


Technical Reclamation Memorandum

TRM # 9

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From: 
William C. Eddins, Director
Division of Reclamation Services



Kentucky Department for
Surface Mining Reclamation
and Enforcement

Subject: Revegetation Standards
for Success

Background

Standards for successful revegetation are addressed in Sections 1, 6 and 7 of 405 KAR 16:200 and 18:200. With some exceptions which are discussed below, the determination of whether revegetation has been successful can be made by one of two methods; 1) use of reference areas, or 2) use of technical guidance procedures. The first method involves comparing ground cover, productivity and stocking rates of the reclaimed mine site to the ground cover, productivity and stocking rates of a reference area that is representative of the geology, soil, slope and vegetation of the mined area and that is maintained under appropriate management for this purpose. The second method involves comparing ground cover, productivity and stocking rates of the reclaimed mine site to technical standards published by USDA or USDI or to standards approved by the department and OSM.

The purpose of this memorandum is to establish the technical standards for ground cover, productivity, and stocking rates that may be used in lieu of the reference area method. In addition, this memorandum establishes minimum requirements for approving an area as a reference area. Measurement techniques for determining success in meeting the technical standards and measurement techniques to be utilized in comparing the reclaimed mine site to a reference area will be addressed in a future memorandum.

These technical standards cannot be utilized by the department until they are approved by OSM. Therefore, permit applicants that desire to use the technical standard approach should state in their applications that they intend to utilize the department's technical standards provided they are approved by OSM and will revise the application to include reference areas if the technical standards are disapproved by OSM.

Reforestation

a) Commercial forest land - As noted above, there are a number of cases where the use of a reference area method is not applicable. A post mining land use of commercial forest land is one such case. Instead, the regulations specify the following technical standards for success:

At the time of bond release:

- 1) The area shall have a minimum stocking of 450 trees or shrubs per acre,
- 2) A minimum of seventy-five (75) percent of countable trees or shrubs shall be commercial tree species, and

- 3) The ground cover shall be adequate to control erosion.

The department will consider ground cover to be adequate to control erosion if it is at least 70% cover with ninety (90) percent statistical confidence and there is no evidence of significant erosion.

b) Areas using woody plants for wildlife management, recreation, shelter belts, or non-commercial forest land - The regulations provide for the use of the reference area method for such areas for ground cover, stocking rates, and species composition. For stocking rates the regulations state: "the woody plants established on the revegetated site are equal to or greater than ninety (90) percent of the stocking of live woody plants of the same life form on the reference area ,.... with eighty (80) percent statistical confidence." However, there are many practical problems with utilizing the reference area method for reforested areas. For example, areas available for use as reference areas in the vicinity of the mine site will be relatively mature forests, perhaps consisting of climax species which are difficult to establish on a reclaimed site without going through the lengthy process of natural succession. Such an area is not useful for the purpose of comparison with a reclaimed mine site at the time of bond release which is only five years after initial planting.

Recognizing these problems, Kentucky's regulations provide an alternative method for determining success. Woody plants may be of the life form as approved in the permittee's reclamation plan and stocking and ground cover shall approximate the stocking and ground cover as approved in the mining and reclamation plan as appropriate for the postmining land use. This provision was approved by OSM, but as one of the conditions of primacy, this alternative method can not be utilized until Kentucky develops technical standards and until such standards are approved by OSM.

The following are the technical standards that may be utilized in lieu of a reference area.

At the time of bond release:

- 1) Stocking rates for reforested areas shall be 500 trees or shrubs per acre; on steep slopes it shall be 670 trees or shrubs per acre. The reforested area shall have live woody plant stocking of ninety (90) percent of these standards with 80% statistical confidence.
- 2) There shall be a minimum of four (4) species of trees and shrubs, in a mixed planting pattern, each of which must be appropriate for the postmining land use and suitable to the soil conditions at the reclaimed mine site.
- 3) Ground cover shall be adequate to control erosion.

The department will consider ground cover to be adequate to control erosion if it is at least 70% cover with 90% statistical confidence and there is no evidence of significant erosion.

