NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

LAND RECONSTRUCTION, CURRENTLY MINED LAND

(Acre)
CODE 544

DEFINITION

Restoring currently mined land to an acceptable form and planned use.

PURPOSES

- Prevent negative impacts to soil, water and air resources in and near mined areas.
- Restore the quality of the soils to their pre-mining level.
- Reduce erosion and sedimentation.
- Maintain or improve the visual quality of the landscape.

CONDITIONS WHERE PRACTICE APPLIES

This standard applies to areas that are or will be undergoing surface mining operations. It applies to the identification, removal, stockpiling and replacement of soil materials on currently mined land. This standard also applies to nearby areas that may be affected by the mining activities.

CRITERIA

General Criteria Applicable to All Purposes

Reclamation and operation plans must comply with all local, state, federal, and tribal laws and regulations relating to mining and reclamation.

These include:

- Surface Mining Control and Reclamation Act of 1977 (SMCRA), 30 U.S.C. 1201 et seq. (regulates coal mining operations).
- 30 CFR 785.17, 816.22, and Part 823 (requirements and standards for surface coal mining and reclamation operations on prime farmland).
- Federal Register/Vol. 64, No. 124, Tuesday, June 29, 1999/Notices, pages 34770-34778 (NRCS specifications for soil handling in relation to surface coal mining activities on prime farmland).
- 30CFR780.15 (Air pollution control plan).
- 30CFR701.5 (Definitions: Fugitive dust).
- The California Surface Mining and Reclamation Act of 1975 (SMARA). SMARA regulates surface mining operations, in part to assure that: 1) adverse environmental effects are prevented; 2) mined lands are reclaimed to a usable condition which is readily adaptable for alternative uses; and 3) residual hazards to the public health and safety are eliminated.

Dust Control. The generation of particulate matter and fugitive dust shall be controlled during removal and replacement of soil and other earth materials by: 1) controlling vehicular and pedestrian traffic; 2) modifying soil moisture content as appropriate; and 3) establishing temporary vegetation on disturbed soils as needed.

Earth moving activities shall be restricted or stopped when wind direction and velocity could allow particulate matter and dust to impair visibility on roads downwind from the construction area.

Site preparation. Areas shall be cleared of trees, logs, brush, rubbish, and other undesirable materials. Areas to be preserved, including those containing trees, vegetation, stream corridors, natural springs or other important features shall be properly identified.

Additional structural measures shall be installed as needed to support the intended use of the site.

Additional Criteria to Restore the Productivity of Soils to Their Pre-mining Level

Removal of Material for Soil Reconstruction. A detailed soil survey shall be done on the entire area to be mined. This information will be used to determine the extent and location of prime farmland soils.

All upper soil horizons to be used in reconstructing the soil shall be removed from the immediate area before blasting, mining or any surface disturbance other than removal of woody plants.

If the area is prime farmland and/or soil productivity is consistent with that needed for post-mining use, the A horizon shall be removed and stockpiled separately from other soil material. The B horizon (or part of the C horizon or other underlying layers suitable for root development) shall be removed and segregated for use as subsoil. The minimum depth of the soil and the soil material to be reconstructed shall be 48 inches (122 cm) or equal to the depth of the subsurface horizon in the natural soil, whichever is less. If root-inhibiting layers, such as bedrock or a fragipan underlie the natural soil, the reconstructed depth shall be no less than the rooting depth of the original soil.

For soils that are not prime farmland, the A horizon shall be removed for use as surface soil on disturbed areas. If the A horizon is less than 6 inches (15 cm) thick, material (other than bedrock) immediately below the A horizon shall be removed and used to obtain this thickness. If the total thickness of the available material is less than 6 inches (15 cm), all unconsolidated material shall be used.

Soils with restrictive properties such as high electrical conductivity (EC), calcium carbonate, or sodium shall be separated and treated as practicable.

Removal of Overburden Material for Use as Topsoil. Selected overburden material can be substituted for or added to the material in the A and B horizons. Where this alternative is considered, field observations, supported by chemical and physical laboratory analyses, must demonstrate that the overburden material, (or a mixture of overburden and original topsoil) is better suited to restoring the capability and productivity than the original A and B horizon material. Analyses shall include determination of pH value; sulfide content; percentage of organic material; nitrogen, phosphorus and potassium contents; sodium absorption ratio (SAR); electrical conductivity (EC); texture; and available water capacity. Field-site trials or greenhouse tests shall be conducted if needed to ascertain the feasibility of using overburden material.

