

# **The Kempton Coal Waste Stabilization and Doser Installation Project**

**Kempton, Garrett County, Maryland**

**Submitted by:**

**STATE OF MARYLAND  
DEPARTMENT OF THE ENVIRONMENT  
BUREAU OF MINES  
Abandoned Mine Land Section  
160 South Water Street  
Frostburg, Maryland 21532.**

Jane Nishida - Secretary, Maryland Department of the Environment  
John E. Carey - Director, Maryland Bureau of Mines  
Michael P. Garner - Chief, Abandoned Mine Land Section

**DATE: March 11, 2002**

CONSTRUCTION START: May 1, 1998

CONSTRUCTION COMPLETION: December 1, 1998

CONSTRUCTION COST: \$394,524.16

CONSTRUCTION CONTRACTOR: Frank Arnold Contractors, Inc., Oakland MD  
John Duckworth Coal Company, Frostburg, MD

PROJECT ENGINEER: Michael P. Garner, Maryland Bureau of Mines

PROJECT ADMINISTRATOR: John C. Eilers, Maryland Bureau of Mines

CONTRACTING AGENCY: Natural Resources Conservation Service under Cooperative Agreement with the Maryland Bureau of Mines.

FUNDED BY: The Abandoned Mine Reclamation Fund administered by the U.S Department of the Interior, Office of Surface Mining

# PROJECT NARATIVE

## SITE HISTORY

### THE TOWN AND MINING OPERATION

Attracted by the extensive reserves of the Upper Freeport Coal Seam, the Davis Coal and Coke Company began deep mining at the Kempton Mine #42 in 1914. To support the extensive mining operation, the Company constructed the town of Kempton, which straddled the West Virginia/Maryland border. The Town consisted of over 106 company owned houses, a company store, opera house and mining facilities. By 1918, the town of Kempton had grown to a population of over 500 people, including 140 miners, 14 laborers, and other Davis Coal and Coke Company staff and their families.

The Town of Kempton was considered luxurious relative to other mining towns. Its appeal to residents was enhanced by construction of a community building, high school, opera house, concrete sidewalks and streetlights. Most of the houses were single-family dwellings, which included front and back porches, a small yard, and in 1926, electric power was provided. When combined with other features, Kempton became a very desirable place for miners to live and work. Running water was also provided via construction of an innovative underground “reservoir”. The reservoir was located 178 feet below the ground surface, within deep mining operation’s equipment and man hoist shaft. A collection collar and sump were constructed along the sides of the shaft to collect groundwater entering from a high yield aquifer. The water was then pumped to a holding tank located above the town where it was distributed, via gravity flow to each residence. Although the houses were not equipped with indoor plumbing, water was available at a spigot located in the rear of each house. Miner’s wages were paid in company script on a weekly basis. Script was utilized as payment in order to discourage robberies, and was not intended to eliminate free trade and competition. Local merchants also accepted this script as legal tender since it was redeemable for dollars at the main company store located in Coketon, WV.

Kempton Mine #42 included the construction of two 420 foot deep vertical shafts on the Maryland side of the North Branch of the Potomac River, just east of the West Virginia State line. One shaft transported miners and equipment to and from the underground workings, while the second shaft was dedicated to hauling coal to the surface for processing. As the mine developed, a ventilation shaft was also constructed in Maryland, approximately 1 mile north of Kempton in the headwaters of Laurel Run, a tributary to the Potomac River. During mining, drainage flowed via gravity to a sump located below the coal hauling shaft, where it was subsequently pumped to the surface and discharged into the Potomac. Kempton Mine #42 eventually became interconnected

with other underground mines operated by the Davis Coal and Coke Company, until the total complex encompassed approximately 12.2 square miles, seven percent of which is located in Garrett County, Maryland with the remainder underlying Preston, Grant and Tucker County, West Virginia.

However, due to dwindling markets in the eastern cities and exceedingly high production costs, the Company unexpectedly announced in April, 1950, that the Kempton Mine #42 would close immediately. Subsequently, machinery was removed and facilities at the site abandoned. Following closure of the Kempton mine, residents of the town began moving from the area. As of March, 2002, only seven houses and approximately 20 residents remain, as the final vestiges of this once thriving community slowly fade into history.

