

## Sugarite Gob Reclamation Project - Phase I



The Sugarite Gob Reclamation Project – Phase I is located about six miles northeast of Raton in Colfax County, New Mexico. The project area is on unplatted public and private land within the Maxwell Land Grant.

The project involved reclaiming and controlling erosion at part of one of the large coal mine waste piles and at one small coal waste pile in Sugarite Canyon.

This phase of the project included the following work:

- Construction of two rock check dams, a rock rundown and a gabion structure;
- Branch packing at gullies;
- Construction of straw bale terraces and sediment log check dams;
- Planting of seedlings, including maintenance and protection for six months;
- Placement of live stakes and live fascines where specified; and
- Hydroseeding of designated areas and areas disturbed by construction using a gypsum-based bonded fiber matrix.

The contractor was Lopez Excavation of Penasco, NM.

**Year Completed:** 1999

**Cost:** \$213,430.32

**Project Engineer:** John Kretzmann, P.E.

**Project Manager:** Randall Armijo

Sugarite is located in northeastern New Mexico, in a deep canyon on the edge of the Great Plains and a few miles south of the border with Colorado. In the years 1901 through 1941, coal was mined in Sugarite Canyon serving the domestic fuel market in New Mexico and east to Kansas. As many as 250 miners, largely immigrant, were on the payroll and a company mining town of up to 600 people flourished at the base of the canyon.

Waste rock from the underground mines on both sides of the canyon was brought to the surface and dumped, creating steep mine dumps. In a couple of places the mine waste piles almost reached the usually perennial stream 300 feet in elevation below the mine entries. Coal mine waste dumping eventually impacted a total of 22 acres.

Today the mine waste piles are located within Sugarite Canyon State Park, where the history of coal mining in the area is celebrated in a museum display, hiking trails through the ruins of the town site and to the edges of the mine waste piles, and reconstruction of the original mule barn and town post office. As part of the historic coal mining landscape in a heavily visited, publicly owned area, the State Historic Preservation Office required that the Bureau reclaim the mine waste piles in place and without significant alteration.

The coal mine waste is largely composed of shale fragments, with some sandstone and coal pieces. Weathering of the material has produced a soil high in clay content, with samples averaging 40 percent clay. The soil is moderately acid with pH averaging 5.8 and mildly saline, with electrical conductivities averaging 4.5 mmhos/cm. The main deterrent to plant growth, however, appears to be sodium with sodium absorption ratios for the coal gob averaging 24, and in one sample as high as 43. This compares with generally acceptable SAR values of below 8 for soils with high clay content.

Excess sodium results in poor soil aeration, slow infiltration rates, and causes serious nutritional disturbances in plants by affecting the availability of calcium, magnesium, and other ions required by plants. Slopes on the gob piles are extremely steep, averaging about 2:1, are rapidly eroding, and are extensively gullied, in some places to as much as twenty feet deep. At gully side walls, slopes are nearly vertical and are steeper than 1:1 at landslide scarps. The site is in one of the wetter areas of New Mexico, receiving an average of about 20 inches of precipitation per year.

The five largest gob piles all have signs of one or more landslides – hummocky, irregular, flatter slopes below steep upper slopes – although site inspections and slope stability analyses lead AML to conclude that the slopes are largely stable from further mass movement.

AML objectives for the project are then three-fold (and to some extent contradictory):

1. to improve water quality in Chicorica Creek, which is used for trout fishing and downstream irrigation, by reducing the rapid rate of erosion on the gob piles;
2. to preserve historic mining structures and mine waste piles;
3. to reduce the physical hazards for visitors of deep gullies and steep slopes on the waste piles.

