

Reclamation of Abandoned Mines At New River Gorge, Gauley River, and Bluestone

By Carol A. Pollio

"Smokeless" coal from the New River Gorge once fueled the navies and steamships of the world. America's steelmills and industries depended on this clean burning coal to meet their energy needs. Today, all that remains of this industrial heritage is an abundance of abandoned mine sites, including hundreds of mine openings, refuse piles, deteriorating structures, and dangerous highwalls.

The National Park Service administers three units in southeastern West Virginia: New River Gorge National River (NR), Gauley River National Recreation Area (NRA), and Bluestone National Scenic River (NSR). This part of West Virginia was mined extensively in the past – for coal in the New and Gauley River areas, and for oil and gas near the Bluestone and Gauley Rivers. This past mining activity created a wide range of safety and environmental problems, which NPS managers must now address.

Abandoned underground mines have serious potential health and safety hazards and environmental problems in New River Gorge NR and Gauley River NRA. The greatest threat is from open or partially open mine portals (entries), especially those mined out areas that are extremely unstable and easily accessible to park visitors and area residents.

Because of the geologic formation of coal seams in this part of West Virginia, coal was primarily "deep mined." (Diagram 1). Deep mine portals present serious hazards to visitors, including the danger of roof falls (loose, falling rock), the presence of poisonous and explosive gases (methane), and deep pools of water. In addition, numerous partially collapsed buildings and unstable walls, conveyors, rail lines, bridges, hazardous equipment, and debris are associated with deep mines. Specific environmental problems that go with underground mines include mine drainage, subsidence of mine voids (creating sink-holes), and unvegetated, eroding mounds of waste materials and coal refuse.

Unreclaimed surface mines are a source of significant landscape disturbances in all three of the NPS areas. Hundreds of acres of unvegetated or partially vegetated bench areas with steep unstable spoils piles and slides subject to slippage and erosion still remain. Major associated problems include erosion and runoff from highwalls, haulroad and spoil areas, rock falls, slippage and slope failures, and lack of vegetation on many sites.

In addition, many reclaimed surface mines within park boundaries present problems. Surface mines, reclaimed as contemporary standards require, are often returned to grasslands, creating areas devoid of woody vegetation surrounded by climax forest. Typical reclamation seed mixtures often contain species of grasses, e.g. rye, now known to be allelopathic (plants which produce toxins that prevent other plants from becoming established.)

Other types of abandoned mine sites in the three park units include oil and gas operations – capped wells and clear areas with sparse vegetation. The Bluestone NSR contains the bulk of these abandoned operations.

In 1988, an inventory of abandoned mine lands (AML Inventory) was conducted through a Cooperative Agreement with West Virginia University (Armstrong and Yuill, 1988). Potential abandoned mine sites were

identified first by conducting thorough searches of historical geological data; historical aerial photos; USGS topographic maps; coal, oil, and gas permit and exploration records, and numerous interviews with state and local experts. The most difficult task was ground truthing the sites. The New River Gorge, often referred to as the Grand Canyon of the East, contains rugged terrain and few access roads. The gorge walls are steep, in some places rising 1500 feet from river edge to ridge top in as little as 100 yards.

The AML Inventory revealed 115 areas with abandoned mines located in the park or within a 1/2 mile of the boundary. Each abandoned mine may contain numerous hazards, including multiple open portals, deteriorating structures, and scattered debris. Once located, the sites were rated to determine which ones presented the most serious problems, using the following hazard rating system.

Health and Safety

High – likely danger to exposed visitors/residents including features such as portals, unstable structures, subsidence holes, dangerous equipment.

Medium – moderate potential for hazard if site is visited – structures, unstable highwalls, slides, partially accessible portals.

Low – potential for hazard but low likelihood based on site conditions – unstable trail, low highwall, etc.

None – minimal or no hazard potential observed.

Environmental

High – observed significant problem including active slides, major polluted drainage discharges, etc.

Medium – high potential for significant future problems – unstable slide areas, impounded water in unstable areas or moderate problems observed such as erosion and sedimentation.

Low – minor problems identified such as minor drainage with no visual evidence of pollution or limited erosion and sedimentation.

None – no problems observed with minimal potential for future problems.

Eyesores

Identified based on qualitative judgments in the field. Unvegetated slides, refuse areas, dead vegetation, coal piles and trash and debris were examples of areas noted in this category. The visibility of mine features from the river, trails, and major and minor roads also was estimated and described.

