

**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.

PURPOSE

- Prevent permanent damage to soil and water resources in and near mined areas.
- Restore the productivity 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

On areas that are or will be undergoing surface mining operations.

This standard applies to the identification, removal, stockpiling, and replacement of soil materials on currently mined land. It also applies to nearby areas that can be affected by the mining of various minerals or commodities.

CRITERIA

General Criteria Applicable to All Purposes

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

Texas regulations pertaining to mining and reclamation

Coal:

- Coal Mining Regulations (16 Texas Admin. Code § 12.1 et seq.) as provided by the Office of the Secretary of State.
- Texas Surface Coal Mining and Reclamation Act (Tex. Nat. Res. Code Ann. § 134.001 et seq.) as provided by the Texas Legislative Council.

Uranium:

- Substantive Rules- Uranium Mining (16 Texas Admin. Code § 11.71 et seq.) as provided by the Office of the Secretary of State.
- Texas Uranium Surface Mining and Reclamation Act (Tex. Nat. Res. Code Ann. § 131 et seq.) as provided by the Texas Legislative Council.

Iron Ore:

- Iron Ore/Iron Ore Gravel (Tex. Nat. Res. Code Ann. § 134.012 et seq.) as provided by the Texas Legislative Council. Coal Mining Regulations, Title 16, Texas Administrative Code, Chapter 12; Railroad Commission of Texas.

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service.

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Federal Regulations

- Surface Mining Control and Reclamation Act of 1977 (SMCRA), 30 U.S.C. 1201 et seq.
- 30 CFR 785.17, 816.22, and part 823.
- Federal Register/Vol. 64, No. 124, Tuesday, June 29, 1999/Notices, pages 34770-34778.

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

Removal of material for soil reconstruction – Prime Farmland. 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** as defined by the Railroad Commission of Texas (RCT) the A horizon, or other suitable soil material which will create a final soil having a greater productive capacity than that which originally existed prior to mining shall be removed and stockpiled separately. 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 amount of soil removed and stored will be sufficient to meet the requirements stated in the soil replacement-prime farmland section of this standard.

Soil Stockpiling-Prime Farmland

If not utilized immediately, A horizon or other suitable material will be stockpiled separately from the spoil and all other excavated material.

If not utilized immediately, B and/or C-horizon or other suitable material will be stockpiled separately from the spoil and all other

excavated materials. Where combination of such soil materials has been shown to be equally or more favorable for plant growth than the B-horizon, separate handling is not necessary.

Stockpiles will be placed where they will not be disturbed or subject to excessive erosion. If stockpiles are left in place for more than 30 days, a temporary cover of non-noxious quick-growing annual herbaceous vegetation will be established on the stockpile.

Unless approved by the Railroad Commission of Texas, the stockpiles will not be moved until they are to be placed in their final location.

Soil Replacement-Prime Farmland

The physical and chemical characteristics of the reconstructed soils and soil descriptions containing soil horizon depths, soil densities, soil pH, and other specifications will be such that reconstructed soils will have the capability of achieving levels of yield equal to, or higher than, those of non-mined prime farmland in the surrounding area.

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 fragipan, underlie the natural soil, the reconstructed depth shall be no less than the rooting depth of the original soil.

The soil material will only be replaced on land that has been first returned to final grade and scarified according to the RCT rules, unless site specific evidence is provided and approved by the RCT showing that scarification will not enhance the capability of the reconstructed soil to achieve equivalent or higher levels of soil productivity.

The soil horizons or other rooting zone soil material will be replaced and regraded in a manner that:

- ❖ Insures that the position and thickness of each horizon is equivalent to those in the undisturbed soil.
- ❖ 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

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equivalent to that of a similar layer in undisturbed soil.

The B-horizon, C-horizon, or other suitable soil material will be replaced to meet the minimum depth requirements stated previously in this section.

The A-horizon or other suitable soil materials shall be replaced as the final surface layer. This surface material shall equal or exceed the thickness of the original surface layer, as determined by the detailed pre-mined soil survey. This material will be placed in a manner that protects the surface layer from wind and water erosion before it is seeded or planted.

Recommended nutrients or soil amendments to achieve quick cover will be applied at this time according to Nutrient Management Standard (590).

Restoration of Soil Productivity-Prime Farmland

- ❖ Prime farmland soil productivity shall be initiated within 10 years of the completion of soil replacement.
- ❖ Soil productivity will be measured on a representative sample or on all of the mined and reclaimed prime farmland area using a reference crop. A statistically valid sampling technique at a 90% or greater statistical confidence level shall be used as approved by the RCT in consultation with the NRCS.

The measurement period for determining average annual crop production will be a minimum of 3 years prior to the release of the operator performance bond.

The level of management during the measurement period will be the same as that used on non-mined prime farmland in the surrounding area.

Restoration will be considered achieved when the average yield during the measurement period equals or exceeds the average yield of the reference crop established for the same period on non-mined soils of the same or similar texture or slope phase of the soil series in the surrounding area under equivalent management practices.

The reference crop on which restoration of soil productivity is proven shall be selected from the crops most commonly produced on the surrounding prime farmland. Where row crops are the dominant crops grown on prime farmland in the area, the row crop requiring the greatest rooting depth shall be chosen as one of the reference crops.

