Award Nomination
2001 National Abandoned Mine Land Reclamation Awards

Sunnyside Project

Project Manager
Louis A. Amodt

Contractors
Minchey Digging, Cleveland, Utah

VCM Construction, Kamas, Utah

AML Program Administrator
Mark Mesch

AML Staff
Luci Malin, Becky Doolittle, Paul Wisniewski, Manuel Palacios, Dave Donnelly, Dick Rol, Randy Harden(Title V)

Preliminary Investigation
Montgomery Watson

Final Engineering
In-House

Historical Involvement
Utah SHPO

Landowners
BLM, Penta Creek/Magnificent Seven, Coval Technologies, Sunnyside Cogeneration Associates, Union Pacific Railroad, Sunnyside Land, W.F. Barns Historical Properties, Russel & Margaret Woodruff

Location

The Sunnyside Project is located directly east of the town of Sunnyside at the mouth of Whitmore Canyon, 30 miles east of Price, Carbon County, Utah.
Townships 14 & 15 South, Range 14 East, SLBM.

Submitted By

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Date Submitted

March 13, 2001

Project Dates

Start: July 13, 1998
Completion: October 18, 2000

Project Cost

Construction:	$1,512,374.20
Engineering/Management:	$ 499,655.43
Total Project Cost:	$2,012,029.63

Background

In the Book Cliffs region of central Utah, approximately 30 miles southeast of Price, lies the Sunnyside Coal Mine. Since the late 1800's the Sunnyside Coal mine accessed coal seams averaging nine feet thick in the Upper Cretaceous, lower Blackhawk Formation of the Mesaverde Group. The quality of the coal is sub bituminous, with low moisture, ash and sulfur (13,110 to 14,620 Btu/lb). Miners began extracting the coal resource soon after it was discovered in 1898. Early uses included coking, thermal and steam power generation for the railroad.

The Sunnyside Coal Mine operation has a rich history as one of the longest continuously producing coal mines in the United States. In the late 1800's, exploration of the Book Cliffs coal field revealed that coal in the Sunnyside area was of superior quality for coking because of the metallurgical quality of the coal. In 1899 the Pleasant Valley Coal Company and Utah Fuel Company, both owned by Denver & Rio Grande Western (D&RGW) Railroad, were consolidated under the name of Utah Fuel Company and began mining operations. Initially coal was shipped 40 miles to Castle Gate to be coked. Over the next several years, the mine built coking ovens at Sunnyside. By 1917, the Sunnyside Mine had over 800 coking ovens situated near it, primarily due to the push for energy development and metal production caused by World War I. In 1919 the Sunnyside coke plant was the largest single beehive in operation in the United States with 819 12 to 13-foot ovens located to the south of the mine utilizing 7.5 tons of coal per charge to convert a total of 6,142 tons of coal to 4,387 tons of coke a day or a maximum production of 1.6 million tons of coke a year.

Most coal camps in the west were small in population and size. Sunnyside was an exception. By 1920 Sunnyside had increased to over 2,000 people of various nationalities, including Mexican, Italian, Greek, Japanese and Polish. Italian miners built rock houses using the rock from the canyons. The housing in the coal camps had segregated enclaves where various nationalities lived. Complete segregation was impossible in the small community. It began softening, then finally ended with the outbreak of World War II.

Mine union activity has a violent past in Utah. In 1922 the miners at Sunnyside joined their fellow miners of the United Mine Workers of America in striking. Violence broke out quickly. As a result, mine owners placed machine guns in nests of steel and rock construction on the canyon walls above the mine to prevent striking workers from entering the property. Those machine gun nests are still clearly visible from the mine property as a sobering reminder of the past.

By 1927 Utah Fuel closed down its coke oven operation. The Sunnyside Mine had been the area's largest coal mine, employing several hundred workers, but it declined drastically until only about 400 people remained during the Depression. World War II changed the economic situation in the mines and production boomed once again. When Kaiser Steel Corporation expanded its steel mill in Fontana, California, it leased Sunnyside No. 2 Mine, later purchasing the mine.

When Kaiser bought the property in 1942, they moved Grassy Trail Creek 100 feet north to allow for expansion of the mine property. The stream relocation destroyed many home sites and left the stream channelized, straightened and deeply entrenched. Production ran continually until 1983 when the mine (now called the Kaiser coal mine) in Sunnyside first slowed production and then stopped for ten months before going into bankruptcy in 1989. In 1985 Kaiser Steel Company began using a "unit train," devoted solely to hauling coal from Sunnyside to its steel plant in Fontana, California. The success of unit trains resulted in Carbon County coal being shipped to Pacific Rim nations. Sunnyside Reclamation and Salvage acquired the mine through bankruptcy court from the Kaiser Steel Corporation and reopened it in March 1989. The mine operated for a few more years and finally closed in 1992.

