Western Regional and People's Choice Awards

Sugarite Canyon Coal Mine Reclamation Project
Raton, New Mexico

Completed by:
New Mexico Energy, Minerals and Natural Resources Department
Mining and Minerals Division
Abandoned Mine Land Bureau

Project date: April 12, 2000 - December 31, 2001, at a cost of $ 1,092,244.43.

Background

Prior to the late 19th Century, Sugarite Canyon was part of the historic Maxwell Land Grant, which was conveyed from the Mexican government in 1841. The original land grant was inherited by Lucien Maxwell and by 1866, he had expanded the land area to approximately 1.7 million acres, which was primarily used for cattle grazing. The expansion of the Atchinson, Topeka, and Santa Fe Railroad led to the development of water resources at the head of Sugarite Canyon, approximately six miles east of Raton, New Mexico. By 1892, additional demands for water by the railroad and the City of Raton resulted in the construction of Lake Alice in the upper region of the canyon. This was the first of three reservoirs constructed, supplying water to Raton and the railroad yards there via pipeline.

Prior to the turn of the 20th Century, several small coal mines were in operation in Sugarite Canyon. By 1906, the Santa Fe, Raton, and Eastern Railroad Company had constructed a spur up the canyon. By 1912, several larger mines were in operation, including substantial infrastructure, residences and a gravity-powered tram system to carry coal down the steep slopes of the canyon to a large tipple structure bridging the canyon floor.

The town of Sugarite was established around 1912 with the construction of a post office and school. The name "Sugarite" is a modification of the Comanche word "chicorica", the name of the creek that flows through the Canyon. In the Comanche tongue, chicorica means "land of the many birds." The majority of the first Sugarite workers were immigrants, typical of early coal mining operations in the West. The community included people from Europe, particularly Croatian, Irish, Italian, Polish, Scottish, and Slavic. Others came to the area from Japan and northern Mexico. The population varied with the fluctuations of the coal economy and ranged from 300 to 1000 people throughout the town's history.

The closing of the Sugarite Mine was announced on May 1, 1941, with the mines operating only 80 days in that year. By early 1942, the mines were completely closed and most of Sugarite's residents moved to Raton and other nearby towns. The mining company removed and sold most of the residences and other wooden buildings, leaving only cellars and rock foundations behind. Many of the houses were relocated to Raton and are still in use today.

The property was eventually sold to Kaiser Steel and was leased as grazing land until the mid 1960's, when the ownership reverted to the City of Raton. Currently, Sugarite Canyon is owned by the City of Raton and is operated under lease as a state park by the New Mexico Parks and Recreation Division of the Energy, Minerals and Natural Resources Department.

The area around Raton, New Mexico, is the site of the only known footprint of Tyrannosaurus Rex yet discovered in the world. T-Rex roamed the perimeters of the vast mudflat swamps in this region during the Cretaceous Era, 65 to 135 million years ago. Today, Sugarite Canyon still looks like dinosaur country. The transitions within the Canyon have been slow ones. From the foliage for T-Rex eons ago to an open range for Texas longhorn cattle of the 19th Century, to the noise and airborne coal dust emerging from a bustling mining camp, these steep slopes have been home to both man and beast. Now the Canyon has become a mecca for another critter which evolved from the 20th Century, the two-legged, work-bound, weekend recreational visitor. The area, which once was a place of hard work, little play, long hours and low pay, is now a welcomed retreat for the camper, hiker, fisherman, historian, and the sightseer. And the rustling in the gamel oak will be mule deer, cougar, black bear, turkey, or maybe a disoriented hiker who got off the trail.

The Problem

The New Mexico Abandoned Mine Land Bureau has been involved in mine safeguarding and reclamation efforts in the Sugarite Canyon since the mid 1980's. With the advent of Sugarite State Park in 1983, came a substantial increase in the number of people using the area for recreation. In order to eliminate the imminent danger to human life, health, and

This reclamation successfully stabilized sides of the steep-walled canyon which were covered with large areas of coal mine waste. Today, erosion is controlled, sediment prevented from washing into streams, and vegetation reestablished.