Site Accessibility

Ease of access (vehicle, pedestrian, difficult pedestrian) and site visitation levels (based on physical evidence, such as tire tracks, road use, trash, and personal interviews) were rated and described.

In addition, the Office of Surface Mining Reclamation Priority System was used. It categorizes sites into six levels that determine priorities for reclamation: Priority 1 represents a threat of substantial physical harm to

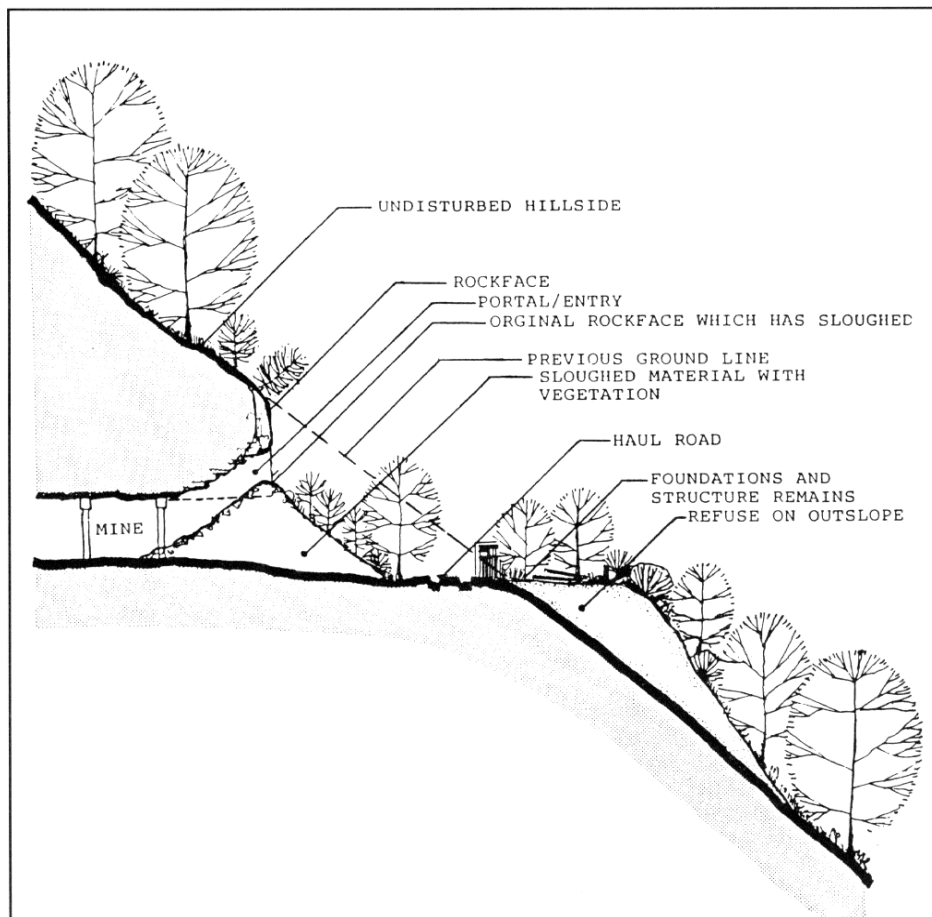


Diagram 1. Typical Abandoned Deep Mine Site

Abandoned Mines

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the public; Priority 2 is the protection of the public from adverse effects of mining practices; Priority 3 deals with restoring environmental damage; Priority 4 represents research project areas for reclamation techniques; Priority 5 deals with repair or replacement of public facilities, such as roads, utilities, or recreation areas adversely affected by mine operations; and Priority 6 deals with public lands adversely affected by coal mining. During the inventory, numerous sites were categorized as Priorities 1, 2, and 3. (USDI Abandoned Mine Update).

Using this rating system, 62 sites were identified as possessing severe potential health and safety problems, 31 were rated moderately severe, and only 22 received a low or no-hazard rating. Environmental problems were considered severe at only 3 mine sites; another 38 sites were rated moderately severe, and 31 sites were categorized as eyesores (Table 1).