If the overburden material is determined to be suitable, it shall be removed, separated from other material and replaced according to the requirements specified in this standard.

Storage of Soil Material. If it is impractical to spread the material immediately after the land is regraded, it must be stockpiled. Stockpiles shall be selectively located and protected against wind and water erosion, particulate matter generation, unnecessary compaction, and contamination by undesirable materials.

Replacement of Soil Material. Before spreading topsoil, the regraded areas must be scarified or otherwise treated to eliminate slippage surfaces and to promote root penetration.

Topsoil shall be spread in a manner that:

1. Insures that the position and thickness of each horizon is equivalent to those in the undisturbed soil.
2. Prevents excess compaction. The bulk density and soil strength of the reconstructed soil when moist must permit the soil to support plant growth at a level equivalent to that of a similar layer in undisturbed soil.

Nutrients and Soil Amendments. Soil amendments and plant nutrients shall be applied to the site based on soil test recommendations, to achieve the physical and chemical soil conditions suitable to support plant growth.

Additional Criteria to Reduce Erosion and Sedimentation

For all post-mining land uses, develop a resource management system that reduces water and wind erosion to acceptable levels for the planned use of the site.

The resource management system shall consider practices that will reduce sediment erosion, transport, and delivery from the reclamation site. Potentially applicable NRCS Conservation Practice Standards include, but are not limited to:

- (393) Filter Strips;
- (391A) Riparian Forest Buffers;
- (332) Contour Buffer Strips; and
- (342) Critical Area Planting.

Establishment of Vegetation. Plant materials established on the site shall be adapted to the site conditions, and appropriate for the intended use of the site.

Seedbed preparation, seeding rates, dates of planting, and planting methods shall be consistent with the intended use of the site and approved local criteria.

Additional Criteria to Maintain or Improve the Visual Quality of the Landscape

The appearance of the reclaimed site shall be in accordance with standards for maintaining and improving the visual quality of the landscape, and shall be compatible with the adjacent landscape.

Areas of high public visibility (or those offering direct or indirect human benefits) shall be evaluated and considered in landscape resource management planning and design.

Additional Criteria to Protect Public Health, Safety and General Welfare

Provisions must be made to reduce potential safety hazards, erosion, and water quality degradation in areas that have highwalls and landslides. Treatment shall meet or exceed the requirements of NRCS Conservation Practice Standards for Land Reclamation - Landslide Treatment (453) and Highwall Treatment (456) as appropriate.

Provisions must be made to identify and reduce safety and contamination hazards posed by any subsurface shafts or tunnels that may be present in the area to be reclaimed. The State Conservation Engineer shall review any projects where subsurface shafts or tunnels are identified that impact or are impacted by the reconstruction project.

CONSIDERATIONS

Cultural Resource Considerations

NRCS' objective is to avoid any effect to cultural resources and protect them in their original location. Determine if installation of this practice will have any effect on any cultural resources.

Document any specific considerations for cultural resources in the design docket and the Practice Requirements Worksheet.

GM 420, Part 401, the California Environmental Handbook and the California Environmental Assessment Worksheet provide guidance on how the NRCS must account for cultural resources. The Field Office Technical Guide, Section II contains general information, with internet sites for additional information.

Endangered Species Considerations

Determine if installation of this practice with any others proposed will have any effect on any federal or state listed Rare, Threatened, or Endangered species or their habitat. NRCS' objective is to benefit these species and others of concern, or at least not have any adverse effect on a listed species. If the Environmental Evaluation indicated the action may adversely affect a listed species or result in adverse modification of habitat of listed species which has been determined to be critical habitat, NRCS will advise the land user of the requirements of the Endangered Species Act and recommend alternative conservation treatments for installation; or at the request of the landowners, the NRCS may initiate consultation with the U.S. Fish and Wildlife Service, NOAA Fisheries (National Marine Fisheries Service), and/or California Department of Fish and Game. If the Environmental Evaluation indicates the action will not affect a listed species or result in adverse modification of critical habitat, consultation generally will not apply and usually would not be initiated. Document any special considerations for endangered species in the Practice Requirements Worksheet.

