3.2.1.7 CARBON SEQUESTRATION ON RECLAIMED MINED LANDS

Technology Description

Hundreds of thousands of hectares of lands are disturbed by extracting minerals, particularly coal, in the United States annually. Topsoils are generally removed prior to mining, resulting in loss of soil organic matter. Stockpiling of the topsoil until it is needed for reclamation of the mined lands also results in a loss of soil organic matter through decomposition with only limited inputs. These degraded lands have a significant potential to sequester carbon once revegetated to grasslands, pastures, cropland, or forest; and, because the land is currently nonproductive, additional GHG benefits are relatively easy to demonstrate.

System Concepts

- Climatic condition is the single most important factor in determining revegetation success.
- Nearly 1.6 million acres in the Unites States have been affected by mining operations, and are currently classified as Abandoned Mined Lands. The soils at these abandoned mining sites only marginally support regrowth of trees and vegetation in the absence of direct management, resulting in erosion and runoff into receiving tributaries.
- Carbon sequestration by these mined lands can be enhanced with organic amendments such as biosolids, sawmill residues, feedlot wastes, and other organic or inorganic byproducts that result in enhanced nutrient status or improved physical characteristics of the restored soil.

Representative Technology or Practices

- Grassland, cropland, and forest restoration on reclaimed or abandoned mine lands.

Technology/Practice Status and Application

- Limited data exist as to the actual quantification of sequestered carbon by reclaimed mined lands.
- These lands should have the potential to sequester carbon at a rate similar to degraded croplands.
- Organic residues have been used on reclaimed mine lands, generally to dispose of the residue rather than consider its benefits in carbon sequestration.

Current Research, Development, and Demonstration

RD&D Goals

- Quantify carbon sequestration on reclaimed mined lands to enable better estimates of the potential of this large land area to sequester carbon.
- Evaluate the extent to which various management practices on reclaimed mined lands enhance carbon sequestration (i.e., measure the effects of organic and inorganic residues, grazing, plant biodiversity, and various shrubs and trees on soil carbon).
- Establish the role of various plant community attributes in carbon sequestration in semi-arid regions of the United States.
- Partner with private organizations and the public sector to sequester carbon and restore impacted lands.
- Develop demonstration projects that promote carbon sequestration and other collateral benefits as primary goals of mine reclamation.

RD&D Challenges

- Establish a sequence of studies across variable climatic zones to adequately address the soil variables, plant community attributes, and response of amendments to the various climatic conditions and management scenarios.
- Changing current industry practices, which encourage compaction of soils.

RD&D Activities

- Ongoing research in the eastern U.S. mining regions evaluates the impacts of planting trees and establishing grasses to reclaim mined lands, and provides estimates of the potential carbon sequestration from these practices.
- Researchers are revising growth and yield models to determine the optimal time of harvest for maximum carbon sequestration.
- Field demonstrations in Kentucky and Virginia are reforesting Abandoned Mined Lands, sponsored through the DOE/FE Sequestration Program.

Recent Progress
• Community-based environmental groups are working with coal and utility companies to reclaim impacted lands, forming successful partnerships. • Department of Interior, Office of Surface Mining reforestation initiative. Formal agreements between NETL and OSM to produce primer on reforesting mined lands. Active involvement and collaboration between DOE/FE and OSM with industry involvement through the Electric Power Research Institute.