of wetlands should be included in the reclamation plan if wetlands mitigation is required by USACE.

K. APPENDIX D-11 - PREMINING RADIOLOGICAL ASSESSMENT

- a) Natural radioactive background.
 - (1) Description of methods.
 - (2) Background results for lands to be affected.

- b) Overburden radiochemistry. Discussions of sampling methodology and presentation of analytical results should be included in Appendix "D-5" and cross referenced here.
- c) Summary of results.

For guidance on conducting this survey, please refer to the Nuclear Regulatory Commission guidance documents Regulatory Guide 4.14, Revision 1, Radiological Effluent and Environmental Monitoring at Uranium Mills Revision 1, NUREG-5849, Manual for Conducting Radiological Surveys in Support of License Termination, and NUREG-1575, Multiagency Radiation Survey and Site Investigation Manual.

WyLQD Guideline 3

III. MINE PLAN

This section covers information related to proposed mining methods and schedules, tailings piles construction and maintenance, heap leach facilities construction and maintenance, topsoil salvage and protection, wildlife monitoring and protection, and surface and groundwater monitoring.

A. GENERAL DESCRIPTION OF MINING OPERATION

- a) A description of the mining operation proposed to be conducted during the life of the mine, including
 - (1) Type of mine
 - (2) Method of mining
 - (3) Acreage to be affected annually
 - (4) Overburden removal
 - (5) Overburden transportation
 - (6) Mineral removal
 - (7) Mineral transportation
 - (8) Anticipated annual production by tonnage
 - (9) Anticipated total production by tonnage
 - (10) Major equipment to be used for all aspects of the operations

WyLQD-NC Ch.2 Sec.2(b)(i)(A); WyLQD-NC Ch.2 Sec.2(a)(i)(F)(IV)

B. MINING METHOD AND SCHEDULE

- a) Comprehensive life of mine facility design map or maps which show the estimated orderly progression of mining on all proposed affected lands as well as other specific features delineated in W.S. § 35-11-406(b)(v)
- b) Auger location map – If applicable
- c) Discussion of delineation and developmental drilling within the permit area.

- d) Topsoil and Subsoil Handling Plan including removal, storage, protection, and replacement; and a plan for handling and disposal of all toxic, acid-forming, or otherwise hazardous materials
 - (1) Description, to include capacity, a location map and, where appropriate, typical topographic profiles of the:
 - i. Facility area
 - ii. Mine mineral stockpiles
 - iii. Spoil piles
 - iv. Topsoil stockpiles
 - v. Subsoil stockpiles
- e) Spoil handling and stockpiling plan
- f) Plans for segregation of spoil and waste rock from contact with surface water if the spoil or waste rock is potentially toxic or acid forming.
- g) Description of all roads (except exempted roads), other transportation facilities, shipping areas and rights-of-way to be built or utilized during the operation
 - (1) Classify all roads as either a haul road, access road, or light-use road
 - (2) Transportation maps and cross-sections – If appropriate
 - (3) If the operator does not possess mineral rights or the right to mine for the area described in this section, include a separate subsection in Appendix C with the surface owner and legal land description for any lands within the permit area which fit this criteria
- h) Plan to mine reserves if anticipated
- i) Blasting Plan
- j) Onsite ore processing procedures and designs
- k) Process facilities monitoring plan
- l) Spill protection and remediation plan

WyLQD-NC Ch.2 Sec.2(b)(iii)(A); WyLQD-NC Ch.2 Sec.2(b)(iii)(G); WyLQD-NC Ch.3 Sec.2(k)(ii)(A)(II)

C. MINING HYDROLOGY (SEE GUIDELINE NO. 8)

- a) Water budget (anticipated during mining and anticipated post mining)

- b) For any historic workings that may have interaction with ground/surface water, provide:
 - (1) Map of identified workings
 - (2) Characterization of the potential interactions
 - (3) Mitigation plans.
- c) Surface drainage plans
 - (1) Description of the proposed surface water diversion systems.
 - (2) Surface drainage plan maps, including any ponds or impoundments.
 - (3) Surface drainage plan cross-sections
- d) Groundwater discharge characterization
 - (1) Estimated quality of discharge water
 - (2) Estimated discharge schedule and quantity of groundwater discharge
 - (3) Include reference to methods, calculations and values used to arrive at estimates
- e) Plans for use and storage of waters extracted during mining
- f) Surface water monitoring plan – If required by the Administrator
 - (1) Description of monitoring sites
 - (2) Detail of monitoring site construction
 - (3) Maintenance plan
 - (4) Removal plan – if necessary
- g) Groundwater monitoring plan – If required by the Administrator
 - (1) Description of monitoring well locations
 - (2) Details of monitoring well construction

- (3) Maintenance plan
 - (4) Abandonment plan – if necessary
- h) Predicted water quality during mining (focusing on acid rock drainage)
- i) Predicted water quality post mining (predictions using appropriate geochemical and flow modeling should be included)
- j) Potential Impacts
 - (1) Describe potential impacts to water resources from mining activities
 - (2) Describe measures to mitigate said impacts
 - (3) Describe and provide designs for all planned ponds and impoundments
 - (4) Attach copies of Wyoming State Engineers Office permits
- k) Water management plan
- l) Treatment and processing system design(s)
- m) If water supply mitigation is required, provide the plan here

*WyLQD-NC Ch.2 Sec.2(b)(iii)(D); WyLQD-NC Ch.3 Sec.2(e-f); WyLQD-NC Ch.3 Sec.2(h)(i)
WyLQD-NC Ch.2 Sec.2(b)(iii)(E)(V)*

D. REFUSE DISPOSAL

- a) Industrial solid wastes
 - (1) Management plan for industrial solid wastes generated by the operation
 - (2) Disposal plan for industrial solid wastes generated by the operation

WyLQD-NC Ch.2 Sec.2(b)(iii)(I)

E. PUBLIC NUISANCE AND SAFETY

- a) Describe the procedures proposed to avoid constituting a public nuisance, endangering the public safety, human or animal life, property, wildlife and plant life in or adjacent to the permit area including a program of fencing all

stockpiles, roadways, pits and refuse or waste areas to protect the surface owner 's ongoing operations.

