

NOMINATION

**2000 ANNUAL NATIONAL
ABANDONED MINE LAND
RECLAMATION AWARD**

**PLEASANT VIEW MINE AML PROJECT
MADISONVILLE, KENTUCKY**

**KENTUCKY DEPARTMENT FOR SURFACE MINING
RECLAMATION AND ENFORCEMENT
DIVISION OF ABANDONED MINE LANDS
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PROJECT START DATE: January 27, 1998
PROJECT END DATE: November 19, 1999
COST: \$4,014,410.75
CONTRACTOR: RUST OF KENTUCKY
SUBMITTAL DATE: MARCH 10, 2000



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NARRATIVE

Background

The Pleasant View Mine AML Reclamation Project began as one of the most intimidating projects ever undertaken by the Kentucky Abandoned Mine Land program due to its size, the huge monetary investment that it required, and the very real potential for failure. The most far-reaching and perhaps the most significant benefits realized from the project were never anticipated at its inception.

The Pleasant View Mine site is located in western Kentucky immediately west of the City of Madisonville. The 250-acre site lies adjacent to Greasy Creek, which drains directly into Clear Creek, the location of one of the Commonwealth's most extensive wetland systems. Farms, residential areas and city-owned athletic fields surround the mine.

The site was first impacted by mining nearly 70 years ago. Century Coal Company conducted mining operations there in the 1930's and 1940's. Their surface mine in the #14 seam resulted in the creation of the typical area mine topography of the era: spoil ridges and a large final pit which eventually impounded water. Mining activity resumed in the 1960's when Island Creek Coal Company disposed of coal refuse at the site from their nearby Pleasant View underground mine and washer complex. This latter operation in the #9 seam generated millions of tons of acidic coal refuse, creating the site conditions and off-site impacts that the AML project sought to abate.

In the decades between the last mining activity and the start of the AML project, the site degraded drastically. The vast areas of barren coal refuse attracted trespassers who visited the site in recreational vehicles or illegally dumped trash and waste tires. The refuse generated enormous amounts of acid drainage, fouling the water impounded in the old final pit to such a degree that it acquired the deep red color that gave the site its local name, Ketchup Lake. (Photo 1 is an aerial view of the site showing the spoil, coal refuse, and the large acidic impoundment.) The water in the 32-acre impoundment had acidity values measured as high as 12,000 mg/l and total iron values as great as 1000 mg/l. Elevated levels of aluminum, manganese and sulfates were also detected. An estimated 400 million gallons of acidic, highly mineralized water was either impounded in the lake or stored as groundwater in the refuse. Acid mine drainage (AMD) was constantly draining into Greasy Creek at an average rate of 200

gallons per minute. (Photo 2 is an on-ground view of the impoundment and surrounding refuse.) The stream was decimated for much of its length to the receiving wetland in Clear Creek, either devoid of aquatic life or supporting only marginal use.

An AML restoration plan had been developed in the mid-1980's by the Kentucky Division of Abandoned Mine Lands (DAML), but reclamation of the site had not been attempted due to the high cost. In 1997, the Secretary of Kentucky's Natural Resources and Environmental Cabinet, with encouragement from local citizens and groups, most notably the Greasy Creek Steering Committee, decided that the site so egregiously degraded the environment and posed such a threat to public health and safety that work was warranted in spite of the high cost. That critical decision began the process of project development. Funding for the effort would come from the Commonwealth's annual construction grant coupled with \$225,000 of Appalachian Clean Streams Initiative funds. Once the project funding had been earmarked, then came the process of updating the plans, determining how best to bid the project, and obtaining the regulatory approval that would be needed to discharge water from the lake.

Project Development

The site had changed little since the grading plans were developed in the mid-1980's so updating the plan was a relatively minor task. The basic plan was to transport and place enough coal refuse in the final pit to eliminate the impoundment and then grade and cover the entire area with soil obtained from the spoil ridges created by the original mining. This work would involve moving an estimated 2.5 million cubic yards of material. The revegetation effort for the 250-acre site would require 10 tons of seed, 500 tons of straw mulch, 26,000 tons of agricultural limestone and 88 tons of fertilizer.

Considerable effort was invested in characterizing the water in the impoundment and in the receiving stream. DAML personnel obtained samples of the impoundment from varying depths to give a clear understanding of the total water chemistry that the contractor would face. Likewise, Division personnel assessed the quality of the receiving stream at various points in the vicinity of the site, and downstream at the wetland, to help the Kentucky Division of Water establish the effluent standards that project discharges would have to meet. Those parameters were: daily maximum total recoverable iron - 27 mg/l; daily maximum total suspended solids - 70 mg/l; minimum pH - 4.0 standard units. A metals treatability study was performed to find the pH range that would effectively reduce the high iron content in the lake and raise the pH to an acceptable value. A settling analysis was conducted to help the contractor evaluate the potential need for sludge handling. DAML estimated the total quantity of impounded water on soundings of the lake and calculated the quality and treatability of the water through the earlier studies. The DAML evaluated all this information and decided

to bid the water treatment portion of the project as a lump sum rather than on a unit price basis. The method of achieving the established effluent limits was left to the contractor with some restrictions on the reagents that could be used. DAML anticipated that this approach would encourage the contractor to use his ingenuity to develop an innovative, cost effective method to treat and discharge the water. This proved to be the most significant decision made on the project.

