Revegetation of Coal Mined Lands in the United States - Permitting and Success Standard Requirements at the Federal Level

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Abstract

The resource information needs of land use, soil handling and revegetation are integral to the reclamation planning and permitting requirements of Surface Mining Control and Reclamation Act. Revegetation success is but one of several factors - return to approximate original contour, maintenance of water quality - to be considered when releasing an operation from its bonded liability. Revegetation success is based on the postmining land use selected by the operator and approved by the regulatory authority. An important aspect of that approval is the establishment of revegetation success criteria used to release the mine operator from the revegetation liability established in the Act.

A. Introduction

The Surface Mining Control and Reclamation Act (SMCRA) of 1977 and its implementing regulations require that certain vegetation, soil handling and land use information be provided in permit applications. This information is necessary to prepare a reclamation plan which demonstrates that the applicant will be able to comply with regulatory performance standards.

Federal Regulations (780.18) require that each permit application "shall contain a plan for reclamation . . . . showing how the applicant will comply with the environmental protection performance standards of the regulatory program." A complete and technically adequate reclamation plan is an important first step in the reclamation process. It encourages the operator to thoroughly evaluate his proposed actions and serves as a "blueprint" against which inspections are judged. The lack of a complete and technically adequate reclamation plan makes it impossible to determine whether the operator has the technical ability, in terms of experience, equipment or other knowledge, to reclaim the affected land to the approved land use and its associated standards of revegetation success.

Should an operator comply with the few commitments made in a permit which is incomplete and technically deficient, it is possible that, despite the inspection process, the postmining disturbed area will not be capable of achieving the intended land use. A hypothetical example is the use of an inadequate depth of topsoil cover over a toxic spoil which results in poor revegetation cover and/or productivity. Remedial measures could well exceed the bond amount. In such a case, an unnecessary financial burden would be placed on the Federal government and taxpayers. The intent of the regulations -- that each permit application demonstrate how the applicant will comply with environmental performance standards -- requires the mining operator to pre-plan all reclamation activities rather than submit a "plan" which states that "we will comply with all rules and regulations." The plan must indicate how the operator will comply with the regulations on a site-specific basis.

A logical interconnection exists between vegetation information and pre- and postmining land use information in developing revegetation plans and evaluating revegetation success for release of vegetation liability. Planning for revegetation of lands disturbed by coal mining involves an evaluation of premining vegetative cover and productivity; pre- and postmining land use; determination of overburden and topsoil/subsoil quality with regard to suitability and quantity available for use as a plant growth material; and selection of appropriate seed mixtures, seeding methods and erosion control measures to establish the proposed postmining vegetation and land use on regraded spoils covered with an appropriate depth of suitable plant growth material.

Determination of revegetation success involves a quantitative evaluation of pre-disturbance vegetation cover and production, selection of a reference area representative of the postmining land use or another success standard consistent with the pre- and postmining vegetation cover and productivity, and a description of methods used to compare reclaimed areas to the selected reference area or technical standard.

B. Statutory Requirements

The permitting section of SMCRA states that:

> 510(b)(2) No permit . . . . shall be approved unless . . . the applicant has demonstrated that reclamation as required by this Act and the State or Federal Program can be accomplished under the reclamation plan contained in the permit application;

The environmental protection performance standards section states that the operator will:

515(b)(19) establish on the regraded areas . . . . a diverse, effective, and permanent vegetative cover of the same seasonal variety native to the area of land to be affected and capable of self-regeneration and plant succession at least equal in extent of cover to the natural vegetation of the area; except, that introduced species may be used in the revegetation process where desirable and necessary to achieve the approved postmining land use plan;

C. Regulatory Requirements

In March, 1979 the permanent regulatory program regulations were promulgated under SMCRA. Those regulations have been revised in 1983 and pertinent parts are exerpted below:

701.5 Definitions

Land use means specific uses or managment related activites rather than the vegetation or cover of the land."

The federal regulations classify land uses as follows and provide definitions for each:

cropland
pastureland or land occasionally cut for hay.
grazingland
forestry
residential
industrial/commerical
recreation
fish and wildlife habitat
developed water resources
undeveloped land or no current use or land management.