- b) Dust management plan
- c) When affecting lands within 300 feet of an existing occupied dwelling, home, public building, church, community or institutional building, park or cemetery, see Section I D.
- d) LQD recommends including hours and seasons of operations, routes of haulage, access routes, and estimated truck and vehicle traffic per route.

W.S. § 35-11-406(b)(xiii)

F. MILL AND TAILINGS DISPOSAL SYSTEM

Provide the following mill construction plans and details:

- a) Best available technology assurance plan for design, construction, operation, monitoring, maintenance and reclamation of any tailings impoundments, tailings disposal areas, heap leaching facilities or spent ore disposal areas
- b) Geologic cross section of tailings disposal site
- c) Wyoming State Engineer approved construction specifications of tailings disposal system
- d) Wyoming State Engineer's Office impoundment permit – If applicable
- e) Geologic cross section(s) of heap leach site construction
- f) Monitoring plan map

WyLQD-NC Ch.2 Sec.2(b)(iii)(F); WyLQD-NC Ch.3 Sec.2(h)(i); WyLQD-NC Ch.3 Sec.2(h)(i)

G. COMPLIANCE DOCUMENTATION

- a) Summary of all monitoring and reporting commitments:
- b) Signs and Markers

IV. RECLAMATION PLAN

Post-mine land uses, revegetation practices, tailings reclamation, heap leach facilities reclamation, pit wall stabilization, post-mine impoundment designs (See Guideline 17), surface and groundwater restoration methods employing best practicable technology, reclamation success criteria and monitoring of reclamation success.

A. POSTMINING LAND USES

- a) Identify the present use(s) of the land to be affected
- b) Identify the proposed use of the land to be affected after reclamation.
- c) Provide a postmining land use map – If applicable

W.S. § 35-11-406(b)(i); WyLQD-NC Ch.2 Sec.2(b)(iii); WyLQD-NC Ch. Sec.2(a)

B. CONTOURING PLAN FOR AFFECTED LANDS

Compose a plan for backfilling, grading, and contouring of all affected land. The plan must include the following:

- a) Postmining surface contour map
- b) Proposed post reclamation contour map showing the final surface configuration of the affected lands. This map should demonstrate that the slopes of the reclaimed land surface do not exceed the approximate premining slopes
- c) Terrace or bench design diagrams – If applicable, these diagrams shall include dimension and design of the terraces, check dams, any erosion prevention techniques and slopes of the terraces and their interval
- d) Detail procedures for assuring the stability of the reclaimed land

W.S. § 35-11-406(b)(ii), WyLQD-NC Ch.2 Sec.2(b)(iii)(B)(I); WyLQD-NC Ch.2 Sec.2(b)(iii)(B)(I) ; W.S. § 35-11-406(a)(vii); WyLQD-NC Ch.2 Sec.2(b)(iii)(B)(II) ; WyLQD-NC Ch.2 Sec.2(b)(iii)(B)(V)

C. SURFACE PREPARATION FOR TOPSOIL OR SUBSOIL REPLACEMENT

- a) Replacement plan
 - (1) Explain procedure for replacing soils during reclamation

- (2) Identify the thickness of the soil to be replaced
 - (3) Explain what procedures will be followed to protect the replaced soil until vegetation is adequately established.
- b) Plan for treatment and disposal of potential hazardous materials
 - c) Location map of plan features identifying:
 - (1) Capacity of each stockpile shown and described
 - d) Topographic profiles of plan features
 - e) Map of final completed reclamation of acid rock drainage material storage

W.S. § 35-11-406(a)(viii), WYLQD-NC Ch.2 Sec.2(b)(iii)(A); W.S. § 35-11-406(a)(ix), WYLQD-NC Ch.2 Sec.2(b)(iii)(A); WYLQD-NC Ch.2 Sec.2(b)(iii)(A); WYLQD-NC Ch.2 Sec.2(b)(iii)(A)

D. REVEGETATION PRACTICES (SEE GUIDELINE NO. 2)

- a) Revegetation plan should include:
 - (1) Species of vegetation
 - (2) Other surface treatments
 - (3) Methodology
 - (4) Schedule to include
 - i. Seeding times
 - ii. Seeding rates
 - (5) Erosion control techniques
- b) Results of consultation with and incorporation of guidance from Wyoming Department of Agriculture and other state and federal agencies, as required.
- c) Revegetation plan map

W.S. § 35-11-406(b)(iii), WYLQD-NC Ch.2 Sec.2(b)(iii)(C); WYLQD-NC Ch.2 Sec.2(b)(iii)(C)

E. FINAL HYDROLOGIC RESTORATION

- a) Provide a stream channel reclamation plan demonstrating effective control of erosion, siltation, and pollution of affected stream channels and stream banks by the mining operations;
- b) Show a final drainage system map for the reclaimed land surface demonstrating that no pollution is allowed to drain untreated into surface or subsurface water in accordance with state or federal water quality standards, whichever are higher, as may be required in the approved reclamation plan
- c) Plan for the reclamation of open pit mines, solution ponds and other structures/area used during mining
- d) Provide an aquifer reconstruction and restoration plan
- e) Postmining monitoring map – If applicable
- f) Final anticipated piezometric surface(s) and post mining water quality – If applicable
- g) Wetlands mitigation map – If applicable
- h) If permanent impoundments are proposed, provide
 - (1) Landowner consent of the proposed permanent impoundment
 - (2) Description of the proposed use of proposed impoundment post reclamation
 - (3) Report on the source, quantity and quality of the water available for impoundment and a statement regarding its suitability for recreational, irrigation, livestock or wildlife watering
 - (4) Map showing slope conditions around the impoundment and anticipated high and low postmining water levels
 - (5) Geologic cross section showing slope conditions around the impoundment and anticipated high and low postmining water levels
 - (6) Description of design and control techniques that will be implemented to comply with water quality and quantity requirements

- i) Results of consultation with Wyoming Game and Fish Department and other state and federal agencies, as required.

