

MCKINLEY MINE: VEGETATION BOND RELEASE CRITERIA
BASED ON SOIL CONSERVATION SERVICE TECHNICAL GUIDE

RANGE SITE DESCRIPTIONS¹

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Revegetation success standards using locally adjusted Soil Conservation Service Technical Guides (WP-1) in conjunction with Order III Soil Surveys were established during technical review of a permanent program permit application for The Pittsburg & Midway Coal Mining Co.'s McKinley Mine. Regulatory acceptance of these standards suggests that vegetation baseline studies for the establishment of revegetation success criteria may be unnecessary if SCS Range Site Descriptions are available.

INTRODUCTION

Permitting History

In 1980 The Pittsburg & Midway Coal Mining Co. (P&M) submitted a permanent program permit application to the Office of Surface Mining (OSM) and the New Mexico Mining and Minerals Division (MMD) for the McKinley Mine, McKinley County, New Mexico. When vegetation baseline data was collected for this application, no published guidelines existed for the State of New Mexico. In the absence of New Mexico guidelines, vegetation baseline data for the mine using reference areas was collected under a combination of guidelines drawn from the Wyoming Department of Environmental Quality and the Montana State Land Department programs. Since technical review of the 1980 permit application was never completed, the technical adequacy of this information was never determined.

P&M submitted a revised permit application to the regulatory authorities in July 1983 based on the addition of a truck/shovel prestripping operation and changes in mining sequencing. During technical review of this permit application the vege-

tation baseline data collected in 1979 was found to be inadequate. The OSM indicated that vegetation community types were too general. P&M could not persuade the OSM to reconsider this position.

There were six community types in the original baseline data which covered approximately 27,000 acres of lease. The communities included Pinyon/Juniper Woodlands, Sagebrush, Rabbitbrush, Greasewood, Garden Plots and Disturbed Land. The OSM reasoned that since the community types represented such a large area, that the productivity measurements were not a true reflection of the areas productive capacity, nor were they a valid indicator of the richness of species diversity. This in turn cast doubt on the validity of revegetation success standards.

P&M then submitted in the permit application package an Historical Data Monitoring proposal from which revegetation success standards would be developed after the required 7 year monitoring period. This method would eliminate the need for reference areas and would take into account the extreme variability in precipitation quantity and distribution that occurs in the McKinley Mine region. The MMD agreed with this approach, but the OSM indicated that this was not acceptable. The OSM maintained that success standards for revegetation must be part of a permit application package in order for it to be complete.

It seemed that an impasse had been reached for ongoing, timely review and approval of the permit application package. A delay of six to twelve months for the collection and preparation of additional vegetation information seemed inevitable. However, review of the permitting regulations (Mazloom, Office of Surface Mining 1981 and New Mexico Mining and Minerals Division 1980) revealed another possible

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solution. Information collected by government offices, institutions and other groups could be used as an alternate source for baseline information with regulatory approval.

After consultation with the regulatory authorities, P&M then requested that Technical Guideline Range Site Descriptions, developed by the local Soil Conservation Service as described in the National Range Handbook (1976), be used to establish revegetation success criteria. The Range Site Descriptions were to be used in conjunction with Order III soil survey information contained in the permit application to develop the revegetation standards. A technical meeting was subsequently held with the SCS in Gallup, New Mexico, at which revegetation success standards were established for the permit application.

This approach to revegetation success criteria development allowed the permit application review to go forward without delay. OSM agreed that the baseline data would be considered adequate in the permit application, since the SCS data collected for the development of the Range Site Descriptions were included by reference and could be reviewed if necessary.

SCS RANGE SITE DESCRIPTION REVEGETATION SUCCESS STANDARDS AND DEVELOPMENT

Standards Development

To establish the revegetation standards, P&M requested and received through the McKinley Soil and Water Conservation District, the help of Mr. Wayne Fjseth, Soil Conservation Service, Gallup, New Mexico. Mr. Fjseth's in-depth knowledge of the rangelands in McKinley County and surrounding region was an important contributor in the establishment of the success criteria for McKinley Mine.

The revegetation success criteria development process involved four phases. In the first phase, all soil types identified at the mine by the Order III baseline soil inventory were listed. A soil profile description for each mine soil mapping unit was then compared with all range site soil profiles known to occur within the McKinley Mine region. This comparison resulted in the identification of nine range sites that exist within the permit area. Although not necessary, vegetation information from the permit application and the Range Site Descriptions was compared to verify the range sites chosen. The SCS Range Site Descriptions identified were Loamy (No. 036A006N), Clayey Bottomland (No. 03613119N), Swale (No. 036A017N), Salty Bottomland (No. D36-6-N), Bottomland (No. D-36-118N), Loamy Savannah (No. 036A015N), Shallow Savannah (No. 036A016N), Shallow Upland (No. D-36-2N), and Flood Plain (No. D-36-81N).

In the second phase, a generic soil profile for reclaimed lands at the mine was established. Only the A horizons of the salvaged topsoils were considered in this process. A single generic reclaimed soil profile was derived instead of several profiles, since all topdressing materials at

the mine are redistributed at uniform depths and there is no special handling of any particular soil materials. The generic reclaimed soil profile arrived at is a 9" layer of sandy loam to clay loam topsoil, over a 39" layer of subsoil ranging from clay loam to clay. The profile was described from the surface to a depth of four feet, this being considered the effective rooting zone.