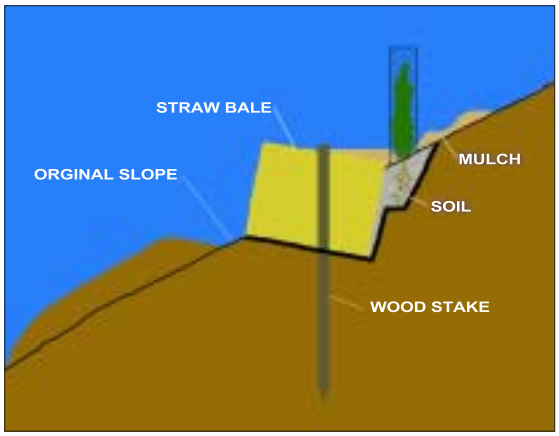
safety there was an increasing need for hazard abatement and reclamation of the remaining abandoned mine areas. In the mid 1960's, a fifteen year old boy fell to his death in a open air shaft in this same area.. The local community sealed off this particular hazard but many still remained.

During the early years of the Abandoned Mine Land Program under the Surface Mining Law, New Mexico abated most of the remaining priority 1 and 2 hazardous openings to the mine workings in the Canyon. It was obvious that something still had to be done to address the extensive coal gob heaps, which were badly eroded and gullied on the slopes of the steep walled canyon. Many of these waste piles were at or near their angle of repose, which represented a serious threat to hikers and other visitors to Sugarite State Park. These piles were also constantly eroding into the Chicorica Creek, causing toxicity and excessive sedimentation.