W.S. § 35-11-406(b)(xv); WyLQD-NC Ch.2 Sec.2(b)(iii)(B)(III); WyLQD-NC Ch.2 Sec.2(b)(iii)(E)(I); WyLQD-NC Ch.2 Sec.2(b)(iii)(E)(III); WyLQD-NC Ch.3 Sec.2(f)(ii)

F. SPECIAL RECLAMATION STANDARDS

Provide discussion of any special reclamation standards required.

G. DECOMMISSIONING, STABILIZATION, AND RECLAMATION OF MILL SITE AND TAILINGS DISPOSAL SYSTEM

- a) Provide the plan for restoration of topsoil and vegetation at site
- b) Describe how the best technology currently available will be used to ensure long term stability, prevent contamination of surface or groundwater and facilitate the approved postmining land uses.
- c) If typical restoration procedures are not feasible for the proposed site, justify and provide an alternate proposal

WyLQD-NC Ch. 2, Section 2(b)(iii)(F), Chapter 3, Section 2(h)

H. SITE PROTECTION MANAGEMENT PLAN

Present discussion and plan for the protection of the site during and after site reclamation.

I. RECLAMATION SCHEDULE - ANNUAL PROGRESS OF RECLAMATION IN ACCORDANCE WITH MINE SEQUENCE MAP

- a) Concurrent reclamation timeline – Please provide a schedule for each major step in the reclamation which coordinates the reclamation plan with the mining plan in such a manner so as to facilitate reclamation at the earliest possible time consistent with Chapter 3, Section 2(k) and the orderly development of the mining property.
- b) Reclamation sequence map showing the estimated orderly progression of mining and reclamation on all proposed affected lands
- c) Method of disposal of buildings and structures erected during the operation

- d) Liquid waste treatment and disposal plan
- e) Written request of landowner (or other entity) to leave road unreclaimed – If applicable
- f) Written consent of landowner to leave buildings or facilities intact – If applicable

W.S. § 35-11-406(b)(xix); W.S. § 35-11-406(b)(v); W.S. § 35-11-406(b)(iv); WYLQD-NC Ch.2 Sec.2(b)(i-iii); WYLQD-NC Ch.3 Sec.2(i)(vii); WYLQD-NC Ch.3 Sec.2(j)(ii)

J. RECLAMATION COSTS (SEE GUIDELINE 12)

Detailed itemized cost estimate for completion of site reclamation in accordance with the reclamation plan computed according to established engineering methods

W.S. § 35-11-406(b)(vi)

K. RESULTS OF CONSULTATION WITH THE LOCAL CONSERVATION DISTRICT – IF PURSUED

Detail the results of consultation with the local conservation district with regards to reclamation.

WYLQD-NC Ch. 2, Sec. 1(e)

V. REFERENCE GUIDELINE

ADJUDICATION

A. FORM 1

W.S. § 35-11-406
 W.S. § 35-11-406(a)(xii)
 W.S. § 35-11-406(a)(ii-iii)

B. FORM 3

W.S. § 35-11-410(B)
 W.S. § 35-11-410(B)(II)
 W.S. § 35-11-410(B)(VI)

C. RECLAMATION BOND

W.S. § 35-11-401(E)(VII)
 W.S. § 35-11-417(C)(I)
 W.S. § 35-11-416(A)
 W.S. § 35-11-417(B)
 W.S. § 35-11-418
 WYLQD-NC CH.6 SEC.2(A)
 W.S. § 35-11-410(C)
 W.S. § 35-11-401(E)(VII)
 W.S. § 35-11-410(C)
 W.S. § 35-11-416(A)
 W.S. § 35-11-417(C)(I)
 W.S. § 35-11-418
 WYLQD-NC CH.6 SEC.2(A)

D. CERTIFICATE OF PUBLIC LIABILITY INSURANCE

W.S. § 35-11-406(a)(xiii)

E. LANDOWNER CONSENT

W.S. § 35-11-406(b)(xi-xii), W.S. 35-11-406(m)(viii)

F. APPENDIX A (FOR LANDS WITHIN THE PERMIT AREA).

W.S. § 35-11-406(a)(iv)
 W.S. § 35-11-406(a)(ix)(A)

G. APPENDIX B (FOR LANDS ADJACENT TO THE PERMIT AREA)

W.S. § 35-11-406(a)(v)
W.S. § 35-11-406(a)(ix)(A)

H. APPENDIX C

W.S. § 35-11-406(a)(vi)(A-D)
W.S. § 35-11-406(a)(ix)(C)
W.S. § 35-11-406(a)(viii)

I. APPENDIX E (APPENDIX D, DESCRIPTION OF THE LAND IS DETAILED IN SECTION II)

W.S. § 35-11-406(a)(ix)

J. PROOF OF FILING

W.S. § 35-11-406(d)

K. PROOF OF NOTICE

W.S. § 35-11-406(g)

L. PROOF OF PUBLICATION

W.S. § 35-11-406(j)

M. PROOF OF NOTIFICATION

W.S. § 35-11-406(j)

N. WRITTEN VERIFICATION OF CITY OR COUNTY (APPROPRIATE ZONING OR PLANNING DEPARTMENT)

WyLQD Guideline 4

O. LISTING OF OTHER PERMITS OR CONSTRUCTION APPROVALS

- Wyoming DEQ Solid and Hazardous Waste Division (307) 777-7752)
- EPA Region VIII, Denver, Colorado (800) 227-8917
- Wyoming DEQ Water Quality Division (307) 777-7781
- EPA Region VIII, Denver Colorado (800) 227-8917
- Wyoming DEQ Air Quality Division (307) 777-7391

- US Army Corp of Engineers, Omaha District, Wyoming Regulatory Office, Cheyenne, Wyoming (307) 772-2300
- Radioactive Materials, U.S. Nuclear Regulatory Commission Source Material License; (NRC Regional Office, Arlington, Texas (817) 860-8100
- State Engineers Office, Cheyenne, Wyoming (307) 777-6150)