## **THE PROBLEM**

Following closure of the Kempton #42 Mine in April of 1950, the site was abandoned and left in an inadequately reclaimed condition. Many of the abandoned surface support structures, including the tipple, rail siding, and other facilities were left in a state of disrepair and collapse, posing a severe threat to public health and safety. The vertical shafts, each in excess of 12 feet in diameter, and over 400 feet in depth, were inadequately sealed and left to deteriorate, posing an imminent threat to the public safety. Over 160,000 cubic yards of abandoned coal refuse had been dumped within the channel and floodplain of the North Branch of the Potomac, a designated American Heritage River, and also within the Kempton Glades, a designated Wetland of Special State Concern, destroying biologically unique wetlands and clogged the river with eroding and acidic sediment. Unauthorized dumping and disposal of industrial and residential waste at the site created further public health and safety concerns. Illegal burning of the residential waste and debris also posed a risk of combustion of the coal refuse.

Additionally, as the abandoned underground mine flooded, acid mine drainage (AMD) emanating from the entire 12.2 square mile mine complex began discharging from the abandoned ventilation air shaft and a nearby 18" diameter borehole, both located adjacent to Laurel Run. Combined drainage from the air shaft and borehole currently discharges an average of three and 3.5 million gallons per day of highly acidic AMD into Laurel Run and the Potomac River. Laboratory analysis of the AMD discharge has documented on average the following water quality:

<u>Flow</u>	<u>pH</u>	<u>Iron</u>	<u>Aluminum</u>	<u>Sulfates</u>	<u>Acidity</u>
2,407 gal/min.	3.52	38.6 mg/l	17.1 mg/l	451 mg/l	347 mg/l

The AMD emanating from the airshaft and borehole has discharged in excess of 91,600 Tons of Acid and 14,700 Tons of Iron and Aluminum into the receiving streams during the past half century since the mining operation was abandoned. The AMD discharge from the Kempton mine complex has also been responsible for eliminating aquatic habitat in over 4.5 miles of Laurel Run and 35 miles of the Potomac River as well

as impacting unique biological wetland species in over 100 acres of riverine and palustrine wetlands. The Kempton Glades, a 400 acre wetland in the headwaters of the North Branch Potomac River, has been designated by the State of Maryland as a Wetland of Special State Concern. The Kempton Glades is currently home to several endangered and rare plant species including Linear-leaved willowherb (*Epilobium leptophyllum*), Appalachian blue violet (*Viola appalachiensis*), Bog clubmoss (*Lycopodium inundatum*) and Maryland's largest population of Appalachian twayblade (*Listera smallii*). The Glade is also home to the threatened Atlantis Fritillay Butterfly and the Alder flycatcher.

## RECLAMATION

### **PROJECT DEVELOPMENT AND DESIGN**

Project development began in June of 1993 when the Maryland Bureau of Mines (BOM) performed preliminary site review in preparation for federal grant submission and reclamation design. Historical documents were researched to determine the extent of the mining and evaluate potential hazards that could be expected at the site. Reports from the 1905 and 1920 Maryland Geological Survey provided a very detailed description of the mine and the surface facilities. Using these reports and field reconnaissance, the various abandoned mine problems and features were inventoried and preliminary design requirements for reclamation were evaluated and selected.

During performance of the NEPA process it became very apparent that there was considerable interest in restoration of the adjacent wetland and river, and that the site posed unique and innovative reclamation opportunities. The BOM had been concentrating its restoration efforts and funds on the Potomac for several years, and this interest seemed to extend to other State and Federal Agencies. The magnitude and severity of the AMD impacts on the Potomac River and Kempton Glades provided an excellent opportunity to restore the degraded wetlands and improve water quality within the river while at the same time eliminating the high priority health and safety hazards that existed at the site. Additionally, the approval of the North Branch Potomac River Hydrologic Unit by U.S. Department of Interior, Office of Surface Mining provided other funding sources (Acid Mine Drainage 10% Set-Aside Funds) that would allow Maryland to expand its environmental restoration efforts at the site.

Design of the Kempton Coal Waste Stabilization and Doser Installation Project began in summer of 1994. The BOM contracted with CTL Engineering of West Virginia to perform auger drilling to identify the vertical limits of the coal refuse and potential topsoil borrow areas. Photogrammetric mapping and field surveys were performed to provide mapping and elevation data. The BOM design staff used this data to develop existing and proposed cross-sections and a final grading plan. A vertical shaft stabilization design was also developed, specifying removal of the existing deteriorating caps and construction of 36 inch thick reinforced concrete seals, extending 3 feet horizontally beyond the limits of each shaft in all directions. Since the vertical shafts are 420 feet deep, constructability and equipment operator safety were also considered in the

final design. The hazardous facilities and equipment, including the unstable tipple and collapsing retaining walls would be demolished. Materials unsuitable for on-site disposal, including the industrial and residential waste, were to be hauled to an authorized landfill for proper disposal.