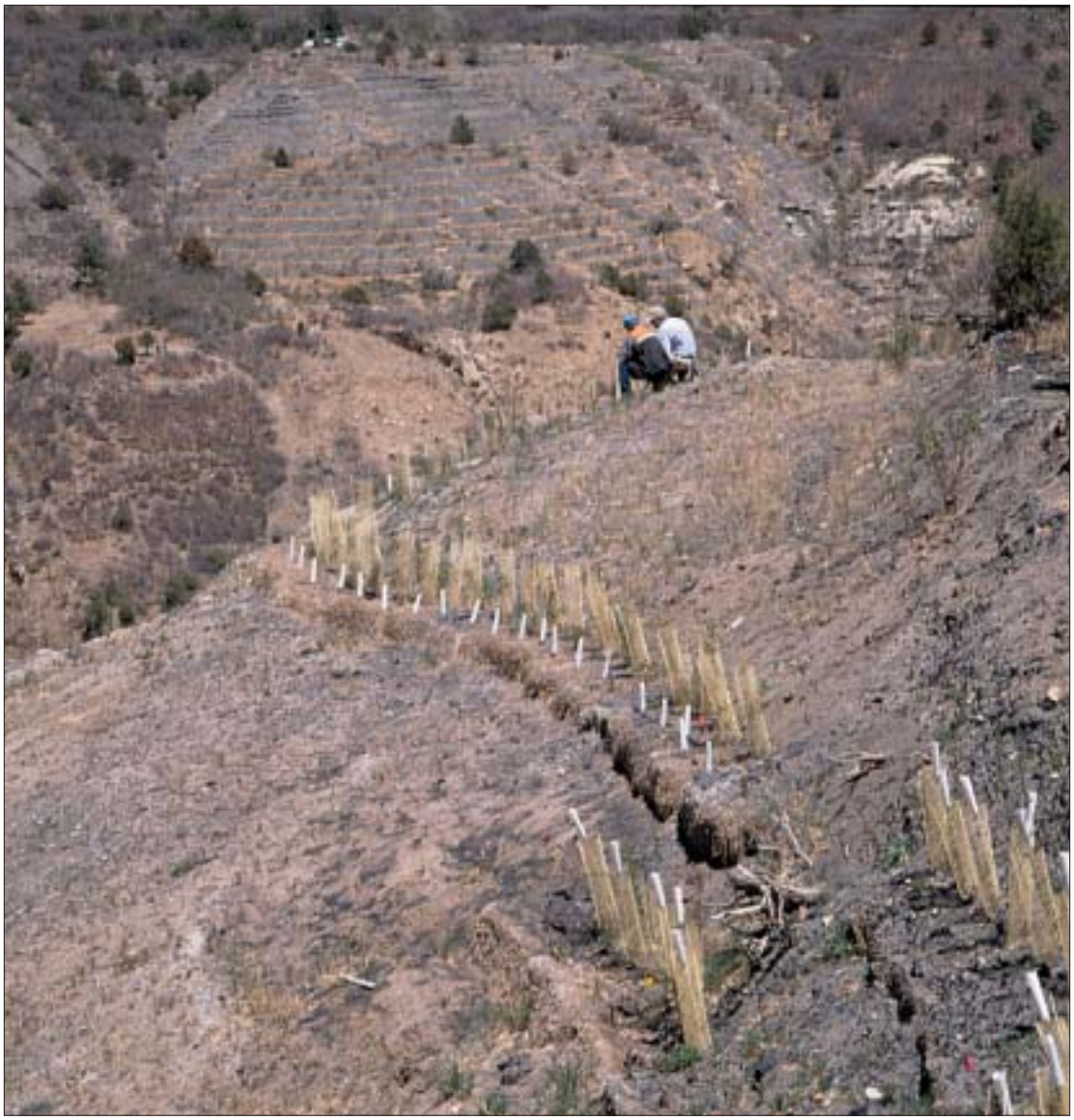
Project design

The Sugarite Coal Gob Reclamation Project focused on reclaiming and controlling gob waste piles located on these canyon walls. The reclamation of approximately 15 acres of coal gob incorporated the following work items:

- Construction of gully diversions
- Construction of gabion structures, to include PVC coated gabion drop structures with soil bioengineering installation
- Construction of straw bale terraces, coir roll terraces, diverter and spreader coir rolls, straw wattles, and sediment barrier dams
- Bank toe stabilization of Gob using juniper bales
- Branch packing of gullies in and near the Gob areas
- Incorporation of lime, compost and fertilizer into acidic slag gob sites
- Incorporation of wood waste, gypsum, lime, fertilizer and compost into gob areas with sodic clay material
- Placement of tackified straw mulch layer twelve inches deep over specified amendments at indicated gob areas
- Hydro-seeding of approximately 15 acres using a bonded-fiber matrix at designated areas
- Planting of seedlings, including maintenance and protection for six months



Construction of the straw-bale terraces slow water runoff and provide a long-term environment for the closely spaced vegetation planted around the hillside.



The New Mexico Abandoned Mine Land Bureau has been involved in mine reclamation efforts in the Sugarite Canyon since the mid 1980's. Here Office of Surface Mining and state staff examine tree and shrub plantings on an adjacent reclamation project. The award winning Sugarite Canyon reclamation can be seen across the canyon.