APPENDIX D - DESCRIPTION OF THE LAND

A. APPENDIX D-1 - LAND USE

WyLQD-NC Ch.2 Sec.2(a)(i)(A)

B. APPENDIX D-3 - ARCHAEOLOGICAL AND PALEONTOLOGICAL RESOURCES (SEE GUIDELINE 11, GUIDELINE FOR REPORTING CULTURAL AND PALEONTOLOGICAL RESOURCES WITHIN MINE PERMIT AREAS)

WyLQD-NC Ch.2 Sec.2(a)(i)(J)

C. APPENDIX D-4 - CLIMATOLOGY

W.S. § 35-11-406(a)(vii)
WyLQD-NC Ch.2 Sec.2(a)(i)(C-D)

D. APPENDIX D-5 - TOPOGRAPHY, GEOLOGY, AND OVERBURDEN ASSESSMENT (SEE GUIDELINE NO. 1, SOILS AND OVERBURDEN)

W.S. § 35-11-406(a)(vii)
WyLQD-NC Ch.2 Sec.2(a)(i)(F)(I)
WyLQD-NC Ch.2 Sec.2(a)(i)(F)(IV)

E. APPENDIX D-6 - HYDROLOGY (SEE GUIDELINE NO. 8, HYDROLOGY)

W.S. § 35-11-406(a)(vii)
W.S. § 35-11-406(a)(ix)
WyLQD-NC Ch.2 Sec.2(a)(i)(G)(I-II)
WyLQD-NC Ch.2 Sec.2(a)(i)(H)
WyLQD-NC Ch.2 Sec.2(a)(i)(I)(I)
WyLQD-NC Ch.2 Sec.2(b)(iii)(D)

F. APPENDIX D-7 - SOIL ASSESSMENT (SEE GUIDELINE 1, SOILS)

W.S. § 35-11-406(a)(vii)
 WyLQD-NC Ch.2 Sec.2(a)(i)(F)(II)
 WyLQD-NC Ch.2 Sec.2(a)(i)(F)(II)
 WyLQD-NC Ch.2 Sec.2(a)(i)(F)(II)
 W.S. § 35-11-406(a)(vii)
 WyLQD-NC Ch.2 Sec.2(a)(i)(F)(III)
 WyLQD-NC Ch.2 Sec.2(a)(i)(F)(III)

G. APPENDIX D-8 - VEGETATION INVENTORY (SEE GUIDELINE 2, VEGETATION)

W.S. § 35-11-406(a)(vii)
 WyLQD-NC Ch.2 Sec.2(a)(i)(B)

H. APPENDIX D-9 – WILDLIFE (SEE GUIDELINE 5, WILDLIFE)

W.S. § 35-11-406(a)(vii)
 WyLQD-NC Ch.2 Sec.2(a)(i)(E)(I); WyLQD-NC Ch.2 Sec.1(f)

I. APPENDIX D-10 – WETLANDS

J. APPENDIX D-11 - PREMINING RADIOLOGICAL ASSESSMENT

WyLQD Guideline 3

MINE PLAN

A. GENERAL DESCRIPTION OF MINING OPERATION

WyLQD-NC Ch.2 Sec.2(b)(i)(A)
 WyLQD-NC Ch.2 Sec.2(a)(i)(F)(IV)

B. MINING METHOD AND SCHEDULE

WyLQD-NC Ch.2 Sec.2(b)(iii)(A)
 WyLQD-NC Ch.2 Sec.2(b)(iii)(G)
 WyLQD-NC Ch.3 Sec.2(k)(ii)(A)(II)

C. MINING HYDROLOGY (SEE GUIDELINE NO. 8)

WyLQD-NC Ch.2 Sec.2(b)(iii)(D)
 WyLQD-NC Ch.3 Sec.2(e-f)
 WyLQD-NC Ch.3 Sec.2(h)(i)
 WyLQD-NC Ch.2 Sec.2(b)(iii)(E)(V)

D. REFUSE DISPOSAL

WyLQD-NC Ch.2 Sec.2(b)(iii)(I)

E. PUBLIC NUISANCE AND SAFETY

W.S. § 35-11-406(b)(xiii)

F. MILL AND TAILINGS DISPOSAL SYSTEM

WyLQD-NC Ch.2 Sec.2(b)(iii)(F)
 WyLQD-NC Ch.3 Sec.2(h)(i); WyLQD-NC Ch.3 Sec.2(h)(i)

G. COMPLIANCE DOCUMENTATION

RECLAMATION PLAN

A. POSTMINING LAND USES

W.S. § 35-11-406(b)(i); WyLQD-NC Ch.2 Sec.2(b)(iii); WyLQD-NC Ch. Sec.2(a)

B. CONTOURING PLAN FOR AFFECTED LANDS

W.S. § 35-11-406(b)(ii)
 WyLQD-NC Ch.2 Sec.2(b)(iii)(B)(I)
 WyLQD-NC Ch.2 Sec.2(b)(iii)(B)(I)
 W.S. § 35-11-406(a)(vii)
 WyLQD-NC Ch.2 Sec.2(b)(iii)(B)(II)
 WyLQD-NC Ch.2 Sec.2(b)(iii)(B)(V)

C. SURFACE PREPARATION FOR TOPSOIL OR SUBSOIL REPLACEMENT

W.S. § 35-11-406(a)(viii)
 WyLQD-NC Ch.2 Sec.2(b)(iii)(A)
 W.S. § 35-11-406(a)(ix)
 WyLQD-NC Ch.2 Sec.2(b)(iii)(A)

WyLQD-NC Ch.2 Sec.2(b)(iii)(A)
 WyLQD-NC Ch.2 Sec.2(b)(iii)(A)

D. REVEGETATION PRACTICES (SEE GUIDELINE NO. 2)

W.S. § 35-11-406(b)(iii)
 WyLQD-NC Ch.2 Sec.2(b)(iii)(C)
 WyLQD-NC Ch.2 Sec.2(b)(iii)(C)