779.19 Vegetation information

The permit application shall, if required by the regulatory authority, contain a map that delineates existing vegetative types and a description of the plant communities within the proposed permit area and within any proposed reference area. This description shall include information adequate to predict the potential for reestablishing vegetation.

779.22 Land-use information

"The application shall contain a statement of the condition, capability, and productivity of the land within the proposed permit area, including-

A map and supporting narrative of the uses of the land existing at the time of the filing of the application.

A narrative of land capability and productivity, which analyzes . . . . the capability of the land before any mining to support a variety of uses . . . . and the productivity of the proposed permit area before mining, expressed as the average yield of food, fiber, forage or wood products from such land obtained under high levels of management.

780.18 Reclamation plan: General requirements

Each application shall contain . . . . a plan for removal, storage, and redistribution of topsoil, subsoil, and other material.

A plan for revegetation as required in 816.111 through 816.116, including, but not limited to, descriptions of the . . . . measures proposed to be used to determine the success of revegetation as required in 816.116.

780.23 Reclamation plan: Postmining land uses

Each plan shall contain a detailed description of the proposed use, following reclamation, of the land within the proposed permit area . . . . and the relationship of the proposed use to existing land use policies and plans.

816.111 Revegetation: General Requirements

The permittee shall establish on regraded areas . . . . a vegetative cover that is in accordance with the approved permit and reclamation plan and that is . . . . diverse, effective, and permanent and . . . . comprised of species native to the area, or of introduced species where desirable and necessary to achieve the approved postmining land use and approved by the regulatory authority.

The reestablished plant species shall be compatible with the approved postmining land use.

816.116 Revegetation: Standards for success

Success of revegetation shall be judged on the effectiveness of the vegetation for the approved postmining land use.

Standards for success and statistically valid sampling techniques for measuring success shall be selected by the regulatory authority and included in an approved regulatory program.

Ground cover, production, or stocking (density) shall be considered equal to the approved success standard when they are not less than 90 percent of the success standard. The sampling techniques for measuring success shall use a 90-percent statistical confidence interval (i.e., one-sided test with a 0.10 alpha error).

For areas developed for use as grazingland or pasture land, the ground cover and production of living plants on the revegetated area shall be at least equal to that of a reference area or such other success standard approved by the regulatory authority.

For areas developed for use as cropland, crop production on the revegetated area shall be at least equal to that of a reference area or such other success standard approved by the regulatory authority.

For areas to be developed for fish and wildlife habitat, recreation, shelter belts, or forest products, success of vegetation shall be determined on the basis of tree and shrub stocking (density) and vegetative ground cover.

The period of extended responsibility for successful revegetation shall begin after the last year of augmented seeding, fertilizing, irrigation or other work.

In areas of 26.0 inches or less average annual precipitation, the period of responsibility shall continue for a period of not less than 10 full years. Vegetation parameters shall equal or exceed the approved success standard for at least the last 2 consecutive years of the responsibility period.

C. Vegetation and Revegetation Information Required

Land use is the driving force behind reclamation planning and implementation. Section 508(a) of SMCRA and its supporting regulations require that the reclamation plan contain a statement of the condition and capability of the land prior to mining. The requirement establishes a quantifiable site-specific premining land use capability which precisely identifies the applicant's liability in reestablishing a postmining land use and its associated productivity.

SMCRA requires the regulatory authority to evaluate the applicants reclamation plan and statement concerning the ability of the premined land to support a variety of postmining land uses when it makes a finding on the feasibility of achieving the applicants proposed postmining land use.

Land use decisions were intially motivated by a desire to return the land to its native condition as evidenced by the regulatory requirement that non-native species could be used during revegetation only "after appropritae field trials have demonstrated that the introduced species are desirable and necessary to achieve the approved postmining land use." However, regulatory changes in 1983 provided more flexiblity (the requirement for "appropriate field trials" has been removed). It is evident that Congress intended for land use decisions to enhance and benefit future uses as evidenced by the following statment from the House of Representatives Committee on Interior and Insular Affairs report entitled "Surface Mining Control and Reclamation Act of 1977"

> "surface mining also presents possible land planning benefits as such mining involves the opportunity to reshape the land surface to a form and condition more suitable to man's uses. In such instances, the overburden and spoil become a resource to achieve desired configurations rather than waste material to be disposed of or handled by the most economic means. The performance standards recognize that return to approximate permining conditions may not always be the most desirable goal of reclamation and thus appropriate exceptions to the general requirements are provided."

