

MOUNTAINTOP REMOVAL MINING: ONE COAL COMPANY'S RESPONSE TO THE PUBLIC DEBATE¹

by

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Abstract: Mountaintop Mining has been practiced in West Virginia and surrounding Central Appalachian states for over twenty years. In recent months, however, media coverage and other events have increased public and regulatory scrutiny of the practice, which has led to mine permitting delays and employee layoffs. A law suit was filed in federal court alleging, among other things, that the construction of valley fills for excess spoil disposal is a violation of the Clean Water Act. West Virginia's Governor appointed a Task Force to study the issue and has made recommendations for further regulations. Arch Coal, Inc., operates four large surface mines in West Virginia, and many of its mining subsidiaries have won federal and state honors for excellence in reclamation. Arch has also funded several studies that address many of the issues that have been at the core of the public debate. One study involves the assessment of the long term impacts of large scale mining and valley fills on downstream water quality and aquatic life. Another evaluates the rate of forest plant invasion onto reclaimed lands. A third study compares the value of the wildlife habitats created on reclaimed lands relative to undisturbed ridge top and stream side habitats. The results of these studies show that mountaintop removal mining, when done responsibly, has minimal impacts on the environment, and can in fact provide valuable lands for future development. Arch Coal, Inc., has taken a leading role in addressing the scientific and public policy aspects of this controversial issue.

Additional Key Words: valley fills, wildlife habitat, forest invasion.

Introduction

The United States Congress passed the Surface Mining Control and Reclamation Act in 1977 and specifically provided for mountaintop removal mining in the steep topography of the Appalachian region where the coal seams lie in relative close proximity to the surface. Indeed, in many areas, there are from four to fourteen recoverable coal seams, some of which are less than two feet thick, that can only be recovered by surface means. Large scale mining in Central Appalachia evolved from the increased demand for low sulfur coal and the increased efficiency and productivity demands brought about by competitive pressures from western low sulfur coal operations. This paper details the efforts of one company to respond to and work to address many of the environmental concerns raised by the media and the environmental community.

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Background History

In August 1997, an article was published in the *U.S. News and World Report* which, by any reasonable interpretation, was some of the most one sided journalism that had ever graced the pages of that magazine. Subsequent articles appeared in other publications, as well as a story featured on ABC's "Nightline". Furthermore, the newspaper published in Charleston, West Virginia continued a series of stories, alleging inconsistencies between the interpretation and enforcement of state and federal laws governing surface mining. Concerns were exacerbated in the spring of 1998 by the passage of a new state law in West Virginia dealing with the mitigation requirements of stream resources affected by the construction of valley fills. The new law ostensibly brought West Virginia's threshold acreage for mitigation in line with neighboring Kentucky's policy, but the law was never implemented. The heightened public perceptions culminated in a law suit filed in July 1998 by the West Virginia Highlands Conservancy and several coal field residents. The suit alleged, among other things, that the U.S. Army Corps of Engineers was illegally issuing approvals to mining applicants under Section 404 of the Clean Water Act using Nationwide Permit 21. The argument being that the cumulative environmental impacts from these valley fills were not adequately assessed, and that NWP 21

was not intended for these types of structures. In December 1998, a settlement was reached between the U.S. Justice Department and the plaintiffs, allowing the Corps to continue issuing permits for some valley fills under NWP 21, but requiring a full, two year Environmental Impact Study to be conducted to address the cumulative impacts on water resources and related matters.

An interim process was proposed to allow for NWP 21 approvals to take place as long as the watersheds, within which these fills are constructed, are less than 250 acres. In the case where watersheds in excess of 250 acres were proposed for a valley fill, then a separate 404 permit is required, including a complete EIS. This settlement is currently being reviewed by a federal judge.

In the meantime, many uninformed claims have been made in public forums regarding the impacts of mountaintop mining on aquatic and terrestrial habitats, as well as the general perception that there is a lack of significant tree growth on reclaimed sites. In order to help address this seeming dearth of information on these matters, Arch Coal, Inc. funded a number of studies done by well respected academic institutions or other third parties. These included studies on the relative value of the wildlife habitats on reclaimed lands versus adjacent unmined sites, the rate of natural forest plant succession onto twenty year old reclaimed mountaintop sites and a brief assessment of benthic life in the streams immediately downstream of valley fills.