E. FINAL HYDROLOGIC RESTORATION

W.S. § 35-11-406(b)(xv)
 WyLQD-NC Ch.2 Sec.2(b)(iii)(B)(III)
 WyLQD-NC Ch.2 Sec.2(b)(iii)(E)(I)
 WyLQD-NC Ch.2 Sec.2(b)(iii)(E)(III)
 WyLQD-NC Ch.3 Sec.2(f)(ii)

F. SPECIAL RECLAMATION STANDARDS

G. DECOMMISSIONING, STABILIZATION, AND RECLAMATION OF MILL SITE AND TAILINGS DISPOSAL SYSTEM

WyLQD-NC Ch. 2, Section 2(b)(iii)(F), Chapter 3, Section 2(h)

H. SITE PROTECTION MANAGEMENT PLAN

I. RECLAMATION SCHEDULE - ANNUAL PROGRESS OF RECLAMATION IN ACCORDANCE WITH MINE SEQUENCE MAP

W.S. § 35-11-406(b)(xix)
 W.S. § 35-11-406(b)(v)
 W.S. § 35-11-406(b)(iv)
 WyLQD-NC Ch.2 Sec.2(b)(i-iii)
 WyLQD-NC Ch.3 Sec.2(i)(vii)
 WyLQD-NC Ch.3 Sec.2(j)(ii)

J. RECLAMATION COSTS (SEE GUIDELINE 12)

W.S. § 35-11-406(b)(vi)

K. RESULTS OF CONSULTATION WITH THE LOCAL CONSERVATION DISTRICT – IF PURSUED

WyLQD-NC Ch. 2, Sec.1(e)



LARAMIE COUNTY PLANNING AND DEVELOPMENT OFFICE

CONDITIONAL USE PERMIT C PERMIT

3966 ARCHER PKWY
CHEYENNE, WY 82009 (307) 633-4303
www.laramiecountywy.gov planning@laramiecountywy.gov

PERMIT NUMBER: **PZ-26-00011**
ISSUED DATE: 05/04/2026
EXPIRATION DATE: **N/A**

PARCEL NUMBER: 17690610000100
SUBDIVISION: UNPLATTED
Legal Description: 17-69: ALL SEC 6 AND 7; N1/2 SEC 18: 17-70: ALL SECS 1, 2 AND 3; N1/2, SE1/4, E1/2 SW1/4 SEC 4; E1/2 SEC 11; ALL SECS 12; SEC 13, LESS (BK 1283 PG 818) POR WEST OF RD 211; SEC 13; N1/2 NE1/4, POR S1/2 N1/2, S1/2 (BK 1283 PG 433) SEC 14: 18-69: S1/

**3380 HORSE CREEK RD
Cheyenne, WY 82009**

PROJECT: THE PURPOSE OF THIS PROJECT IS TO MINE AGGREGATE FROM THE GRANITE IN THE NORTH HILL AND SOUTH HILL'S ON THE FOLLOWING PARCELS: 176961000100, 18700530000200 AND 18691910000200 ON THE FARTHING RANCH COMPANY'S PROPERTY IN LARAMIE COUNTY. THE MINED GRANITE WILL BE CRUSHED AND PROCESSED ONSITE, THEN HAULED (VIA TRUCK) VIA HWY 211 TO CHEYENNE AND NORTHERN COLORADO. CURRENTLY, THE ABOVE-DESCRIBED MINING IS OCCURRING VIA A LIMITED MINING OPERATION (LMO) ISSUED BY THE WYOMING DEPARTMENT OF ENVIRONMENTAL QUALITY, LAND QUALITY DIVISION. THE CURRENTLY APPROVED LMO IS #1696. THE PROJECT OWNER, L.G. EVERIST, INC., IS IN THE PROCESS OF CONVERTING LMO #1696 INTO A LARGE MINE PERMIT. THE LMO AUTHORIZES A MAXIMUM DISTURBANCE OF 15 ACRES. THE FORTHCOMING LARGE MINE PERMIT APPLICATION WILL AFFECT UP TO 400 ACRES OVER THE LIFE-OF-MINE, WHICH IS EXPECTED TO BE 62 YEARS.

	<u>NAME</u>	<u>ADDRESS</u>	<u>PHONE/EMAIL</u>
APPLICANT:	Bautz, Melissa	7321 E. 88TH AVE., SUITE 200 HENDERSON, CO 80640	307-330-7629 mbautz@brierleyassociates.com
OWNER:	FARTHING RANCH COMPANY	228 ROAD 237 CHEYENNE, WY 82009	307-632-7097 FARTHINGRANCH@AOL.COM

FEE SUMMARY:

Conditional Use C	\$750.00
Legal Ad Fee	\$55.01
Mailing Fee	\$7.78
P&D Engineer Review Fee	\$325.00
Public Notice Sign Fee	\$26.00
Recording Fee	\$12.00
TOTAL FEES PAID:	\$1,175.79

CONDITIONS

1. A conditional use is given to a land use meant to be beneficial to the permitted uses within a zoning district with conditions; or it requires conditions to mitigate impacts it may have on the surrounding area to uphold public health, safety and general welfare. Every listed land use which is a conditional use has probable impacts and is required to meet all conditions contained within these regulations.

PRINTED NAME: Melissa Bautz
APPROVED BY: Sonny Pourchot

DATE ISSUED: 05/04/2026

RESOLUTION # _____

A RESOLUTION FOR A REVISED COMMERCIAL SITE PLAN FOR “HORSE CREEK ROCK QUARRY EXPANSION”, LOCATED IN A PORTION OF LAND SITUATED IN THE E ½ SECTION 31, SECTION 32, T18N, R70W, AND SECTION 5 AND 6, T17N, R70W, OF THE 6TH P.M., LARAMIE COUNTY, WY

WHEREAS, Wyoming State Statutes §18-5-201 to 18-5-208; §18-5-301 to 18-5-315 authorize Laramie County, in promoting the public health, safety, morals and general welfare of the county, to regulate the use of land through zoning in unincorporated Laramie County; and

WHEREAS, the Laramie County Board of Commissioners have adopted the 2025 Laramie County Land Use Regulations; and

WHEREAS, this application meets the criteria for revised commercial site plan pursuant to section 3-1-109(h) of the 2025 Laramie County Land Use Regulations; and

WHEREAS, this application meets the criteria for quarries pursuant to section 3-1-112(c) of the 2025 Laramie County Land Use Regulations; and

WHEREAS, this application is in conformance with section 2-4-104 of the 2025 Laramie County Land Use Regulations governing the LU – Land Use Zone District.