Permitting

The permit application must discuss the probable land uses, as defined in the regulations, that could be supported on the permit area before mining. Using this list of alternatives and other available information, the applicant can chose the postmining

land use that is consistent with land owner and state and local agency land use plans.

Vegetation information is useful in coroborating the land use information. It is also a factor to be considered in determining the potential for reestablishing vegetation. Vegetation information is essential in establishing either a reference area or other technical revegetation success standard.

Operators are required to prepare a site-specific reclamation plan which includes a soil-handling plan and which describes how the proposed postmining land use will be achieved. For the regulatory authority to make a finding that the reclamation plan will result in an achievable postmining land use, the applicant must provide information on the quantity and quality of topsoil/subsoil that is available for use as plant growth material on regraded spoil. Such information may or may not be in the form of a soil survey.

Based on the land use, vegetation and reclamation information presented in the permit application, the regulatory authority makes a finding that the postmining land use is appropriate and can be achieved in accordance with the reclamation plan presented in the permit application.

Revegetation Success

The regulations require that the regulatory authority establish standards for the evaluation of revegetation success. Parameters for evaluating success vary according to the land use (i.e. productivity for cropland, cover and production for grazingland and pastureland, and density and cover for wildlife habitat) and are evaluated against a reference area or technical standard approved by the regulatory authority. Reference area are the most common success standard used in the western United States, although some states, such as North Dakota, are developing alternative technical standards. The use of reference areas is probably best suited to rangelands and other natural plant communities typical of the Western United States while technical standards are more appropriate for croplands and pasturelands.

Reference Areas

Vegetation information is important in establishing reference areas which are representative of the postmining land use. Reference areas should not be selected based soley on their premining vegetation but should also consider the postmining land use. The operator should select a vegetation type which is

comparable in cover and production (or density) to the premining disturbed vegetation and which will also support the designated postmining land use. A reference area is then established in that vegetation type.

The reference area concept is based on the assumption that vegetative cover will vary over time as it is influenced by various climatic factors. Thus the operator is liable only for the vegetation cover existent at the end of the mining period rather than that existed under the premining condition. Reference areas are, in effect, large-scale bioassay tests in which the interaction of climate and soils on vegetative growth on an undisturbed area is compared to that on a reclaimed site.

The reference area success comparison requires the operator to demonstrate that during the last two years of the 10 year liability period the parameters of cover, production and/or density on the reclaimed site are at least 90% of those same parameters on the reference area at the 90% confidence level. This calls for a statistical sampling. Many large mining operations have technical personnel who can perform this work while smaller companies must rely on consultants.

Technical Standards

The regulations also allow operators to select technical standards rather than use reference areas. Such standards were initially required to conform to technical guidance procedures published by the U.S. Department of Agriculture (USDA) or the U.S Department of the Interior. The most readily available standards are the USDA's Soil Conservation Service (SCS) productivity estimates for mapped soil series. These estimates are based on long-term average yields obtained under normal levels of management.In developing or proposing such standards, premining soil information is very useful. For example, a technical standard could be developed by calculating a weighted-average of the selected crop or pastureland productivites based on the areal coverage of each soil series within the permit area. Other means of developing technical standards are available. This is evidenced by New Mexico's system of comparing seven years of premining data to the reclaimed site and North Dakota's current study of SCS and other productivity data in the development of a statistically valid technical standard.

Regardless of the technical standard used, the reclaimed site must also be statistically sampled during the last 2 years of the liability period to demonstrate that the parameters of cover, production and/or density are at least 90% of the technical standard at the 90% confidence level.

PROCEEDINGS

ALBERTA RECLAMATION CONFERENCES

1985
Planning and Certification
of Land Reclamation
April 16-17, 1985
Edmonton Inn, Edmonton

1986
Reclamation in the
Eastern Slopes of Alberta
September 25-26, 1986
Overlander Lodge, Hinton

C.B. Powter
R.J. Fessenden
D.G. Walker
Compilers

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ALBERTA RECLAMATION CONFERENCES
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For more information on the Alberta Chapter of the Canadian Land Reclamation Association please write to CLRA, Box 682, Guelph, Ontario, Canada N1H 6L3.

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