

**SUBJECT: MR-13 for Mine Seals**

1. Purpose: To require that mine seals be installed as designed.
2. Definition:
3. Legal Authority: 22-3-14(b) (2) ; 38-2-3.13(b)
4. Policy/Procedures: All underground mining operations shall submit a certification (DMM-13) for the construction of the mine seal(s). The DMM-13 shall be submitted prior to regrading and backfilling for review and approval of mine seal installation by the inspector, unless the DMM-13 provides accompanying photographs clearly demonstrating the mine seal is appropriately constructed and clearly distinguishing the site.

**SUBJECT: Interim Enforcement Procedures on Underground  
Mine Barriers**

1. **Purpose:** Establish enforcement procedures for operations that fail to comply with approved barrier width
2. **Definition:** N/A
3. **Legal Authority:** 22-3-17, 38-2-3.13
4. **Policy/Procedures:** When it is determined that the permittee has failed to leave the approved barriers in an underground mine, the following Interim Enforcement Procedures will be followed: *(Note: Although some of the procedures outlined below may apply to blowouts, these procedures are intended as preventive measures to avert blowout situations when barrier widths are encroached upon.)*
  1. Issue a Notice of Violation (NOV) for failing to follow the approved pre-plan.
  2. IN NO CASE will calculations on remaining barrier(s) be accepted as an approved abatement measure to abate an NOV issued at item #1, unless circumstances discussed in 3.C. are applicable.
  3. The remedial measures will be dependent on site specific situations at the mine and may include:
    - A. Area is still accessible from underground- Remedial measures should include replacing the missing portion of the barrier with constructed bulk-head(s) and/or backstowing of voids with suitable materials to bring the strength and seepage resistance of the constructed barrier to original design.
    - B. Area is not accessible from underground- Remedial measures should include installation of approved seal(s) and backstowing of voids with suitable materials to bring the strength and seepage resistance of the constructed barrier equal to the original design. This may entail drilling and pumping of concrete, or other suitable materials, from the surface.

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- C. Other remedial measures on areas not accessible underground may be approved on a site specific case by case basis. Such cases must be supported by a comprehensive engineering analysis that provides specific monitoring and remediation plans which must contain at a minimum:
- 1) Structural analysis of remaining barriers;
  - 2) Structural analysis of the overburden and underlying rock strata to ensure the integrity of any remaining barriers;
  - 3) Analysis of any impounded water;
  - 4) A plan for dewatering the mine or reducing the head to correspond with the remaining barrier width that will permanently control water buildup in the mine or affected area. This plan may not include "gravity discharge".
  - 5) A water treatment plan.
- D. In all cases, the permittee will be required to conduct adequate surveying, measurements, testing, and engineering design and analysis to assure the reconstructed barrier provides protection at least equal to that of the intended and approved coal barrier. Analysis and design documents must be certified by a qualified R.P.E., and submitted to DEP. Construction certification, by a qualified R.P.E., must also be submitted upon completion of work.
4. In order to effect changes in underground mine barriers that may have been originally overdesigned, such changes must be submitted and approved prior to any physical disturbance of the originally designed barrier.

**SUBJECT: Underground Mine Outcrop Barriers and Post Mining Hydrology Evaluation**

**Purpose:** This procedure is intended to prevent the occurrence of a “mine blowout,” and to prescribe the requirements for the evaluation of post underground mining hydrologic impacts prior to bond reduction for operations that proposes underdrainage mining and/or where the Secretary has determined the application has an elevated risk of blowout or offsite impacts. “Blowouts” are a rapid release of large volume of water impounded in underground mine workings to the land surface due to the failure of outcrop barrier pillar.

