

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

LAND RECLAMATION, ABANDONED MINED LAND

(Ac.)

CODE 543

DEFINITION

Reclamation of land and water areas adversely affected by past mining activities

PURPOSE

- Stabilize abandoned mined areas to decrease erosion and sedimentation, support desirable vegetation, and improve offsite water quality and or quantity
- Maintain or improve landscape visual and functional quality
- Protect public health, safety and general welfare

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to abandoned mined land that degrades the quality of the environment and prevents or interferes with the beneficial uses of soil, water, air, plant or animal resources, or endangers human health and safety.

CRITERIA

General Criteria Applicable to All Purposes

Develop a reclamation plan that is consistent with the site capability, the planned land use and the landowner's conservation objectives. Include practices necessary to reclaim and stabilize the mined areas to prevent further degradation of soil, water, air, plant and animal resources.

Reclamation plans must comply with all local, State and Federal laws and regulations relating to weed control policies and abandoned mined land reclamation.

Dust control

Control the generation of particulate matter and fugitive dust during removal and replacement of soil and other materials. Detail the practices and activities necessary for dust control in the plans and specifications. Practices and activities for dust control may include controlling vehicular traffic, modifying soil moisture content, and/or establishment of temporary vegetation as needed.

Site preparation

Properly identify areas for preservation including those containing desirable trees, shrubs, grasses, stream corridors, natural springs, historic structures or other important features.

Remove trees, logs, brush, rubbish and other debris from construction areas that can interfere with reclamation operations. Dispose of these materials so they will not create a resource problem or interfere with reclamation activities and the planned land use.

Remove or bury soil materials that will adversely affect water quality or plant growth. Bury materials containing heavy metals below the root zone, or add suitable soil amendments to minimize the negative effect of this material.

Slope overhanging rock walls to ½ horizontal to one vertical slope or flatter, before placing backfill against the wall. Place fill material in successive layers to decrease settling and seepage through the backfill. Specify the thickness and density of compaction for each layer in the plans and specifications.

Removal and placement of material for final cover

Salvage, stockpile and protect soil materials from the site that are suitable for use as final cover material. Control prohibited noxious and or invasive plant species in the stockpile area according to a pest management plan that is consistent with the Pest Management 595, Conservation Practice Standard.

Reconstructed soils must meet the requirements for the specified land use on at least 80 percent of the area. Soils in the remaining areas must be suitable for stabilization and revegetation.

Spread the final cover material over the graded areas to the depth specified in the reclamation plan. The final slope must permit application of needed structural and management practices to keep soil losses within planned levels. If settlement is likely to interfere with the planned land use, surface drainage or water disposal, compensate for expected settlement during final grading.

Erosion and sediment control during construction

Plan and implement conservation practices that will decrease erosion and trap sediment onsite during construction, to limit offsite damages from sedimentation to acceptable levels.

Runoff control

Plan and implement runoff control practices to control erosion for final stabilization of the site. The practices selected must be compatible with the final planned land use of the site.

Vegetation establishment

Plans for vegetation establishment will be consistent with the Colorado Critical Area Planting 342, Conservation Practice Standard.

Select plant materials suitable for the specified end land use according to local climate potential, site conditions and Colorado Plant Materials Technical Note 59, Plant Suitability and Seeding Rates for Conservation Plantings in Colorado.

Complete a CO-ECS-5, Grass Seeding Planned and Applied, for each seed mix included in the plan.

Apply soil amendments and or plant nutrients as appropriate, according to the Colorado Nutrient Management 590, Conservation Practice Standard. If the recommended fertilizer rate exceeds Nutrient Management Standard Criteria, plan appropriate mitigating practices to decrease the risk of nutrient losses from the site.

Complete site preparation, planting and seeding operations at a time and in a manner to ensure survival and growth of the selected species. Identify the criteria for successful establishment of vegetation such as minimum percent ground/canopy cover, percent survival or stand density, in the plans and specifications.

Borrow area restoration

If cover or fill materials are taken from areas outside the reclamation site, grade and shape the borrow area(s) for proper drainage, and then revegetate to control erosion.

If the cover material is taken from adjacent land, the topsoil from the borrow area must be stockpiled separately and replaced after the borrow area is restored for its intended purpose.

If the borrow area is prime farmland, remove and stockpile the A and B soil horizons separately by horizon (or the B and C soil horizons if applicable). Replace the soil horizons on the borrow area in the natural sequence to a thickness that will restore the original soil productivity. Treat the borrow area to meet the requirements of the Colorado Land Reclamation, Currently Mined Land 544, Conservation Practice Standard.