In phase three of the development, the generic reclaimed soil description was compared to the nine Range Site Descriptions for the area. The generic profile from zero to four feet most closely resembled the Loamy SCS Range Site Description.

In the fourth and final phase of development, the Loamy Range Site Description was used to establish the revegetation success criteria for reclaimed lands at the mine. The standards established included cover, production and diversity. The post-mining land uses, rangeland being primary and wildlife habitat secondary, were also taken into account when establishing the success standards and later when developing seed mixes to meet the success standards.

Revegetation Success Standards

The goal of revegetation efforts at the mine is to establish a rangeland grass/forb/shrub community. The specific standards for cover, productivity and diversity for revegetation success are detailed below. Reclaimed lands at McKinley Mine must meet these standards after ten or more years of growth as dictated by the regulations based on annual precipitation received.

Cover

Canopy cover for trees, shrubs and half-shrubs is to be at least 10 percent. Basal cover for grasses and forbs is to be at least 25 percent. Both canopy cover for shrubs and basal cover for grasses and forbs were taken directly from page three of the Loamy Range Site Description.

Production

Annual production of above ground growth of perennial grasses and forbs, shrubs and half-shrubs must be at least 784 air-dry pounds per acre. The "90 percent of baseline productivity" factor allowed by the regulations is already taken into account and may not be used to reduce this production amount.

P&M initially proposed to use a sliding scale factor for the production figure, keyed to annual precipitation for the years in which productivity measurements were taken for bond release. This approach seemed reasonable since the Range Site Description indicated a range of 600 to 1,100 pounds of production per acre for unfavorable and favorable years, respectively. When the effort to establish the variable production standard became mired in biological, climatological and technical complexities, it became apparent that a fixed standard would be the only way to settle the production issue.

The weighted average production from the vegetation baseline information for the mine measured 706 oven-dry pounds per acre for all community types. In the first production standard submittal P&M proposed that 700 air-dry pounds per acre be established as the production standard. This approach seemed reasonable since forty-five percent of the lease area is covered by the Pinyon-Juniper community which averaged only 351 pounds per acre.

The OSM countered this figure with 784 air-dry pounds per acre. The OSM also established that this figure was the absolute minimum and that the 90% of production factor was already figured in. P&M agreed to these terms.

Diversity

The diversity standard is divided into two sub-categories, inter-habit diversity and intra-habit diversity. Inter-habit diversity standard describes the ratio in percentages between grasses, forbs and shrubs that are to be established. The intra-habit diversity standard describes the number of species and the maximum and/or minimum percentage of contribution a given species may contribute to a particular habit.

The inter-habit diversity standard was taken directly from page three of the SCS Range Site Description. The inter-habit standard requires the following plant community composition: 70 to 75 percent grass and grasslike, five to ten percent forbs, and 15 to 20 percent shrubs and half-shrubs.

The intra-habit diversity standard was developed utilizing a combination of the SCS Loamy Range Site Description, "Guideline for Evaluating Species Diversity" Colorado Mined Land Reclamation Division, and "Methods for Evaluating Diversity" Emrich (1983). The intra-habit standard requires that a minimum of five major species will be present in the herbaceous strata. The woody plant stratum will contain at a minimum three major contributing species. Seed availability, species desirability with regard to the post-mining land use, and seed planting requirements (biological and mechanical) also played a role in limiting the total number of major species required for the two strata.

Woody Plant Density

The standard establishes that there is no minimum woody stem stocking level for 90 percent of the reclaimed area. For the remaining 10 percent of the reclaimed area shrub clusters will be established with a minimum of 400 woody stems per acre. This standard was derived from conversations with local wildlife agencies including the New Mexico Department of Game and Fish and The Navajo Nation Fish and Wildlife, experience with woody stem establishment on reclaimed lands and negotiation with the regulatory authority. The Loamy Range Site Description was not used in the establishment of the woody plant density standards.

An exhibit showing the conceptualized locations of shrub clusters was developed to delineate the percentage of the reclaimed land that

could reasonably be expected to meet the woody stem stocking requirements. The exhibit was developed on 1"=400' post-mining countour maps from the 1983 permit application. It was assumed that shrub growth would be favored on northwest to northeast facing reclaimed slopes as a result of increased shading and moisture in these areas. Slopes within these aspect ranges were delineated on the exhibit for lands to be reclaimed during the permit term. The sum of conceptualized acreages for potential shrub clusters was divided by the total acreage expected to be reclaimed during the permit term to establish the 10 percent figure for the standard.

CONCLUSION

In place of vegetation baseline information obtained through costly field studies, reasonable and achievable revegetation standards for cover, productivity and diversity were developed for McKinley Mine using SCS Range Site Descriptions. The information used to develop these descriptions has been compiled over a number of years and is probably more reliable than information gathered during one growing season in the form of a baseline study, particularly in the arid southwest.

SCS Range Site Descriptions are available for virtually all coal regions in this country and could easily be used for the development of revegetation success criteria for reclaimed lands. When SCS information is used, vegetation baseline studies could be limited to identification of habitats critical to wildlife species of high federal interest, threatened and endangered species inventories, and limited ground-truthing of Range Site Descriptions. The remainder of costly pre-mining vegetation surveys could then be eliminated, as well as the long term maintenance of reference areas for bond release purposes. This should be possible whenever Order III Soil Surveys (or more intensive surveys) are conducted at a mine site and SCS Range Site Descriptions are available for the district in which a mine is located.

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