Kentucky
Energy and Environment Cabinet
Department for Natural Resources

Reclamation Advisory Memorandum RAM # 156

From: Steve Hohmann, Commissioner

Date: July 30, 2012

Subject: Guidelines for Backfilling under 405 KAR 16:190, Section 5, Thick Overburden

Effective Date: July 30, 2012

I. Introduction

For some time now, concerns about potential environmental impacts of hollow fill construction have been a focal point for the mining industry, associated regulatory agencies, and other interested parties. This has lead to initiatives such as the "Fill Placement Optimization Process", which the Cabinet documented in Reclamation Advisory Memorandum (RAM) #145.

The concerns associated with fill construction have affected the ability of coal mining operations to design and construct new fills. This, together with the limited availability of other spoil storage (existing fills, orphan benches) has prompted a rapidly increasing interest in placing greater volumes of material within the coal extraction area.

The purpose of this RAM is to clarify the regulatory allowances and limitations for placement of material in the coal extraction area, especially as that placement exceeds the extents of the approximate original contour. The regulatory provisions for such placement are found in 405 KAR 16:190, Section 5, Thick Overburden. The Division of Mine Permits has received applications that propose such placement but do not specifically invoke these governing regulations. These practices and regulations have rarely been employed until now. So it is entirely appropriate for this clarification to assist industry in the development of their mine plans and to ensure consistency in both the permit review and enforcement processes.

This RAM is not intended to discourage more extensive backfill operations. Neither is it intended to encourage more placement of material in hollow fills. The purpose of the RAM is to ensure that either operation, as selected by the individual operator/designer, is designed and constructed in compliance with all appropriate regulatory standards.

Any permit application that proposes to backfill a volume of spoil in the coal extraction area greater than the total volume of material removed from that area, whether for the entire permitted area or some portion thereof, must include a discussion of how the operation will comply with the requirements of 405 KAR 16:190, Section 5.

II. General Specifications

- The operation must meet the criteria for review under the Thick Overburden regulations, which is a comparison of the amount of overburden to the amount of coal to be removed. Any application proposing to place a volume of backfill greater than the original, in-situ volume of coal and overburden must include in the application a demonstration of applicability of the Thick Overburden standards defined in Section 5. of 405 KAR 16: 190 and KRS 350.410. In order to meet these criteria, the operator should provide a demonstration that;

$$\frac{\text{The Ht. of OB only * (1+Swell Factor)}}{\text{The Maximum Cut Height}} > 1.2$$

Where the Ht. of OB only is the Maximum Cut Height minus the Coal Seam Thickness proposed for removal during mining
Documentation may be requested for the assumed Swell Factor

- 405 KAR 16:190, Section 5 limits application of the Section to "only apply where the final thickness is greater than 1.2 of the initial thickness". As such this regulation does not provide for placement of off-site spoil. While, under certain circumstances, spoil from other sources might be used for backfilling under Section 2 of this regulation, placement of spoil for other sources under "Section 5. Thick Overburden" is not acceptable.

- The backfilled material can never be placed steeper than the angle of repose, and the backfill material must be placed to achieve a static safety factor of at least one and three-tenths (1.3). Because the angle of repose in essence represents placement of the material at a safety factor of 1.0, the requirement for a factor of safety of 1.3 will always govern the design (at least in terms of slope stability) unless additional controls or modification of the backfill material are proposed.

- The backfilled material must be placed in an "ecologically sound land use compatible with the surrounding region" and "shall be shaped and graded in such a way as to prevent slides, erosion, and water pollution" (*as per KRS 350.410*).

III. Stability, Drainage, and General Configuration Requirements

- The final backfill slope will not exceed 26.6 degrees (1v:2h or fifty (50) percent) unless the applicant provides site specific sampling and testing of the backfill material. The sampling must accurately reflect the material to be used in backfilling the site, with standard engineering testing to determine relevant engineering characteristics such as cohesion, friction angle, and/or angle of repose. The accompanying plan of operation shall clearly delineate the details of each element of the backfill planning, including segregation/use of specific materials, source of underdrain material, placement and compaction standards, etc.

- The final backfill configuration on contour operations may not have level areas (decks). All backfill must have positive drainage.

- Terraces in the backfill shall be limited to a width of twenty (20) feet. For steep slope areas (>20 degrees) this includes permanent roads wider than 20 feet in the backfill unless specifically approved by the cabinet as necessary for stability, erosion control, or roads included in the approved postmining land use plan.

- Backfill must be placed behind the undisturbed natural barrier (as per 405 KAR 16:010 Section 4). If there is no natural barrier in place, the backfill material shall be placed only on the solid portion of the bench.

- This RAM addresses a specific component of the backfilling and grading regulations. If a proposed spoil disposal area toes out on an area not proposed for coal extraction, the disposal area may be permitted under specifications for excess spoil disposal included in 405 16:130. This would include:

    1. A hollow fill toeing about below coal level;
    2. Disposal areas toeing out on an existing mine bench or pre-existing bench, where the existing bench is not associated with the proposed permit and no further extraction proposed; or
    3. Areas at or above the permitted coal seam for which no extraction is proposed.

  Fill areas that toe out on non-coal extraction areas may be extended onto the backfill area, in accordance with the "Fill Placement Optimization Process" as described in RAM #145, and material may be placed on existing and proposed fill decks in accordance with that procedure and 405 KAR 16:130. This RAM does not apply to spoil placed in excess spoil disposal areas.