NOW THEREFORE BE IT RESOLVED BY THE LARAMIE COUNTY BOARD OF COUNTY COMMISSIONERS, as follows:

The Laramie County Board of Commissioner’s finds that:

- a. This application meets the criteria for revised commercial site plan pursuant to section 3-1-109(h) of the 2025 Laramie County Land Use Regulations.
- b. This application is in conformance with section 2-4-104 of the 2025 Laramie County Land Use Regulations governing the LU – Land Use Zone District.

FUTHERMORE, the Board approves the Revised Commercial Site Plan for the Horse Creek Rock Quarry Expansion, located in a portion of land being situated in the E ½ Section 31, Section 32, T18N, R70W, and Section 5 and 6, T17N, R70W, Laramie County, WY, with the following conditions:

- 1) The applicant will comply with and provide a copy of the approved Department of Environmental Quality Land Quality Division permit.
- 2) The applicant will comply with all WYDOT recommendations.

PRESENTED, READ, AND ADOPTED, this _____ day of _____, 2026.

LARAMIE COUNTY BOARD OF COMMISSIONER’S

Gunnar Malm, Chairman

ATTEST:

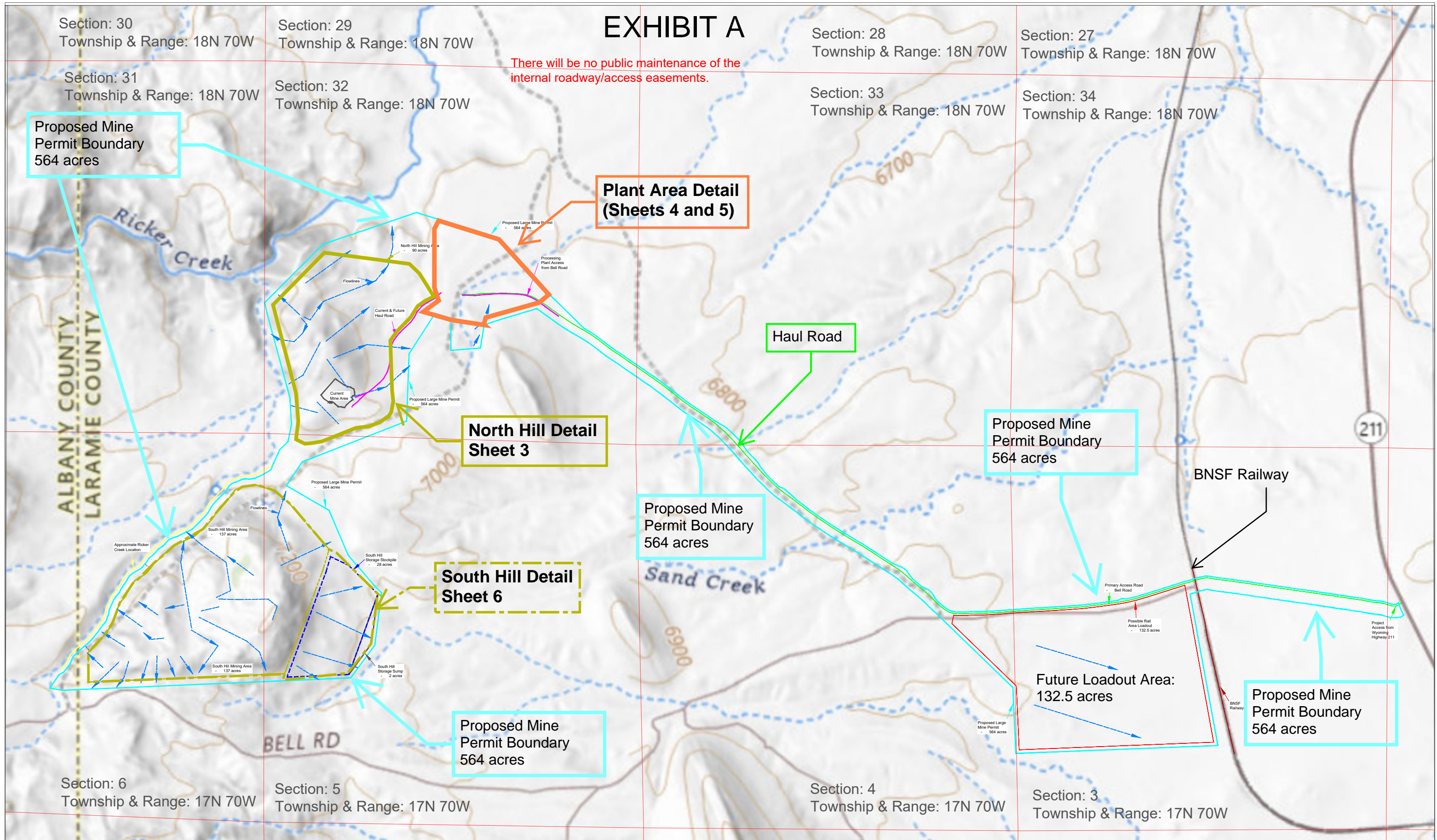
Debra Lee, Laramie County Clerk

Reviewed and approved resolution only as to form:

Laramie County Attorney’s Office

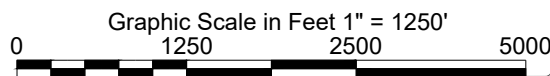
EXHIBIT A

There will be no public maintenance of the internal roadway/access easements.