The information gathered was then rated a second time to establish priorities for reclamation. The most critical potential health and safety hazards were determined in terms of:

1. Problem Severity – the most severe health and safety and environmental problems; and

2. Area Sensitivity – potential impacts on present or planned park developments.

The ultimate goal of the AML Inventory at New River Gorge NR was to establish a priority list of sites in need of reclamation. The Surface Mining and Reclamation Act, passed in 1977, required reclamation of existing mining operations and created a fund source for the reclamation of mines abandoned prior to passage of the Act. This funding, administered by the Office of Surface Mining, has been used to reclaim 5 of the worst areas identified. To date, 50 mine portals have been closed, 3 mine structures have been fenced off, 600 feet of highwalls have been filled, and a large landslide area has been stabilized.

The reclamation projects, coordinated through New River Gorge NR Resource Management section, were designed carefully, taking into account federal threatened and endangered species, state rare and endangered species, wetlands considerations, wildlife habitat, and the significance of cultural resources at the mines. An independent threatened and endangered species (T&E) study was done by the West Virginia DNR to determine the presence of potential habitat of such species, although it focused primarily on bat habitat (Bryan 1988). The park Cultural Resource Specialist coordinated with the West Virginia State Historic Preservation Office to ensure Section 106 compliance. Using this information, 3 types of mine closures were developed that minimized the impact of mine closures on park natural and cultural resources.

The first was a simple soil closure, where soil was backfilled into an opening and a corrugated pipe was placed at ground level to allow for Eastern woodrat (*Neotoma floridana magister*) access. The Eastern woodrat, while still fairly common in West Virginia, is being considered for threatened status in Pennsylvania due to population declines.

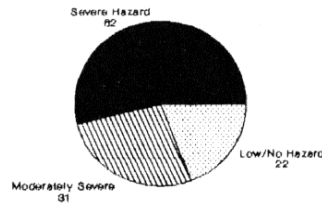
The second type of closure consisted of steel bars anchored in surrounding rock – wide enough for bat access yet narrow enough to exclude people. The T&E survey had indicated the presence of bats (*Pipistrellus subflavus* Eastern pipistrelles, *Myotis lucifugus* Little brown bats, and *Epescicus fuscus* Big brown bats) in

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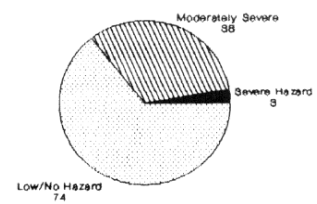
Table 1.

New River Gorge National River Abandoned Mine Inventory

Health and Safety Hazards Associated with Mines



Environmental Hazards of Mines



Resource Management Ranger Robert Sullivan looks into the main portal at the Ames Mine, scheduled to be reclaimed this year. Photo by Robert Sullivan.



Open portal at Ames Mine. Photo by Robert Sullivan.

Reclamation of Abandoned Mines in West Virginia

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several mine openings that were a top reclamation priority. The study also identified portals that represented good potential habitat for federally endangered species, such as the Indiana bat (*Myotis sodalis*) and Virginia big-eared bat (*Plecotus townsendii virginianus*). Each of these steel closures, known as "bat gates," was custom made to fit individual mine openings securely.

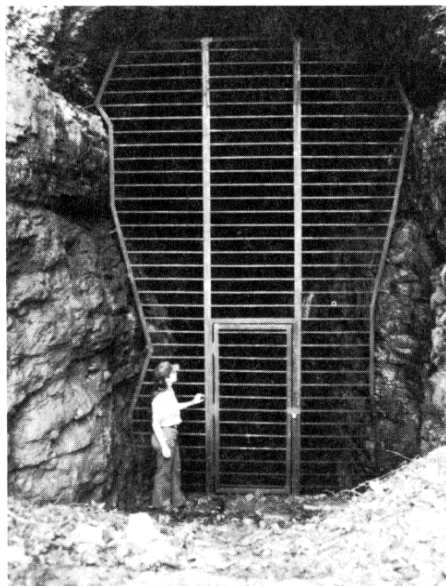
The last type of mine closure was designed to allow for its possible removal at a later date. It consisted of a foam plug, blown into the opening and then covered with soil. The mine openings where this closure was used were the main portals of the Kaymoor Mine, one of the finest examples of an old coal mine and town in the entire gorge. A foam closure allows management the option of removing the plug when the site is developed, so that visitors will be able to experience the operation of a historic coal mine.

As long as funding is available, more cooperative projects with the Office of Surface Mining will be planned. Of the remaining abandoned mines in New River Gorge, 5 rated as most hazardous to both visitors and the environment would then be reclaimed.