- The plan shall specifically address drainage from above, across, and below the terraces, including the slope of the terrace and the frequency and type of any down-drains (to prevent erosion from concentrated flow). Where terraces cross natural drains, the plan shall include provisions to prevent erosion from the natural drain, including features such as energy dissipaters and enhanced erosion protection.

- For contour operations the proposed backfill configuration shall not allow placement of backfill material higher than the top of the associated highwall in such a way as to route drainage towards the highwall or create a water impoundment or conveyance.

- Where necessary, as determined by Division of Mine Permits, the applicant will provide suitable sub-surface drainage (e.g. underdrains, French drains, etc.) to ensure proper drainage of backfill materials. Where the Thick Overburden provision is used, if no underdrain or sub-surface drainage system is proposed the application must contain a justification as to why such a system is not necessary.

- All highwalls must be eliminated. If utilizing a fresh water diversion above the mine area, it must be permitted above the highwall in solid ground.

- Eliminate all spoil piles. The final configuration shall conform to the AOC standards, be compatible with the surrounding terrain and land use, and shall not dramatically alter the general configuration of the land.

- The final configuration shall not significantly increase the peak elevations of the permitting area, though some increases are to be expected. In general such increases shall be limited to twenty (20) percent of the cut depth. Proposals for increases (above AOC) greater than 20 percent will be evaluated on a case by case basis, under the supervision of the Director's Office. This constraint applies only to backfilling and grading operations under 405 KAR 16:190, Section 5. Spoil placement qualifying as excess spoil disposal will need to comply with the specifications of 405 KAR 16:130.

- The plan of operation shall clearly delineate the details of each element of the backfill planning, including segregation/use of specific materials, source of underdrain material, placement and compaction standards, etc., and shall further specify certification stages appropriate to that plan.

- The application must clearly describe those areas of the operation where material is to be backfilled under the Thick Overburden provisions, clearly defining those areas on the Mining and Reclamation Plan Map and providing appropriate drawings, specifications, design analysis, and certification under "Backfilling and Grading Plan" section of the application form (MPA-03).

- Any backfill configuration proposed under the Thick Overburden guidelines shall be designed and certified by a qualified, registered, professional engineer in conformance with professional standards established to assure the stability, drainage, and configuration necessary for the intended use of the site.

- If no special handling procedures are proposed, backfilling and grading will be placed in

accordance with the approved plan and no construction certification will be required. The application should so clearly state as much.

- If the plan does include special handling procedures such as material segregation, material augmentation, alternate compaction standards, underdrains/French drains, drainage baffles, grouted ditches, or other practices as proposed by the applicant, a construction certification will be required attesting that the backfilling specifications have been followed in the field, and that the material has been placed in accordance with the approved design. The timing and sequence of the construction certification is discussed in more detail under Section IV. of this document.

Failure to comply with the approved plans shall result in a non-compliance requiring the permittee to re-work or re-place backfilling materials to attain compliance with the approved plan.

IV. Construction Certification

Any backfill and grading plan proposed under the Thick Overburden guidelines that requires special handling and/or placement specifications (as noted in the permitted plan) will need to provide certified reports by a qualified professional engineer documenting that construction practices conformed to the permit specifications (in accordance with 405 KAR 7:040 Section 6 supported by 405 KAR 20:060 Section 3 (4)). The backfill construction certification process will consist of construction certification progress reports, detailing completion of construction features or the to-date status of on-going backfilling and grading operations, and a final certification upon completion of operations.

The construction certification for permitted features constructed as singular events, such as underdrain placement, will be submitted to the appropriate Regional Office within fourteen (14) days of completion of construction. These certifications should include, at a minimum,

(1) a description of the feature, the location, and the reference as designated in the approved permit, with as-built drawings as appropriate

(2) color photographs of the constructed feature and copies of any verification testing or measurements made in the field to ensure compliance with the permitted plan, and

(3) the engineer's certification that the feature was constructed in accordance with the plans provided in the approved permit application.

For operations that take place over an extended time frame (such as backfill operations requiring material segregation or compaction standards), an engineering certification detailing construction progress to-date will be filed quarterly. This quarterly construction certification shall be filed within fourteen days of the last day of each quarter, and should provide, at a minimum,

(1) cross-sections showing the approved and constructed grade, with the cross-section locations taken from the design sections;

(2) the nature of special handling or placement of the spoil, referenced in the permitted requirements;

(3) any verification testing or measurement made in the field to ensure compliance with the permitted plan; and

(4) an engineer's certification that the backfill was placed, in accordance with the plan as described in the approved permit application.

For those instances when material testing was the basis for the design evaluation and the designated material was used during construction, no verification testing should be needed. If a substitute material is used during construction, verification testing should be performed prior to placement to show suitability with the design.

A final certification, attesting that the construction is complete for the area under consideration, should be included with the final progress certification. The final construction certification should attest that all operations were performed in accordance with the approved plan, but needs only to include cross-sections and documentation for those areas that had not previously been addressed in a progress certification.

If you have any questions or comments about this RAM, or need further information concerning Thick Overburden provisions, please contact the Director of the Division of Mine Permits, # 2 Hudson Hollow, Frankfort, KY 40601 or call (502) 564-2320.