The BOM worked closely with the MD Dept. of the Environment, Wetlands Division, and the MD Dept. of Natural Resources to develop a cost effective wetland restoration plan for the Project. The wetland restoration Plan included removal of the abandoned coal refuse material dumped within the limits of the Kempton Glades, and reestablishment of over 5 acres of wetland utilizing native species salvaged from the area. In addition, a site specific wetland revegetation mixture was developed utilizing selected wetland grass species to further promote wetland recovery.

The BOM Project, Research and Development Section (PRD) also worked jointly with the Bureau's AML Section to develop an AMD remediation plan for the air shaft/borehole discharge. The BOM had previously installed an automated lime doser on Laurel Run, approximately 2 miles downstream of the air shaft/borehole discharge. Although this doser was functioning adequately enough for recovery of aquatic habitat along 35 miles of the main stem of the North Branch of the Potomac River, the BOM was concerned that lack of a backup system would destroy the recovery in the event of mechanical failure to the existing automated doser. Additionally, there was no recovery to Laurel Run and its extensive wetland systems since treatment of the AMD was occurring well downstream of the mine discharge. Considering these factors, Project design included development of a water powered dosing system to be installed immediately adjacent to the air shaft discharge. Installation of the water powered doser would be reliable, given the limited accessibility of the site during inclement weather. The water powered doser would also function as the primary treatment system for the AMD discharge. In addition, the existing automated doser located two miles downstream would then become a secondary backup system that would "idle", dispensing lime only if sensors detected a dip in pH, indicating technical problems at the primary system.

During the design process, several innovative design concepts, techniques, and construction practices were utilized in order to overcome obstacles encountered during development of the project, including 1) Auger boring of the coal refuse indicated that a large coal refuse pile located within the wetland had sunk as much as 4 feet below the surrounding wetland elevation. Testing of this zone of coal refuse determined that due to the saturated, oxygen reduced environment of the wetland, this zone of refuse could remain in place, thus eliminating the need for an additional 25,000 cubic yards of excavation. Additionally, special handling practices were developed allowing for the salvaging and reintroduction of existing wetland vegetation and soils for placement within the reconstructed wetland. Utilization of the existing wetland vegetation also provided a native, biologically unique seed stock for the disturbed area and reduced the chance for non-native, invasive species to develop. 2) Laboratory and field testing of alternative neutralizing agents also determined that the new water powered doser could be operated using kiln dust, a limestone dust by-product of the cement industry, thereby reducing the annual operating cost of the Laurel Run dosers by 50%.

## **PROJECT CONSTRUCTION**

Construction of the Kempton Coal Waste Stabilization and Doser Installation Project was completed during the summer and fall of 1998. A competitive sealed bid procurement method was utilized and the subsequent contracts were awarded to Frank Arnold Contractors, Inc. of Oakland, Maryland for the coal waste stabilization phase of the project at a cost of \$ 290,511.97. John Duckworth Coal Company of Frostburg, Maryland was awarded the doser fabrication and installation phase of the project at a cost of \$104,012.19. Under Cooperative Agreement with the Maryland Bureau of Mines, the Garrett Soil Conservation District and the US Department of Agriculture, Natural Resource Conservation Service provided contract management and inspection services during construction.

Project construction took 7 months to complete and included excavation and grading of 160,000 cubic yards of coal refuse, salvaging and spreading of 26,000 cubic yards of topsoil; installation of 2 vertical mine shaft seals, installation of 500 linear feet of subsurface drain; construction of 5,000 linear feet of surface water diversion channel; restoration of 5.2 acres of wetland; collection and disposal of 150 tons of residential and industrial waste; construction of 2 sediment basins; fabrication and installation of a 100 ton capacity water powered lime doser and silo; construction of 1,000 linear feet of access road; and revegetation of 30 acres.

## **SUMMARY OF BENEFITS**

The removal of 160,000 cubic yards of coal refuse from the wetland restored the natural floodplain and eliminated sedimentation and acid runoff from impacting the North Branch Potomac River and the Kempton Glades. The 5.2 acres of restored wetland was lightly planted with annual grass species to allow migration of native plants into the disturbed area. Additionally, native vegetation disturbed during construction were transplanted within the restoration area. The restored and ecologically healthy wetland has now become an appropriate beginning for the long and historical journey down our American Heritage River, to our Nation's Capitol, and the Chesapeake Bay.