Native Seed Banking

The New River Gorge NR staff also has undertaken the task of reclaiming some of the smaller disturbed sites using an experimental process known as native seed banking. This process involves covering disturbed areas, such as coal refuse piles, with lime, fertilizer, and a 2-inch layer of soil taken from the forest floor. This encourages the germination of native species. Three replications of 20' x 20' experimental plots have been established on a large coal refuse pile near the abandoned Brooklyn mine site. The plots were installed in June, August, October, and the following year's June, to determine if time of year is linked to emergence of desirable species.

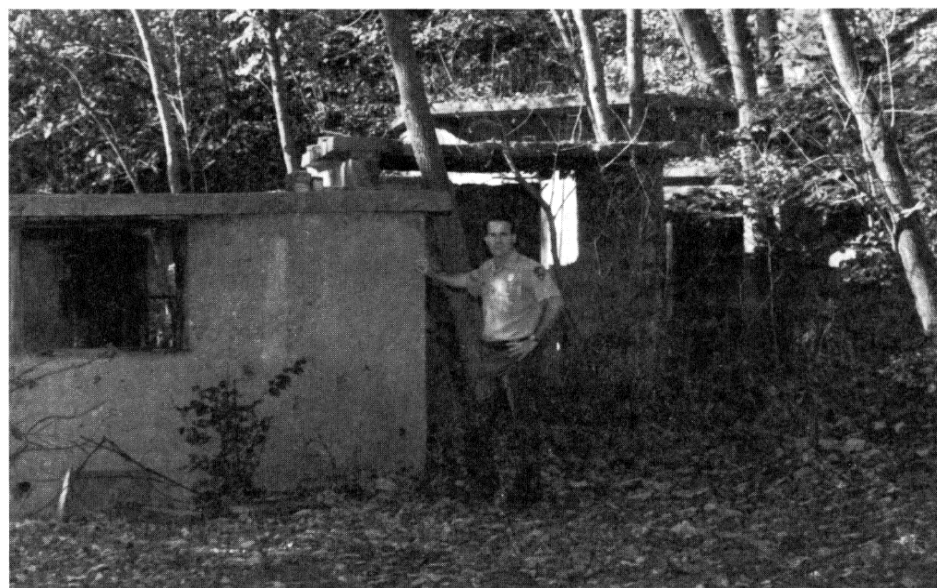
In August, Resource Management rangers identified all vegetation on the plots and currently are preparing a formal report for the native seed bank project. Initial data indicate that woody species present are primarily



Natural Resource Specialist Margaret Weesner looks at a "bat gate" installed at the now reclaimed Kaymoor Mine. Photo by Margaret Weesner.



Deteriorating stone wall from the Ames Mine site. Photo by Robert Sullivan.



Deteriorating structure hides a large, 6' x 10' open portal. Photo by Robert Sullivan.

native species, having successfully crowded out some invasive non-natives. Herbaceous species present are a mix of both native and non-native species with very few takeover species present. On an annual basis, resource management staff will return to the site and monitor successional changes in vegetation to determine success over time.

It may be many years before all the scars that remain from mining of the Gorge are healed, but the Abandoned Mine Land Inventory for New River represents an excellent start in speeding the process. This year the Office of Surface Mining has awarded the park \$50,000 to conduct identical surveys on the Gauley River NRA and Bluestone NSR, two areas added in 1988 and administered by New River Gorge NR. NPS Resource Management personnel will identify and prioritize abandoned coal, oil, and gas operations along the Gauley and Bluestone Rivers and will include a T&E species study of the sites inventoried. Results will be used to determine funding levels necessary to

reclaim abandoned mine sites within the Gauley River NRA and Bluestone NSR.

In our search to make a safe and enjoyable experience for park visitors, it is important not to overlook the cultural history and significance of these areas. Abandoned coal mining towns, like Kaymoor and Nuttallburg, are considered by many to be invaluable vestiges of Appalachian heritage. As they are reclaimed, many historic features of these sites will be preserved for visitors to discover and explore ... safely.

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Literature Cited

- Armstrong, D. and C. Yuill. 1988. *Mine and Well Site Inventory Report for the New River Gorge National River.*
Bryan, H.D. 1988. *A Survey for Federally Endangered Bat Species in Abandoned Mine Portals in New River Gorge National River, WV.* U.S. Dept. of the Interior, Office of Surface Mining. Abandoned Mine Land Update Form, OMB No. 1029-0087.