Wildlife Habitat Evaluation

The first large walking dragline to work in the West Virginia coal fields was erected at Hobet Mining's No. 21 mine and began work in April 1983. Since then, over 7,000 acres have been mined and reclaimed at that Boone County site. These reclaimed lands include open meadows, block plantings of various trees and shrubs, numerous ponds, basins and other wetlands. In the summer of 1998, Dr. Edwin D. Michael, Professor Emeritus of Wildlife Management (Division of Forestry) at West Virginia University completed a study that rated the relative value of two of these reclaimed mountaintop removal areas that were mined between 1983 and 1984. Two adjacent unmined areas were also examined and rated for their wildlife habitat values.

Habitat Evaluation Procedures

A modified HEP was used to determine the wildlife habitat values of the two reclaimed mountaintop mine sites. The vegetative cover types that currently exist are: shrub/tree, grass/forb, ecotone, wetland, conifer and rock. The HEP that Dr. Michael used in the study to rate the two reclaimed sites utilized 12 habitat variables that are listed in Table 1.

Table 1. Habitat Variables Used to Rate Reclaimed Sites

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- Distance to hardwood forest
 - Diversity of habitat types
 - Diversity of seed producing plants
 - Diversity of soft mast-producing plants
 - Edge vegetative cover
 - External edge configuration
 - Forb-grass cover
 - Interspersion of habitat types
 - Potential dens and escape cover
 - Shrub/tree cover
 - Vegetative cover density
 - Water availability

The results of Dr. Michael's study found that the overall wildlife rating for the first reclaimed area was 79.9 points out of 100 while the second reclaimed area was rated at 81.8 out of 100, for an average rating of 80.8. Further comments in the study indicated that as ecological succession progresses through its normal sequence during the next 20-25 years, the wildlife habitat rating will gradually increase. Dr. Michael also recommended that future reclamation efforts could be improved by increasing the number of conifers, creating more wetlands and decreasing the amount of Kentucky-31 fescue.

Seed selection has in fact changed since 1984 to eliminate KY-31 from seed mixes used in reclamation. An endophyte free variety of fescue has replaced KY-31 since the early 1990's. In addition, fescue represents a much smaller percentage of the seed mixture, and has been largely replaced with Orchardgrass and Perennial ryegrass at Arch Coal mine sites.

Adjacent Unmined Sites

Two representative undisturbed sites were similarly evaluated to compare to the mined sites. A

ridgetop at an elevation of approximately 1200 feet was reviewed, as well as a streamside forest at an elevation of approximately 925 feet. As with the evaluation of the reclaimed sites, a modified HEP was used to determine the wildlife value of the undisturbed upland hardwood forest. The modified HEP utilized twelve habitat variables that are listed in Table 2.

Table 2. Habitat Variables Used to Rate Undisturbed Sites

- Average dbh of snags
- External edge
- Hard mast species
- Herbaceous cover
- Number of snags
- Number of stumps and logs
- Openings
- Percent canopy closure of hard mast
- Soft mast species
- Tree size class/canopy closure
- Understory density
- Water availability

The results of Dr. Michael's study indicated that the ridgetop forest had an overall rating of 63.9 out of 100, while the streamside sites had a wildlife rating of 62.8 out of 100, for an average of 63.3. It is important to note that commercial logging had occurred in the study area in the last 25 years, as has been the case with much of southern West Virginia. This point notwithstanding, it is clear from the studies that the habitat value of reclaimed mountaintop mine sites is in some ways superior to the surrounding woodlands due to the increased availability of water, forage opportunities and edge effect.

Evaluation of Tree Growth on Surface Mined Lands

Mining critics also alleged that reclaimed lands will not support native forest species or will take many decades before trees will become established. To address that claim, a study was done by Dr. Jeff Skousen, Professor of Soil Science at West Virginia University and Dr. Paul Ziemkiewicz, Director of the National Mine Land Reclamation Center in Morgantown, WV. The study was completed in November 1998 and the objective was to develop a clearer understanding of the process of forest invasion on reclaimed surface mines in southern WV and to compare the process to endpoints represented by forests developed on adjacent, unmined soils. The study evaluated tree establishment and growth on three reclaimed mountaintop removal surface mines in

southern WV. The sites are identified by the original mine operator and are known as the Mynu, Zapota and Amherst sites. All of the sites had been revegetated with grasses and legumes, and sometimes Black Locust seed was added into the seed mix. The three sites ranged from 19 years to 23 years of age since initial revegetation.