1. The permit applicant must leave an unmined section of coal where the coal seam approaches the land surface so as to create an outcrop barrier pillar except:
  - a. Where the applicant has demonstrated in the permit application that based upon the geologic and hydrologic conditions in the permit area no accumulation of water in the underground workings will occur;
  - b. In those locations where the applicant has proposed mine entries for ventilation and transportation of men and materials.
  - c. Areas where a determination has been made that hydrologic head relief is required.
2. The permit applicant must demonstrate the outcrop barrier is of sufficient width to support the overburden and prevent its failure and sudden release of water due to water pressure against the unmined coal. The applicant must provide an outcrop barrier pillar design based on sound engineering principles. An overburden blow out and stability analysis must be performed and included in the permit package.
3. When the overburden blow out and stability analysis indicates that the coal seam is the weakest point, the permit applicant may use the Empirical Formula (commonly known as the Rule of Thumb) which states that the width of the outcrop barrier  $W = 50 + H$  where  $W$  is the width of the coal barrier in feet and  $H$  is the maximum hydrostatic head that can be built on the outcrop barrier.
4. The outcrop barrier design must also consider seepage analysis in estimating the flow that will be expected from the barrier. The outcrop barrier may be lengthened if estimated flow rates are such that surface water hydrology is likely to be adversely impacted. Alternatively, methods to decrease seepage by use of impermeable materials behind the barrier including curtain grouting may be prescribed.

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5. Where underground mining is proposed to be conducted to an adjacent abandoned waterlogged mine, the effect of additional head of water must be considered by the permit applicant in the design of internal and outcrop barriers. For this purpose, the accuracy of maps of the abandoned mine must be verified by additional borings or by the use of geophysical survey techniques when determined necessary.
6. The width of all outcrop barriers as determined from the design computations must be plotted on the topographic map and included in the permit application. The seam elevations along the outcrop line, location and elevations of springs and seeps must also be plotted on the topographic map. Methods to conduct the water flows safely from seeps downstream of the barrier must be incorporated in the permit.
7. Where multi-seam mining is proposed, the permittee must demonstrate that outcrop barriers in the upper seam are underlain by solid coal barriers in the lower seam, except as provided under item 1.b or where the stability analysis shows that partial mining can occur and that remaining pillars in the lower seam will support the outcrop barriers in the upper seam. The permittee must demonstrate that developmental maps for multi-seam mining include information relating to proposed underground barriers, where mining has already occurred and where it is planned.
8. The permit applicant must demonstrate that procedures for the prevention of buildup of hydrostatic head beyond the designed water level is assured by drilling relief wells or using angled boreholes into the hillside at a point in the overburden for direct passage of mine water to the surface are included in the permit. However, the uses of these methods which result in gravity discharge from acid producing coal seam are prohibited. Alternatively, pumping of water from deep mine workings to the surface may be included in the permit package. Where such procedures for prevention of the buildup of water beyond the designed water level are used, the permittee must demonstrate that appropriate water treatment methods are included in the permit.
9. Applications that proposes underdrainage mining and/or where the Secretary has determined the application has an elevated risk of blowout or other adverse offsite impacts applicant must provide monitoring plans to include measurements on hydraulic head, quality and quantity of water discharged from workings and verification of outcrop barriers on a regular basis, as determined by the reviewer and/or the inspector. This information shall be used by the permittee to perform an analysis of surface and groundwater quantity and quality that will be prior to granting bond reduction. This analysis must be submitted at least 180 days prior to submittal of initial release request. The analysis will include an assessment of the data to show that material damage has been prevented. The analysis can include an evaluation of any trends which may exist in the available data that which demonstrate the elevated risk of blowout or other adverse offsite impacts have been minimized and material damage have been prevented.

**SUBJECT: Post Underground Mining Assessment (PUMA)**

This information is to clarify the November 15, 2012, policy titled, “*Underground Mine Outcrop Barriers and Post Mining Hydrology Evaluation*,” which is included in the Permitting Handbook, Section 24 and the Inspection and Enforcement Handbook, Series 15, pages 4-5.

The November 15, 2012 policy requires the submittal of hydrologic analyses for underdrainage mines and mines having blowout potential, or other possible adverse offsite impacts. Its intent is twofold. First, in cases where there is no discharge from a mine at the time of a request for Phase I bond release, it provides a quantitative method to demonstrate that the post-mining discharge will be in compliance with applicable water quality standards; thereby, providing rationale in support of the approval or denial of the release application. Secondly, the policy is intended to be forward-looking to assure that during the permit review of new mining applications or expansions of existing underground mines, the permit review team will require adequate pre-mining and during-mining groundwater and/or surface water monitoring, as necessary, to enable the permittee to demonstrate that the predictions in the Probable Hydrologic Consequences (PHC) remain valid, prior to the initial bond release. This required supplemental information for the PHC has become known as the Post Underground Mining Assessment (PUMA).

