

Project Name and Location:

Grass Run Refuse - Three Miles West of Weston, West Virginia, and One Mile North of Interstate 79

Name, Title, Organization, Address, Phone Numbers, and E-Mail:

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Project Start Date and Project Completion Date:

August 17, 1998 - July 11, 1999

Construction Costs:

\$1,451,765.00

Contractor:

Alwood Company
Route 1, Box 462
Clarksburg, West Virginia 26301

Consultant:

Terradon Corporation
P. O. Box 519
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Grass Run Refuse

I. Background and Project Need

Located in north-central West Virginia, this 115 acre Lewis County site, about three miles east of Weston, was originally part of an abandoned coal preparation facility. On site were nine water treatment ponds; 30 acres of unvegetated, toxic coal refuse; and more than a half-mile of dangerous highwall. Several of these ponds were nearly full of slurry from eroded coal fines and sediment. A few of the ponds had breached, allowing most of their contents to wash downstream. Pond risers and pipes had either been completely destroyed or washed out, and none of the emergency spillways functioned properly. Uncontrolled run-off also severely damaged most of the drainage channels extending between each impoundment.

The ever-growing threat for catastrophic failure of one or more of these impoundments posed a definite risk to the health and safety of the landowners living downstream. Even worse, heavy storm events had already caused serious flooding to several homes of people living along the receiving stream, Grass Run. As silt and refuse eroded into Grass Run, reducing its natural flow and capacity, the likelihood of more frequent, increased severity flooding also started to concern residents and local officials alike.

Another problem surrounded this site's production of acid mine drainage (AMD). As surface water migrated through the unvegetated coal refuse and spoil material, toxic levels of acid and metals such as iron, manganese, and aluminum leached into the ponds, ditches, and waterways. Gradually, this drainage flowed into Grass Run, and eventually on to Stonecoal Creek. What resulted was a severe reduction in downstream water quality. From this standpoint, departmental consultants ranked the Grass Run site as one of the ten worst AMD pollution sources in West Virginia and a prime candidate for Appalachian Clean Streams Initiative Funding that was utilized for a portion of the construction of this project.

The challenge of restoring abandoned mine lands to their original, pre-mined condition, while at the same time, minimizing environmental degradation during construction, has always been the goal of the West Virginia Division of Environmental Protection, Abandoned Mine Lands and Reclamation (AML & R) program. With this site, however, state officials also believed a unique opportunity existed to turn potentially life threatening and environmentally damaging slurry impoundments into productive wetland and wildlife habitat, while at the same time achieving its prime directive.

II. Reclamation Plan

During the summer of 1998, the AML & R office contracted with the Alwood Company to begin site restoration. The selected reclamation plan involved eliminating five of the nine abandoned water treatment ponds while repairing and enhancing the other four, backfilling 2,800 L.F. of dangerous highwall, regrading and soil covering 30 acres of toxic coal refuse, and constructing nearly two miles of drainage control channel. Several seeps, initially

II. Reclamation Plan (continued)

discovered at the base of the coal refuse pile located in the head of the hollow, were extremely high in acidity and metals, as well as sulfates. The planned combination of capturing this drainage through underdrains along with removing and/or covering slurry in each of the impoundments, promised to completely eliminate these pollution sources.

Because nearly all of the abandoned ponds had damage of one type or another, each structure had to be either repaired or eliminated. Here was the chance for project engineers to not only correct the damage, but incorporate state-of-the-art wetland design features to improve wildlife habitat and increase species diversity. The selected plan involved construction of nearly four acres of new wetlands along with their associated splash pads, spillways, and nesting islands to attract migrating waterfowl. Overall, the selected plan involved:

- enhancing one freshwater pond located at the head-of-the-hollow
- eliminating five of the old water treatment ponds filled with metal precipitate and slurry
- converting the two largest treatment ponds into aerobic wetlands, and
- enhancing the two lower ponds for use as storm water detention basins.

Constructed at the toe of the large coal refuse pile, the first, smaller wetland provides long detention times thus promoting good precipitation of any leached-out metals. The second, larger wetland uses plants such as cattails and rushes to further reduce flow velocity, allowing even more metal extraction. By working together, these passive treatment systems generate a greater level of water quality improvement.