Additional Criteria to Maintain or Improve Landscape Visual and Functional Quality

Reclaim the site to maintain or improve visual quality, based on the scenic quality and function of the reclaimed site, for the end land use. Plan the reclamation to be compatible with the topography and land cover of the adjacent landscape. Focus on areas of high public visibility, and those offering direct or indirect human and wildlife benefits.

Grade and shape spoil piles and borrow areas to blend with the adjacent landscape topography to the extent practicable.

Develop a planting plan that mimics the species, arrangement, spacing and density of plants growing on adjacent landscapes. Select native species for erosion control and other purposes, where practical. Arrange plantings to screen views, delineate open space, act as windbreaks, serve as parkland, provide wildlife habitat or protect stream corridors.

Additional Criteria to Protect Public Health, Safety and General Welfare

Reclamation plans must eliminate the safety hazards to the public from, erosion and water pollution, high walls, pools of water with steep side slopes that are difficult to escape from, land slide potential and underground mine openings.

Design treatment alternatives that meet or exceed the requirements of the following conservation practices based upon the site hazards; Land Reclamation, Landslide Treatment, 453; Land Reclamation, Highwall Treatment, 456, and/or; Mine Shaft and Adit Closing, 457.

CONSIDERATIONS

The reclamation of abandoned mine lands provides an opportunity to increase carbon sequestration. Choose species such as deep-rooted perennial grasses and trees to increase the carbon sequestration potential of the reclaimed site.

The key to a successful restoration is often dependent upon the proper placement of soils that will best support vegetation. One means to do this is to develop a detailed soil survey for the project and proposed borrow areas. Use the soil survey to identify the types and extent of soil materials and those that will best support vegetation.

Soil permeability is often a problem on reclaimed soils. Improve soil permeability after placing backfill material by using tillage or deep ripping to decrease compaction, and promote infiltration and root development. Do not plan practices to promote infiltration if seepage through cover materials can increase acid mine drainage.

Maintenance activities should be completed on a regular basis after the initial reclamation, to ensure success. The construction of stabilized access roads will allow access to the site for maintenance, without causing erosion problems.

Reclaimed mine areas can provide important wildlife habitat. Improve the potential for wildlife habitat by establishing diverse vegetation types, including water in the reclaimed landscape, increasing edge effect and diverse landforms. Avoid monocultures of vegetation if possible.

Reclaimed soils are often low in organic matter. The use of organic soil amendments such as manure, compost, mulch or sewage sludge can contribute to the success of vegetative establishment by increasing soil organic matter.

Abandoned mine sites may include buildings or other structures either on or eligible for the National Register of Historic Places (NRHP). Include a cultural resources (Section 106) review of the site during planning to determine what actions need to take place. Structures that are on or eligible for the NRHP should be considered and recorded. Under NRHP regulations (36 CFR part 800), structures that present a hazard may be removed or destroyed after proper recording and consultation with the State Historic Preservation Officer and appropriate tribes.

Include native, non-invasive vegetative species in the reclamation plan, as appropriate.

Consider washing all equipment utilized in project activities, before leaving the site.

PLANS AND SPECIFICATIONS

Prepare plans and specifications for each treatment unit according to the Criteria included in this standard.

Specifications shall describe the requirements for applying this practice to meet the intended purpose.

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

As a minimum, include the following information in the plans and specification for the reclamation area.

- Location of the reclamation area
- Plans showing the final grading and soil preparation to take place on the reclamation area
- The location of topsoil stockpiles
- The location of erosion and sediment control practices

- Detail information for the installation of erosion and sediment control practices
- Detail information on nutrients and soil amendments to be applied to the site
- Detail information on the species and arrangement of plant materials to be planted on the site

OPERATION AND MAINTENANCE

Prepare an Operation and Maintenance plan that provides specific details concerning conservation practices identified in the reclamation plan. As a minimum, include the following items in the operation and maintenance plan.

- Monitor the site for areas where settlement may adversely affect drainage and land use
- Monitor the site for bare spots, eroded areas, areas of excessive settlement and other areas where initial attempts to establish vegetation were not successful
- Monitor soil fertility and check vegetation to determine if additional nutrients or soil amendments are needed
- Maintain access roads
- Maintain drainage structures and channels
- Monitor the site for noxious weeds and invasive species
- Control vehicular traffic to minimize disturbance to reclaimed areas

REFERENCES

Colorado FOTG, Section I. Plant Materials Technical Note No. 59. Plant Suitability and Seeding Rates for Conservation Plantings in Colorado. 2002. USDA, NRCS. Lakewood, CO. http://efotg.nrcs.usda.gov/references/public/CO/COPMTN_59.pdf

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Soil Survey Division Staff. 1993. Soil survey manual. Pp. 90-92. USDA, SCS. Handbook 18. <http://soils.usda.gov/technical/manual/>