Therefore, based upon its defined scope, a PUMA is not necessary for all deep mines or when resulting mine discharges are compliant with applicable water quality standards. Only underdrainage mines or other mines having an elevated blowout risk or those lacking sufficient data to demonstrate the validity of the predictions of the PHC will require such analyses. Typically, PUMAs are not required for above-drainage mines unless elevated risks of blowout or other adverse offsite impacts exist, e.g., artesian effects, subsidence material damage, stream dewatering, etc.

**All underground mine permits must be evaluated to determine the need for a PUMA, with such determination documented in the permit record.** Therefore, within thirty (30) days of the completion of underground mining operations, the permittee shall submit a **Deep Mine Abandonment Plan** in the form of an Article 3 permit revision. This revision will provide the documentation necessary to uphold the approved PHC and Hydrologic Reclamation Plan (HRP), thus affirming that a PUMA is not required for the permit. Otherwise, a PUMA will be required for the permit. The associated permit revision will require all relevant PUMA information and resulting updates to the PHC, HRP, and existing mine seal designs necessary for approval. The regional Geologist IV will be responsible for conducting the review of the submitted information, with engineering assistance as required.

Should a pending Phase I release application exist for an underground permit, the inspector, after conferring with the region’s Geologist IV and the I & E Supervisor, will order the permittee on an MR-6 inspection form to perform a PUMA evaluation. Likewise, the revision should either include a PUMA, or present adequate documentation supporting why a PUMA is not applicable. The assigned inspector is to immediately contact the assigned Release Specialist or the Release Supervisor and make them aware of this outstanding requirement. **Under no circumstance is**

**the release application to remain pending while the required PUMA revision is being prepared or under agency review. The applicant may either withdraw the application or it will be denied until the requirement is met.**

Additionally, there may be permits approaching Phase II and Phase III release that achieved Phase I status prior to the November 15, 2012 Policy. If such permits require PUMAs, as determined by the region's Geologist IV and I&E Supervisor, the inspector will order the permittee on an MR-6 inspection form to submit a permit revision incorporating all applicable PUMA requirements prior to processing the release request. It will be the responsibility of the regional Geologist IV to review any resulting permit revisions.

The PUMA shall at a minimum include the following information to support all PHC predictions, as follows:

- Final mine map depicting coal seam contours, areas of known water inundation, limits of mining, adjacent mining operations, topographical features, the location of all boreholes (both vertical and horizontal), mine barriers, and dewatering sites.
- Detail map showing coal seam elevation contours, outcrop barrier widths, and if applicable, internal barrier widths adjacent to other mine workings.
- For above-drainage mines, identify any seeps or punch-outs on the down dip end of the mine and provide any available water data from seeps and/or punch-outs.
- Identification of any overlying or underlying mines.
- Resulting hydraulic head calculations reflecting the effects from superjacent, subjacent, and adjacent mining extents; potential barrier interaction between mines; and fracture-induced permeability increases from multiple seam and longwall mining.
- Comprehensive outcrop barrier evaluation comparing existing dimensions and potential hydraulic heads to originally approved values in permit. For significant departures, a factor of safety reevaluation will be necessary.
- Depiction of existing or anticipated mine pool elevations for the mine and inclusion of requirements for monitoring and mine pool level maintenance to control artesian or other adverse effects, if applicable.
- Supporting analyses and descriptions of all underground water discharge(s) from the permit and associated underground mining limits.
- Provide the most recent water data from the approved Article 3 surface and groundwater monitoring sites. At a minimum, provide six (6) consecutive months or, if monitoring quarterly, two (2) years of samples.
- Identification of any pump stations, their pump rates, and sampled water qualities
- Assessment of any injection sites and associated injected volumes affecting mine pool elevations.
- Discussion of past stream dewatering events or well impacts and associated remediation for the specific mine.
- Evaluation of all water sources intentionally introduced to the mine void.

More data may be required, at the discretion of the reviewing geologist.