Reference crop yields for a given crop season are to be determined from:

- ❖ The current yield records of representative local farms in the surrounding area, with concurrence by the NRCS; or
- ❖ The average county yields recognized by the USDA, which have been adjusted by the NRCS for local yield variation within the county that is associated with differences between non-mined prime farmland and all other soils that produce the reference crop.

The average reference crop yield may be adjusted, with concurrence of the NRCS for;

- ❖ Disease, pest, and weather induced seasonal variations; or
- ❖ Differences in specific management practices where the overall management practices of the crops being compared are equivalent.

Removal of material for soil reconstruction –not prime farmland, as defined by the RCT

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.

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 (45 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 identified with high electrical conductivity (EC), calcium carbonate, sodium or other restrictive properties shall be separated and treated if practical.

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. Before this is done, field observations and/or chemical and physical laboratory analyses must be done which 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 must be removed, segregated 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, unnecessary compaction, and contamination by undesirable materials. If stockpiles are left in place for more than 30 days, a temporary cover of non-noxious quick-growing annual herbaceous vegetation will be established on the stockpile.

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. After the topsoil has been spread on the disturbed areas, nutrients and soil amendments shall be applied according to Texas NRCS standard 590-Nutrient Management.

Additional Criteria to Reduce Erosion and Sedimentation

For all post-mining land uses, develop a resource management system that reduces water and/or wind erosion to acceptable levels.

Revegetation Requirements

Perennial vegetation will be established on regraded and on all other disturbed areas except water areas and surface areas of roads that are approved as part of the post mining land use and in accordance with the RCT permit and reclamation plan. The vegetation will be:

- ❖ Diverse, effective, and permanent;
- ❖ Comprised of species native to the area or introduced species where desirable and necessary to achieve the approved postmining land use and approved by the RCT;
- ❖ At least equal in extent of cover to the natural vegetation of the area;
- ❖ Capable of stabilizing the soil from erosion.

The reestablished plant species shall:

- ❖ Be compatible with the approved postmining land use;
- ❖ Have the same seasonal characteristics of growth as the original vegetation;
- ❖ Be capable of self generation and plant succession;
- ❖ Be compatible with the plant and animal species of the area; and
- ❖ Meet the requirements of applicable State and Federal seed, poisonous and noxious plant, and introduced species laws or regulations.

See [Appendix 1](#) of this standard for herbaceous seeding rates and dates that may be used with this standard. Other practices such as wildlife

upland habitat management, wildlife wetland habitat management, tree planting, or other appropriate standards should be consulted if woody species are to be established as part of the approved reclamation plan.

Permanent seeding/planting will be established during the first normal planting period following the final shaping and grading of the site. If shaping and grading is completed outside the normal range of permanent species planting dates and there is a significant erosion hazard, a temporary cover of annual grasses or legumes will be established until a permanent cover is established. When temporary cover or dead litter crops are needed prior to seeding permanent cover, refer to [Appendix 2](#).

The resource management system shall consider buffer practices, such as filter strips, riparian forest buffers, contour buffer strips or similar practices that will reduce sediment delivery off the reclamation site.

As a minimum the reestablished vegetation will meet the intended post mining land use and the following conditions:

- ❖ For areas developed as grazingland, pastureland, or underdeveloped land use, the ground cover and production of living plants on the revegetated area will be at least equal to that of a reference area or other standards approved by the RCT;
- ❖ For areas developed as cropland, crop production on the revegetated area will be at least equal to that of reference area or other standards approved by RCT;
- ❖ For areas to be developed for fish and wildlife habitat, recreation, shelterbelts, or forest products, success of vegetation will be determined on a basis of tree and shrub stocking and vegetative ground cover.
- ❖ Minimum stocking and planting arrangements will be specified by the RCT on the basis of local and regional conditions in consultation with state agencies responsible for wildlife and forestry.
- ❖ Trees and shrubs that will be used in determining the success of stocking and the adequacy of the plant arrangement shall have utility in the post mining land use.

Trees and shrubs counted in determining such success will be healthy and have been in place for not less than 2 growing seasons; and

- ❖ Vegetative ground cover will not be less that required to achieve the intended postmining use.
- ❖ For areas developed for industrial / commercial or residential land use less than 2 years after regrading is completed, the vegetative ground cover will not be less than that required to control erosion; and
- ❖ For areas previously disturbed by mining that were not reclaimed to the requirements of this standard, and are that remined or redisturbed by surface coal mining, the vegetative ground cover will not be less than the ground cover existing before redisturbance and shall be adequate to control erosion.

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.

CONSIDERATIONS

Evaluate water and other related resources.

Consider locations for storage of soil material, access roads, and possible permanent impoundments.

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

Consider measures to maintain or enhance landscape resources.

A special concern is the potential for uncovering or redistributing toxic materials from earth moving activities.

Consider cultural resources when planning, installation, and maintenance. This practice may adversely affect cultural resources and should comply with 420 GM Part 401 concerning cultural resources.

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.

OPERATION AND MAINTENANCE

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

- filling areas where settlement may adversely affect drainage and land use
- promptly repairing and revegetating bare spots and eroded areas
- adding soil amendments to soils that cannot support adequate vegetation or replacing them with suitable soil material
- maintaining access roads
- keeping drainage structures and channels clean and functional
- applying fertilizer and lime
- controlling weeds
- using proper grazing practices
- controlling vehicular traffic