Crops, grasses and legumes

Where the reclaimed mine site is revegetated in agricultural crops (including hay), grasses, or legumes, the reference area method may be the preferred approach because a direct comparison of ground cover and productivity between the reclaimed mine site and the reference area can be readily made, in many cases by visual observation alone. However, the regulations provide that technical standards may be used in lieu of a reference area.

Therefore, the department hereby adopts yield data for high levels of management contained in SCS soil surveys as technical standards for productivity. Where a soil survey is not available, the applicant may choose to have a soil survey conducted prior to mining in order to obtain yield estimates for the soils on the proposed mine site. This technical standard approach can only be utilized when the soil survey contains yield estimates for the specific vegetation that will be established on the reclaimed mine site. For other types of vegetation, or where a soil survey is not available and the applicant does not choose to conduct one, the reference area method must be utilized.

SCS soil surveys do not address ground cover. Where these technical standards are used for productivity, the department will also apply a ground cover standard of 100% for the western Kentucky coal field region and 90% for the eastern Kentucky coal field region. No ground cover standard will be applied to row crops.

The regulations require that ground cover and productivity be at least 90% of the technical standards. Therefore, yield from the reclaimed mine site must be 90% of the yield contained in the soil survey and 90% of the ground cover standard ($.90 \times 100\% = 90\%$ ground cover for western Kentucky and $.90 \times 90\% = 80\%$ ground cover for eastern Kentucky).

As stated above, this memorandum will not discuss techniques for measurement of vegetation for comparison with the success standards. However, applicants should bear in mind that visual observation alone may not be adequate, especially when the technical standard approach is chosen. For example, for grasses, productivity is expressed in animal-unit-month or cow-acre-days. In such cases it may be necessary to obtain clippings on a small plot to determine forage yield and convert that to the units of measurement contained in the soil surveys.

Special cases

The regulations provide alternative success standards for certain cases. For previously mined areas that were not reclaimed to the requirements of the permanent program regulations, productivity is not addressed and only ground cover standards apply. This ground cover standard has two parts: first, the ground cover shall not be less than can be supported by the best available topsoil or other suitable material in the reaffected area. This means that the permittee must evaluate the material in the area to be reaffected to determine the best available material to separate and replace as topsoil. In addition, the ground cover must be adequate to control erosion, which as stated above, means 70% cover with 90% statistical confidence and no evidence of significant erosion.

For areas to be developed for industrial or residential use, productivity is not addressed and only a ground cover standard applies. The ground cover shall be adequate to control erosion which means 70% cover with 90% statistical confidence and no evidence of significant erosion.

For surface mining activity permit areas forty (40) acres or less in size and for surface operation areas of 40 acres or less in size at underground mining activities, the regulations at Section 6(4) of 405 KAR 16:200 and 18:200 specify an alternative success standard that addresses ground cover and stocking rates. In these cases, no productivity standards apply. The condition of primacy requiring use of reference areas for non-commercial forest lands until the technical standards are approved by OSM does not prohibit the use of these technical standards for areas forty (40) acres or less.

Minimum requirements for approving an area as a reference area

Reference areas must be representative of the geology, soil, slope, and vegetation in the permit area. The reference area should be as close to the mine site as possible and should be in the same physiographic area as the permit area. The reference area must be at least one (1) acre in size (at least 10 acres if actual livestock grazing is to be used to measure productivity). Management of the reference area shall be comparable to that which is required for the approved post-mining land use of the permit area. If the permit area contains more than one post-mining land use and/or vegetative types, there must be reference areas for each post-mining land use and vegetative type.

Where the reference area is not under the control of the permittee, there must be a written agreement between the permittee and the landowner specifying that the area may be utilized for the purposes of a reference area. The agreement must also specify that representatives of the department and OSM have right-of-entry for the purpose of observing and measuring vegetation. The agreement must be effective until final bond release on the permit area. A copy of the agreement must be submitted to the department in the permit application.

If changes occur which make the reference area inappropriate or unaccessable for use as a reference area, the permittee must revise his permit to identify another reference area, or if appropriate, to adopt the technical standard method.

If all other requirements are met, a single reference area may be utilized for several mines in the same vicinity.