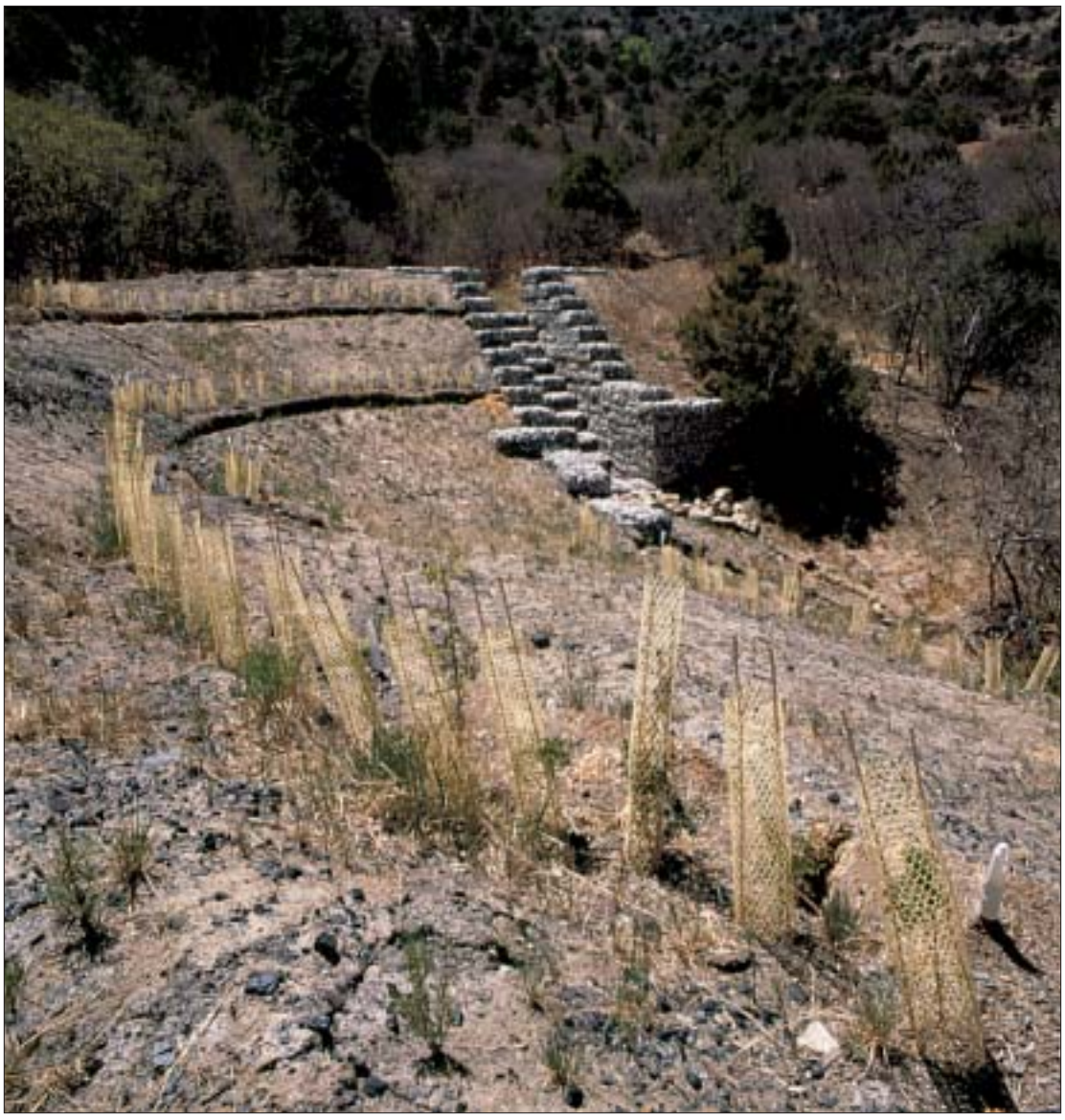
Nearly 18,000 seedlings, representing 10 different plant species have been planted along the slopes of the walls of Sugarite Canyon. These species include: Four wing Saltbush, Curlleaf Mountain Mahogony, New Mexico Forestiera, Rocky Mountain Juniper, Pinyon, Ponderosa Pine, Gambel or Wavyleaf Oak, Skunkbush Sumac, New Mexico Locust, and Wood Rose seedlings.

Project Construction and Reclamation

The project consisted of coal gob sites along the walls of the Sugarite Canyon. These piles were steep, generally moderately to highly sodic, moderately saline, high in clay content, and actively eroding. Some of the areas of gob were composed of coarse, highly acidic slag material. The remaining evidence of previous mining activities has had an obvious negative impact to the local environment of the Canyon, especially the flora ecosystems and the water quality below the water shed. The goals of the project were to establish vegetation of the gob piles, to reduce erosion and subsequent turbidity and sedimentation in Chicorica Creek, to increase the safety of visitors to a highly visited State Park, and to preserve the historic mining landscape of Sugarite Canyon. Significant reestablishment of vegetation on

these slopes can be observed in comparing before and after photos which were taken in 2000 and 2001, of the east side of the Canyon. The New Mexico Abandoned Mine Land Bureau will continue to monitor the progress of the reclamation efforts in order to achieve the desired long-term results of the Program. The Bureau will also continue to work with Sugarite State Park to provide interpretive information to the visiting public in an effort to preserve and protect the historical mining resources of the Canyon.

The project successfully stabilized sides of the steep-walled canyon which were covered with large areas of coal mine waste. The reclamation effort also succeeded in controlling erosion, reducing sediment loading of surface water runoff and reestablishing vegetation on steep slopes, barren of growth for nearly a century. The reclamation was completed, improving the water quality in the canyon below the watershed while preserving more than 100 years of historic coal mining landscape. The reclamation also minimized hazards to the visiting public and added stability to the interpretative trails system managed by the State Park located within the canyon.



Gabion structures were constructed in channels where water flowed down steep areas. These structures provide an efficient construction method in this steep, inaccessible landscape.