Forest Succession

According to the findings of Dr. Skousen and Dr. Ziemkiewicz, there were substantial differences in species composition among the three sites, as well as sections within each site. For example, the undisturbed areas were dominated by tuliptree, sugar and red maple, with minor percentages of red oak, hickory, black gum, black birch and ash. Outslope areas of the reclaimed sites were dominated by red maple, black birch, tuliptree, sourwood and black locust. On the reclaimed flat areas on top, red maple and black locust were the dominant trees.

Reforestation on outsoles is progressing much more quickly than on the flat reclaimed areas on top. A gradient of forest community development among the reclaimed sites from least to most developed is shown in Table 3.

Table 3. Gradient of Forest Community Development on Reclaimed Sites

Flat areas (Amherst < Zapota < Mynu) < Outslope areas (Amherst < Zapota < Mynu)	
Early Succession.....	Later Succession
Least Developed.....	Most Developed
black locust < pines < red maple < sourwood < black birch < tuliptree	

Tree canopy diversity and total tree frequency increase along this gradient. In the case of the Mynu and Zapota outsoles, their canopy diversities and total frequencies were similar to those of adjacent undisturbed areas. Early succession is marked by a predominance of locust and red maple. They are succeeded by sourwood, black birch and tuliptree. It is evident from the field studies that black locust is a "nurse tree" that prepares disturbed areas for the invasion of later successional tree species.

The study concluded that native forest species do establish themselves on mountaintop removal surface mines. The soil medium on the reclaimed outsoles on two of the sites were composed of overburden pushed over the side from the flattened top

and were not compacted by heavy equipment. These diversity of species. The areas that had been revegetated with grasses and legumes generally had less tree cover and fewer stems than sites where no herbaceous cover had been seeded. The competition from forage species like tall fescue, orchardgrass and *sericea lespedeza* was sufficient to hinder the establishment of trees on these sites. On uncompacted outslope areas without seeded herbaceous cover, plant succession is rapid and is, within 20 years, approximating species diversity and growth rates on undisturbed soils.

An Assessment of Benthic Life Downstream of Mountaintop Mining Operations

Many have suggested that there is no evidence of the cumulative long term impacts of large scale mining on the surrounding receiving streams. Although there may not be a comprehensive scientific examination of the cumulative hydrologic impacts of mining and valley fills in central Appalachia, there is a great deal of information gathered routinely consequent to the water monitoring requirements of the Clean Water Act and the Surface Mining Control and Reclamation Act. Hobet Mining, Inc., a subsidiary of Arch Coal, Inc., funded an evaluation of its own data on the receiving streams surrounding its Dal-Tex operation in Logan County, WV. The benthic portion of the assessment was done by Sturm Environmental Services, a well respected consulting firm in WV. The objective of the evaluation was to review the accumulated data on the water quality and quantity over a sixteen year period and review some pre-mining, during mining and post-mining benthic surveys from the receiving streams. This effort was not structured to be an exhaustive study nor was it intended to be a peer reviewed document. It was merely to assess whether some trends could be discerned based on the data at that site.

Site Description

The Dal-Tex operation encompasses over 4000 acres of surface and deep mining activities, most of which has been or is actively mined using mountaintop removal methods. Two primary watersheds receive drainage from these operations and both are in the Spruce Fork sub-basin of the Little Coal River watershed, a tributary of the Kanawha River. Bi-monthly water quality and quantity monitoring of the receiving streams began in 1982, prior to the activation of large scale mining. Benthic survey stations were established below the operations and sampled

areas had about 70% tree cover, and contained a sporadically to assess benthic life. Samples were collected in 1986, 1993 and again in 1998. Both water chemistry and aquatic life data collection is continuing.

Hydrologic and Benthic Survey Conclusions

The review of the water quality and quantity data suggests that, although the project area was not a pristine environment prior to surface mining, some aspects of the hydrologic system have improved. Total suspended solids were reduced after reclamation and the total alkalinity to total acidity ratio increased substantially. The increased alkalinity results in higher buffering capacity of the stream. With respect to the benthic life in the receiving streams, the data suggests that there is an initial impact during the active mining. However, there is significant recovery after reclamation and aquatic energy production appears to return to levels comparable to the pre-mining state. The numbers of individual organisms, as well as the different taxa present in the streams after reclamation approached the pre-mining levels, and some cases were improved. The cumulative effect on large drainages are minimal and there is nothing to suggest the benthics have been impaired or that the downstream segments are energy deficient because of valley fills or pond construction.

Literature Cited

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