Another unique project feature was the strong reliance on a special type of drainage control system known as a grout blanket lined channel. Approximately 10,000 L.F. of this channel was built to minimize surface water infiltration into the newly soil-covered coal refuse and slurry. Project engineers realized early on that this element was critical if AMD was to be eliminated at this site.

III. Reclamation Benefits

The Grass Run Refuse project resulted in one of West Virginia's best reclamation success stories from the standpoint of overall effectiveness. It not only eliminated the threat of flooding for residents along Grass Run, but turned damaged water treatment ponds into valuable wetland habitat.

Residents along Grass Run Road, which parallels the creek, are delighted that flooding has completely stopped since completion of this project. Water quality improvements for both residents and wildlife along Stonecoal Creek, and further downstream in the West Fork River, were also realized. Because the West Fork serves as a source of drinking water for thousands of downstream residents in communities along its course, the resulting improvement in water

chemistry had tremendous, multi-county benefits, going far beyond those realized by most other AML reclamation projects.

Analyses of samples collected before and after reclamation clearly illustrate the remarkable improvement in down-river water quality. The resultant alkalinity has not only neutralized all of the original acid mine drainage from the site, but when combined with the area's natural alkaline, upstream drainage, the resulting net increase in alkalinity further helps to improve water quality in many additional miles of waterway. The table below illustrates the improvements in pH, acidity, and several other chemical parameters. These data were collected at the outflow of the last detention pond, just upstream of its confluence with the main branch of Grass Run.

Pre and Post Reclamation Water Quality Data

Parameter	pH	Hot Acidity (mg/l)	Alkalinity (mg/l)	Total Iron (mg/l)	Total Mn. (mg/l)	Al (mg/l)	SO ₄ (mg/l)
Before	3.0	245	0	55.4	20.0	5.4	1,173
After	7.2	0	70	0	1	0	48

This project's creation of new, productive wetland also generated additional environmental and biological benefits. These include:

- improved soil conservation;
- increased siltation and erosion control;
- developed new fish habitat;
- reduced flood potential through increased surface water storage;
- enhanced recreation and groundwater recharge; and
- increased biodiversity.

Most any day, visitors can readily observe beaver and muskrat activity throughout the site. A variety of ducks, Canada geese, herons, and other waterfowl now frequent the area. Migrating birds nest and raise their young on both of the site's two larger detention ponds. Whitetail deer and even coyote also inhabit this once barren and environmentally degrading abandoned mine land site.

IV. Project Photographs Captions

Six before and after photographs are presented herein. These pictures further attest to this project's success and plainly display the astounding transformation achieved through its approach to innovative reclamation. Captions for each project photograph are noted below:

Project Photograph #1 – Cover Photo

Beautiful, post-reclamation aerial view showing various stages of AMD treatment. Both wetlands are visible in the photo's lower section, and the two detention ponds are shown downstream, at upper center. As AMD flows through the wetlands and on to the detention ponds below, dissolved metals such as iron gradually precipitate. This creates the brown to blue color change, thus indicating that the passive treatment system is functioning properly.

Project Photograph #2

Early photo of lower slurry pond with damaged spillway, just prior to causing severe, downstream flooding in 1996. This structure was removed during reclamation.

Project Photograph #3

Second pond with damaged principle spillway. Debris atop riser indicates water level prior to failure and subsequent flooding. This structure was repaired and converted into the lower detention pond.

Project Photograph #4

Series of old treatment ponds and coarse coal refuse dam. These potentially hazardous structures were eliminated during reclamation

Project Photograph #5

Post-reclamation aerial view looking upstream towards the head-of-the-hollow. Several thousand feet of grout blanket, lined channel clearly shown. Coal processing treatment ponds were eliminated in this area.

Project Photograph #6

Picturesque, downstream post-reclamation view of wetlands and detention ponds. Please note the downstream residential development shown near the photo's upper left corner. It is these families and individuals that most benefited from reclamation which eliminated future flooding.