Legend	
	Large Mine Permit Boundary
	Project Access Road - Bell Road
	Flow Lines
	North & South Hill Mine Area
	Ricker Creek Approximate Location
	Stockpile Locations
	New Traffic Pattern
	Processing Plant & Mineral Stockpiles
	Plant Area Berms
	Trash, Fuel, and Maintenance Area
	Haul Roads
	Sump Areas
	Proposed Location of Rail Loadout Area
	BNSF Railway
	Proposed Locations of Proposed Field Conveyors
	Parking & Administration Trailer
	Weigh Scale
	Portable Toilet

Legend Detail Sheet 2



Drawn By:	Checked By:
ARW	GDC
Scale:	Date:
As Shown	05/04/26

HORSE CREEK ROCK QUARRY SITE
 PLAN MAP - Complete Permit Area

L. G. EVERIST, INC. 350 S Main Ave, Suite 400
 Sioux Falls, SD 57104

Sheet No:	Of No:
1	6

	Large Mine Permit Boundary
	Project Access Road - Bell Road
	Flow Lines
	North & South Hill Mine Area
	Ricker Creek Approximate Location
	Stockpile Locations
	New Traffic Pattern
	Processing Plant & Mineral Stockpiles
	Plant Area Berms
	Trash, Fuel, and Maintenance Area
	Haul Roads
	Sump Areas
	Proposed Location of Rail Loadout Area
	BNSF Railway
	Proposed Locations of Proposed Field Conveyors
	Parking & Administration Trailer
	Weigh Scale
	Portable Toilet

Legend

	Large Mine Permit Boundary		Trash, Fuel, and Maintenance Area
	Project Access Road - Bell Road		Haul Roads
	Flow Lines		Sump Areas
	North & South Hill Mine Area		Proposed Location of Rail Loadout Area
	Ricker Creek Approximate Location		BNSF Railway
	Stockpile Locations		Proposed Locations of Proposed Field Conveyors
	New Traffic Pattern		Parking & Administration Trailer
	Processing Plant & Mineral Stockpiles		Weigh Scale
	Plant Area Berms		Portable Toilet

Drawn By:

ARW

Checked By:

GDC

HORSE CREEK ROCK QUARRY SITE
PLAN MAP - Enlarged Legend



Scale:

As Shown

Date:

05/04/26



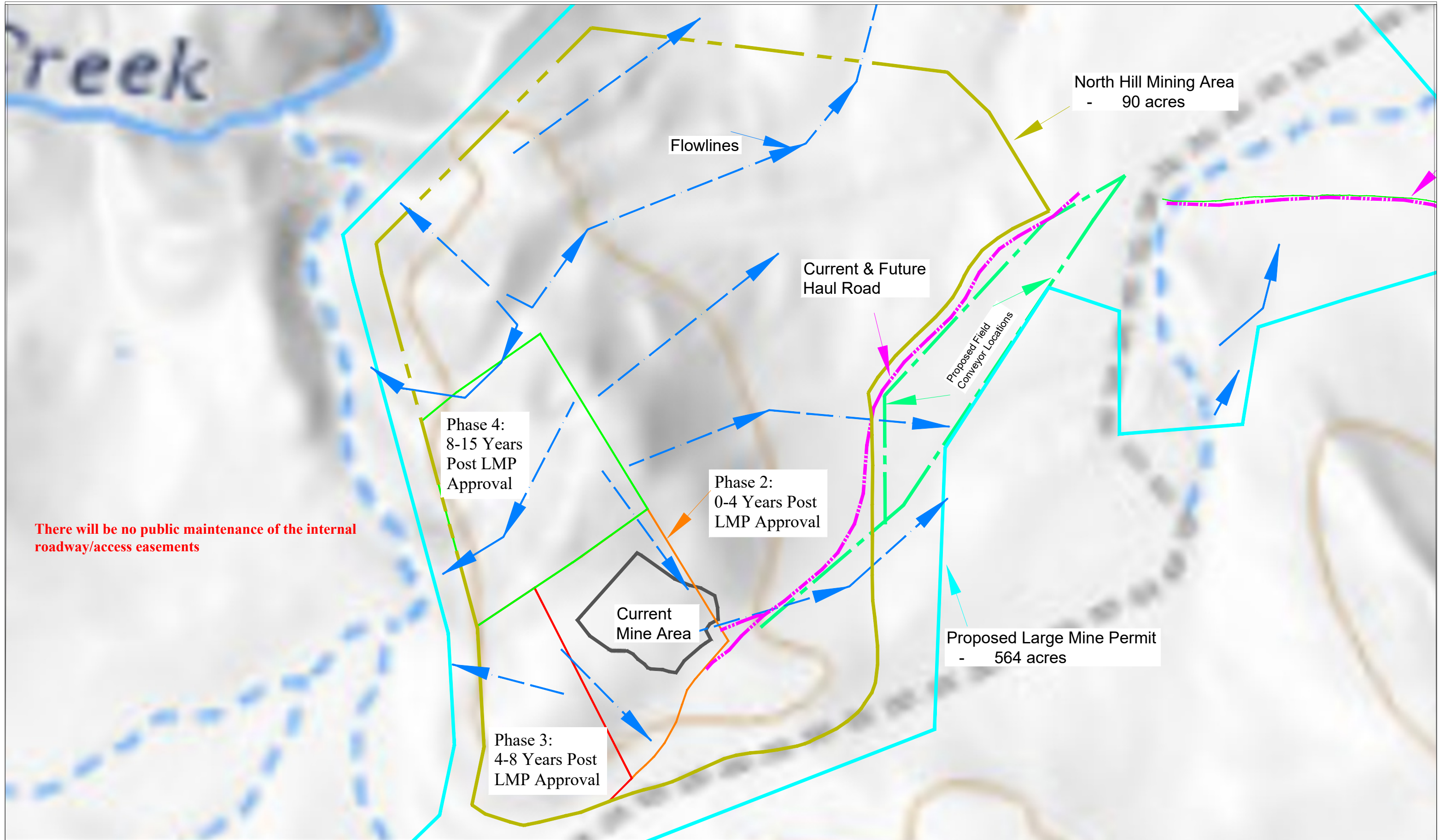
L. G. EVERIST, INC. 350 S Main Ave, Suite 400
Sioux Falls, SD 57104