Some species are year-round residents in some streams, such as freshwater shrimp. Other species, such as steelhead and salmon, utilize streams during various seasons. Be aware that during critical periods, such as spawning, eggs in gravels, and rearing of young, may preclude activities in the stream that may directly affect the stream habitat during those periods. For example, there should be no disturbance of stream gravel beds that may have eggs in them. That could include any equipment in the stream or even walking in the stream or work upstream that may result in sediment depositing in the gravel beds. Document any special considerations for endangered species in the Practice Requirements Worksheet.

Water Quantity

1. Effects on the water budget, especially on volumes and rates of runoff, evaporation, and infiltration;
2. Potential for changes in plant growth and transpiration because of changes in soil water.

Water Quality

1. Effects on erosion and transport of sediment and sediment-attached contaminants by surface runoff;
2. Effects on the mobilization and transport of pathogens and soluble contaminants by surface runoff, and by infiltration to the vadose zone and groundwater;
3. Effects on the chemical quality of the surface and subsurface waters draining from the reclamation site, including pH and temperature;
4. A special concern is the potential for uncovering or redistributing toxic materials from earth moving activities.

Other Considerations

Consider locations for storage of soil material, access roads and possible permanent impoundments. Planning, design, and construction shall be in accordance with the appropriate NRCS Conservation Practice Standard (e.g. 560, Access Roads).

Consider measures for placement of spoil, water disposal and replacement of soil material, restoration of soil productivity, and revegetation of disturbed areas.

Consider measures to maintain or enhance landscape resources.

The use of organic materials such as manure, compost, mulch or sewage sludge can contribute to the success of vegetative establishment and the long-term success of plantings. Such materials also can increase the organic matter content of the soil.

Consider planting reclaimed areas to perennial vegetation to sequester carbon.

Reclamation has great potential for increasing or improving wildlife habitat in the reclaimed area. Avoid monocultures when developing vegetative specifications. Additional guidance regarding the revegetation of disturbed lands is available in Van Kekerix and Kay (1986), and Newton and Claassen (2003).

PLANS AND SPECIFICATIONS

Plans and specifications for reconstructing currently mined land shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose.

A reclamation plan must be developed for each site. The plan must specify the required procedures for conducting reclamation operations.

Plans shall include provisions for the disposal of toxic materials that may be uncovered as a result of earth moving and reclamation activities.

OPERATION AND MAINTENANCE

An O&M plan shall be prepared that provides specific details concerning maintenance and operation of conservation practices identified in the reclamation plan. The O&M plan shall specify procedures for:

- Filling areas where settlement may adversely affect drainage and the intended land use;
- Adding soil amendments to soils that cannot support adequate vegetation or replacing them with suitable soil material;
- On sites established to perennial vegetation, promptly repairing and revegetating bare spots, eroded areas, areas of excessive settlement, and other areas on which the initial attempt to establish vegetation was not successful;
- Maintaining access roads;
- Keeping drainage structures and channels clean and functional;
- Applying fertilizer and lime as appropriate;
- Controlling weeds;
- Proper grazing management where applicable; and
- Controlling vehicular and pedestrian traffic.

REFERENCES

California Dept. of Conservation, Office of Mine Reclamation, May 2004, Surface Mining and Reclamation Act of 1975 and Associated Regulations: http://www.consrv.ca.gov/OMR/smara/; 87 p.

Chepil, W.S., 1956, Influence of moisture on erodibility of soil by wind: Soil Sci. Soc. Am. Proc., Vol. 20, pp. 288-292.

Newton, G.A., and Claassen, V.P.,2003, Rehabilitation of Disturbed Lands in California: A Manual for Decision-Making: California Geological Survey Special Publication 123, http://www.consrv.ca.gov/OMR/qh_publications.htm, 240 p.

USDA- Soil Conservation Service (Soil Survey Division Staff), Oct. 1993, Soil Survey Manual: Revision of USDA Handbook No. 18, 437 p.

Van Kekerix, L., and Kay, B.L., 1986, Revegetation of Disturbed Land in California: An Element of Mined-Land Reclamation: California Division of Mines and Geology (renamed California Geological Survey) Open-File Report 86-14 SAC, 105 p.