Reclamation

The Sunnyside Coal Mine reclamation project is the largest single coal site project undertaken in the history of the Utah Abandoned Mine Reclamation Program (AMRP). With the courts controlling the mine bankruptcy, assets were liquidated by auction in 1994. Beginning in January 1997, funds were transferred from the courts to an AMRP

account. The Utah AMRP began project planning by April of 1997 with inventory of remaining features and preliminary engineering contracts awarded in July 1997. Final engineering was completed in-house and construction contracts were signed in July 1998. Construction on all phases of the project was completed in October 2000. Total construction cost was just over $1.5 million. In-house design, project management, and inspection brought the total project cost to just over $2 million.

Through nearly 100 years of operation, mine workings and associated surface facilities became extensive. Surface facilities were scattered over a six square mile area and included the Main Mine Facility immediately adjacent to the town of Sunnyside (Figure 1), five other major facilities areas and several additional portal areas. Reclamation included nearly 200 acres of surface disturbance and addressed nine hazardous shafts and 48 hazardous portals (Figure 2). Additional work included restoration of a 1/4-mile reach of Grassy Trail Creek and the planting of over 600 potted trees and shrubs. Reclamation was completed using a combination of AML and bond forfeiture funds.

Project planning and construction required coordination between the Utah AMRP and several government agencies and private landholders in the project area. The Utah Department of Transportation and the Carbon County Roads Department issued encroachment permits to complete reclamation where mining operations had encroached onto their right-of-ways. Realignment and restoration of Grassy Trail Creek required a stream alteration permit reviewed and granted by the Utah Division of Water Rights. The town of Sunnyside provided assistance when water lines were discovered during construction activities. The Bureau of Land Management and private landowners were involved in right-of-entry issues.

Demolition

Massive concrete structures left from coal mining, including the coal preparation and wash plant, coal loadout facilities and intra-mine transportation system were demolished or buried depending on their location. Heavy rebar and oversized wall and foundation construction typical of such structures made during World War II and the 1950's made the demolition work difficult. In addition to known structures, several buried concrete foundations were discovered during massive grading operations, increasing demolition cost and time. A total of over 160,000 cubic yards of

Figure 1: Before

Figure 2: After

The Main Facilities Area underwent a dramatic transformation through demolition, realignment of Grassy Trail Creek, and 478,800 cyd of earthwork.

concrete, steel, wood and miscellaneous debris were buried or disposed of offsite during reclamation construction. Reclamation also included removal and salvage of 140 mining related power poles and two substations

Closures

Eight mine shafts were fitted with a heavy reinforced concrete bulkhead, then covered with soil. The custom-designed hexagonal-shaped bulkheads were 18 inches thick and 18 feet across, spanning shafts 16 feet in diameter and capable of supporting the weight of soil cover and earthmoving equipment. One mine shaft was backfilled.

A total of 48 portals were closed throughout the project. A few of the larger portals were flanked with historic Italian-cut sandstone retaining walls, which were preserved intact. Several of the mine portals were located in remote areas inaccessible to earthmoving equipment. Crews used small All-Terrain-Vehicles (ATV's) to access some of these sites and sealed, collapsed and/or backfilled the openings by hand.

Site Grading

With a fixed project budget, the extent of site recontouring was dependent on the successful contractor's bid per cubic yard of material to be moved. Based on initial predictions (using average earthmoving costs), over 200,700 cyd of earthwork was planned. However, because the winning contractor's bid per cubic yard was much lower than average, it was possible to move an additional 287,100 cyd for an ultimate total of 478,800 cyd. The additional yardage provided the opportunity to further reduce highwalls and create final reclaimed landforms that more closely match natural contours and minimize erosion into Grassy Trail Creek and other local drainages (Figure 3). Extreme surface roughening of the final slopes has reduced the potential for generating sediment from over 200 acres of reclaimed disturbance.

Reclamation earthwork uncovered approximately 6,000 cubic yards of marketable coal. This coal was transported to the nearby Sunnyside Cogeneration Facility for blending with lower BTU coal to be burned at the facility. As a result, a viable energy resource was utilized, eliminating the difficultly of finding a suitable burial site within the project boundaries. The remaining waste coal found scattered throughout the main footprint of the project was consolidated and buried (under four to six feet of non-combustible cover material), reducing a large highwall in the main facilities area. Approximately 40,000 to 60,000 cyd of low grade coal was buried in this location, and though it is not currently of sufficient quality to be an economic resource to the Sunnyside Cogeneration Facility, it is recoverable if its value increases in the future.

A large historic Italian stone masonry foundation wall was discovered while excavating a portion of the coal waste. The wall was carefully uncovered and incorporated into the final landform configuration of the reclaimed slope.

Railroad tracks owned by the Union Pacific Railroad played a constraining role in several aspects of the reclamation of the main facilities area since they were required to remain. A 400-foot long tunnel used to load coal into rail cars was removed while protecting and preserving the tracks inside. Their preservation also significantly limited the grading plan for the main facilities area and restricted the restoration options for Grassy Trail Creek.

An additional 287,100 cyd of earthwork was made possible by low earthwork costs, allowing for reclaimed landforms that closely match natural contours

Grassy Trail Creek Restoration

The reach of Grassy Trail Creek flowing through the main facilities area was heavily impacted by mining operations over the course of a century of mining. The stream was gradually channelized and pushed further toward the edge of the canyon. Eventually, the stream was contained within a deep channel and pinched between a county road and the railroad line serving the mine (Figure 4).