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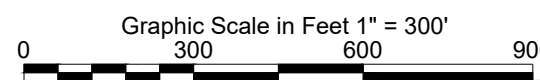
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Of No:

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Legend	
	Large Mine Permit Boundary
	Project Access Road - Bell Road
	Flow Lines
	North & South Hill Mine Area
	Ricker Creek Approximate Location
	Stockpile Locations
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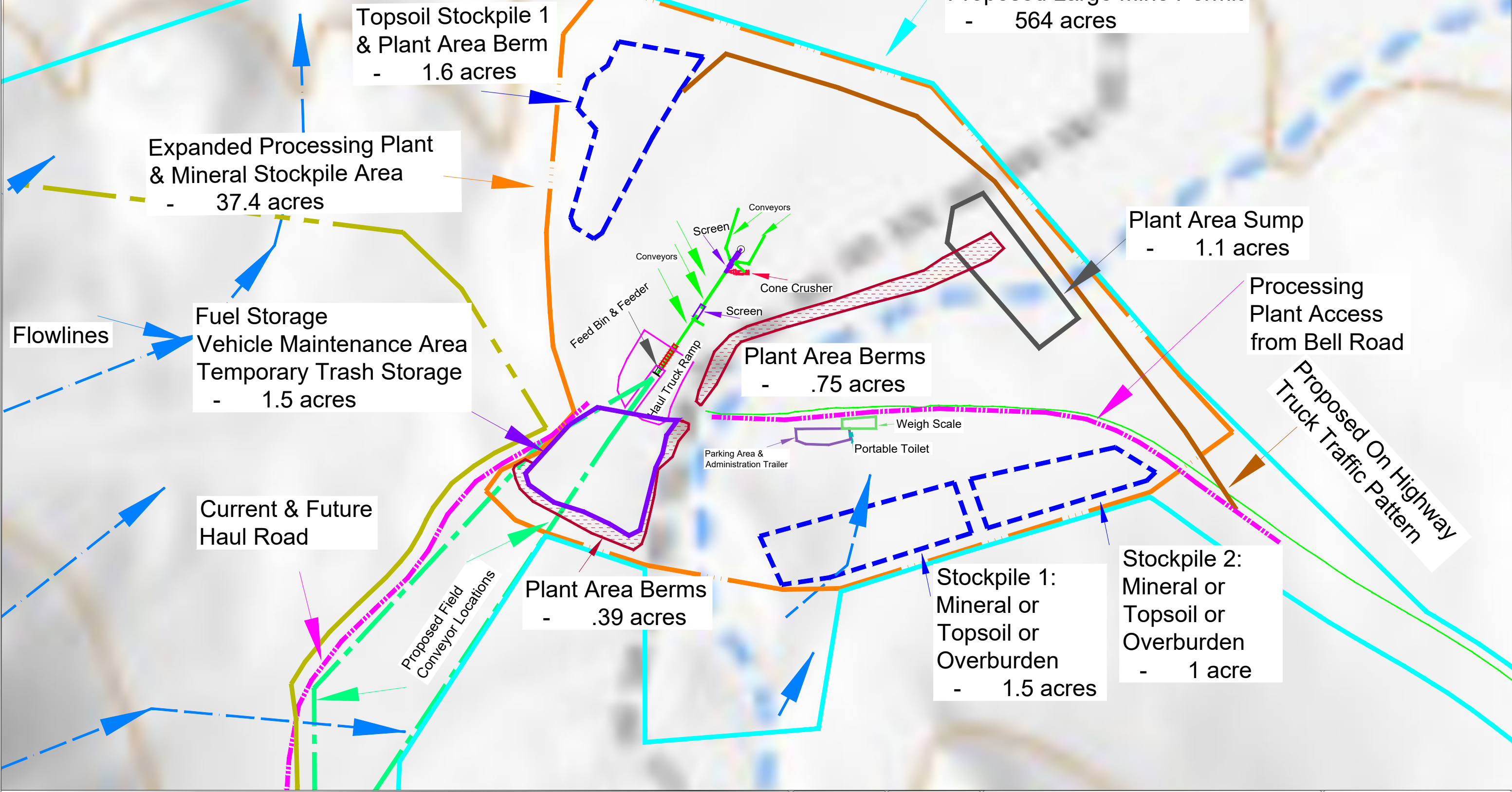
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ARW	GDC
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As Shown	05/04/26

HORSE CREEK ROCK QUARRY SITE
 PLAN MAP - North Hill Mine Area

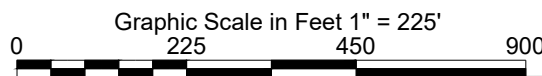
L. G. EVERIST, INC. 350 S Main Ave, Suite 400
 Sioux Falls, SD 57104

Sheet No:	Of No:
3	6

There will be no public maintenance of the internal roadway/access easements



Legend	
Large Mine Permit Boundary	Trash, Fuel, and Maintenance Area
Project Access Road - Bell Road	Haul Roads
Flow Lines	Sump Areas
North & South Hill Mine Area	Proposed Location of Rail Loadout Area
Ricker Creek Approximate Location	BNSF Railway
Stockpile Locations	Proposed Locations of Proposed Field Conveyors
New Traffic Pattern	Parking & Administration Trailer
Processing Plant & Mineral Stockpiles	Weigh Scale
Plant Area Berms	Portable Toilet



Drawn By: ARW
Checked By: GDC
Scale: As Shown
Date: 05/04/26

HORSE CREEK ROCK QUARRY SITE
PLAN MAP - Processing Plant Area

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Sioux Falls, SD 57104

Sheet No: 4
Of No: 6