A mandatory pre-bid meeting was held on site on November 12, 1997, with nearly forty contractors attending. Bids were opened on November 26, 1997. The highest bid of \$6.7 million was well above the engineer's estimate of \$5.1 million. The contract was ultimately awarded to Rust of Kentucky, who submitted the low bid of \$3.9 million. Their lump sum bid for water treatment and release was \$781,500. This low cost for water treatment was a direct result of the decision to allow contractor ingenuity to prevail and bid treatment on a lump sum basis.

Project Construction

At the ensuing pre-construction meeting, Rust outlined the plan of action for executing the 24-month contract. It was their intention to aerate and chemically treat the impounded water with hydrated lime. Upon achieving water quality that would meet the effluent standards, all of the impounded water would be drained or pumped out of the pit. Water levels would be kept low by pumping and treating as needed, while backfilling operations progressed from the upstream end of the impoundment to the discharge point.

Rust mobilized to the site to begin clearing the spoil ridges and other preparatory work in January, 1998. The most vital piece of equipment was not related to earth moving operations, however, but was a proprietary mechanism that would be used to aerate and treat the water. Rust developed, specifically for this project, a system of mixing tanks, slurry lines, and air lift pumps to deliver a combination of hydrated lime slurry and air via a barge-mounted pipe to the bottom of the lake fifty feet down.

The hydrated lime was delivered to the site by truck in twenty-five ton bulk shipments. The carrier was hooked directly to a 1000 gallon tank where water from the lake was pumped and mixed. The slurry was then pumped from the tank and out to the lake to a barge designed by the contractor. The barge held a twenty inch inside diameter pipe that was modified to mix air and slurry at a rate of more than 20,000 gallons per minute. The air lift pump system could circulate and mix water from any desired depth. This made it possible to treat the entire lake at one location during the initial phase. However, this method was not feasible later in the project as the water depth became too shallow. A smaller version of the device, suspended from barrels, that did not circulate water by air lift pump but sprayed the lime slurry mixture with air onto the surface, was used

when the lake became too shallow from sludge accumulation. This was also a highly effective method of treatment for the smaller impoundments scattered throughout the site. The treatment, mixing, and aeration from the system elevated the water quality of the entire impoundment to compliance levels by April 1, 1998. This was the date that the KPDES permit became effective and discharges into Greasy Creek began. This treatment process proved to be a quick and effective way to improve water quality so that discharges complied with water quantity standards, despite rainfall that generated AMD in such large amounts that the pit could never be drained as originally planned. Ultimately, the initial phase of the water treatment to reach compliance levels cost the AML program less than one tenth of 1¢ per gallon of water. (Photo 3 shows the system in operation.)

Throughout 1998 and 1999, Rust worked steadily at treating and discharging water, hauling refuse to the pit, applying the 60-ton per acre lime buffer, and placing the soil cover. The enormous amount of sludge created by the treatment process was left in the lake void and covered in place. An additional 40 tons of lime per acre was placed on the earth cover. (Photo 4 shows earthwork operations in progress.) Though work was often hampered by wet conditions in 1998, Rust was able to work without interruption in 1999, due to severe drought conditions. By early October 1999, the 32-acre, 50-foot deep pit had been filled. Covering, seeding, and surface drainage operations were completed by the end of October, two months ahead of schedule.

Conclusion

A project dedication ceremony was held at the site in November 1999. The contractor, representatives of the Greasy Creek Steering Committee, interested citizens from the area, and dignitaries from local, state and federal government, most notably the OSM Director, turned out to view the finished product and to express their appreciation for the work that had been done. Area school children who had made regular field trips to see the old Pleasant View Mine site at its worst, were able to attend the ceremony and see it restored. (Photo 5 shows the completed project and the ceremony.) At the behest of the Commissioner of the Department for Surface Mining, the property owner, Consol Energy, took the opportunity to donate the entire 250-acre property to the City of Madisonville, completing the transformation of the site from a public hazard to a public asset.

Greasy Creek, once little more than a conduit for AMD from Ketchup Lake, has been restored. The water is no longer a deep red, oily liquid contaminating downstream wetlands. Today the stream has a healthy green translucence because the iron and acidity from the project area no longer flow into it. Aquatic life is returning to Greasy Creek near the project area. Division of Water personnel have sighted turtles, fish and amphibians in this previously dead

section of the stream. No signs of AMD seepage from the project area have been detected. (Photo 6 shows an aerial view of the project taken in March 2000.)

Not only did the project successfully restore a site that had been a blight on the surrounding area for decades, but the knowledge gained about water treatment found immediate use in developing treatment methods at other sites. The technology has crossed from Title IV applications to Title V sites and has achieved the same success in that arena. Long before the Pleasant View project was completed, the technology used there was being modified for use at two bonded deep mine sites in eastern Kentucky. Continuing water treatment costs were drastically reduced and complete bond release is anticipated for both sites in the near future.

The Pleasant View Mine AML Reclamation Project was a resounding success on all levels. A site that had been a wasteland for decades was not only restored but was dedicated to public use, ensuring the continuing benefits to the citizens of Madisonville and Hopkins County. The technical insights gained have already helped restore other sites and promise to have far reaching benefits, not only for the residents of Kentucky's coal fields, but for residents of coal fields everywhere.

The investment in this project continues to produce results far beyond the project boundaries.