Several problems existed within the reach. The position of the stream immediately adjacent to the road caused bank erosion with each high flow event and had begun to impact the stability of the adjacent county road. The opposite bank was retained with timber crib walls ranging from five to ten feet high. Various utility lines spanned the channel and mine buildings were built only a few feet behind the crib walls. The natural channel and floodplain configuration had been obliterated, and the stream corridor was of little to no value as a wildlife corridor or as an aesthetic amenity.

The stream restoration had three main objectives: 1) increase the long-term stability of the entire corridor and eliminate the erosion problem on the road banks, 2) improve the aesthetic appearance and apparent naturalness of this section of stream, and 3) improve riparian habitat quality and its utility as a wildlife corridor. Each of these objectives was somewhat limited by the railroad line which confined the stream to a 200 foot wide corridor between the county road and the tracks. Construction was further complicated by the necessity to divert stream flow during construction and by the discovery of several massive buried concrete foundations and 3,000 cyd of waste coal in the new stream corridor.

The new stream was modeled after relatively natural reaches upstream. A new main channel was constructed with a bed of gravels, cobbles and boulders. Three boulder drop structures were incorporated into the channel. The stream corridor was widened to create a floodplain with off-channel wetland areas. Before construction began, the AMR staff harvested willow cuttings from the existing channel. These cuttings were stored over the winter using two very different methods (shallow burial and bundled in buckets) and were planted in the spring in a variety of bioengineering applications. Willow survival has been very near 100% regardless of storage method or planting technique. Additional revegetation incorporated eight separate seed mixes and 189 potted trees and shrubs.

Figure 4: Before

Figure 5: After

Grassy Trail Creek was transformed from an entrenched, eroding ditch to a meandering stream with functional ecological processes and a natural appearance.

Grassy Trail Creek now meanders through a restored floodplain and provides attractive habitat for bighorn sheep and other wildlife species in the area. In addition, the road has been stabilized, more natural hydrology and sediment transport has been established, and what was once an unattractive ditch has become a community asset (Figure 5).

Revegetation

All disturbed areas were seeded with a mix of native grasses, forbs and shrubs. Prior to seeding all areas were prepared with straw mulch and extreme roughening. Straw mulch was incorporated at a rate

of one ton per acre to increase the content of organic matter in the soil and encourage microbial activity. Extreme surface roughening of all final grading was completed to aid in the control of erosion and to enhance vegetation micro-climates. This technique creates surface relief of greater than 36 inches. The "pocking" pattern creates multiple micro-basins where sediment and seeds collect, trapping runoff and improving conditions for seedling establishment and growth. Rock, deadfall and other natural materials were incorporated into the finished surface to improve micro-habitat and create a more natural appearance. Hydro-mulch was applied following hand broadcast seeding in areas accessible to equipment.

In recognition of OSM's reforestation initiative, crews were remobilized in late fall of the first growing season to plant approximately 600 trees and shrubs. Several species were selected and used to blend the edges of the reclaimed areas with adjacent natural areas. As they grow, the line between natural and reclaimed will blur and disappear. An innovative temporary irrigation system was installed to assist the survival of the plantings through the first growing season, which was anticipated to be a low water year.

Reclaimed landforms and revegetation efforts were designed to enhance wildlife habitat in the area. Highwalls, retaining walls and other barriers to movement were eliminated, seed mixes were enhanced with species of high value to wildlife, and scattered brush piles were left for use as cover. The main facilities area has become a popular big horn sheep viewing area. Other wildlife such as deer, elk, and bear frequent the area since reclamation.

Post-Mining Land Use

The mine warehouse, water tanks, railroad tracks, one power substation and three bridges crossing Grassy Trail Creek were left intact to support a light industrial post-mining land use. To date, the post-mining use has not been realized.

Summary

The life of the Sunnyside Mine has come full circle over the last 100 years. Mining activity began in the area in 1899. The mine quickly grew, setting milestones and leaving its mark on history until ultimately the Utah AMRP completed reclamation in 2000. The landscape has been restored to a near pre-mining condition within the constraints of funding and post mining configuration of rail lines, roadways and bridges. Additionally, opportunities to preserve remnants of cultural history were incorporated into the overall design. Grassy Trail Creek has been relocated to its approximate pre-mining alignment and has been restored to a condition offering significant aesthetic and ecological value. Desirable grasses and forbs have replaced weeds, coal spoil, and bare soil to provide a thriving plant community designed to protect water quality downstream and to enhance wildlife habitat onsite. Deer, elk, bear and big horn sheep now regularly frequent the reclaimed area.

Figure 6
A mining landscape that once provided economic benefits now provides a new set of benefits as a reclaimed landscape.

The land occupied by the Sunnyside Coal Mine has evolved through two major phases of existence. The first phase provided employment and economic benefits that created and sustained the town of Sunnyside over nearly 100 years of mining. The area is now entering its second phase as a reclaimed landscape and continues to provide positive benefits to the community. The natural attributes of the reclaimed landscape, including the opportunity to view wildlife, have quickly become a valued component of the local landscape for area residents (Figure 6).