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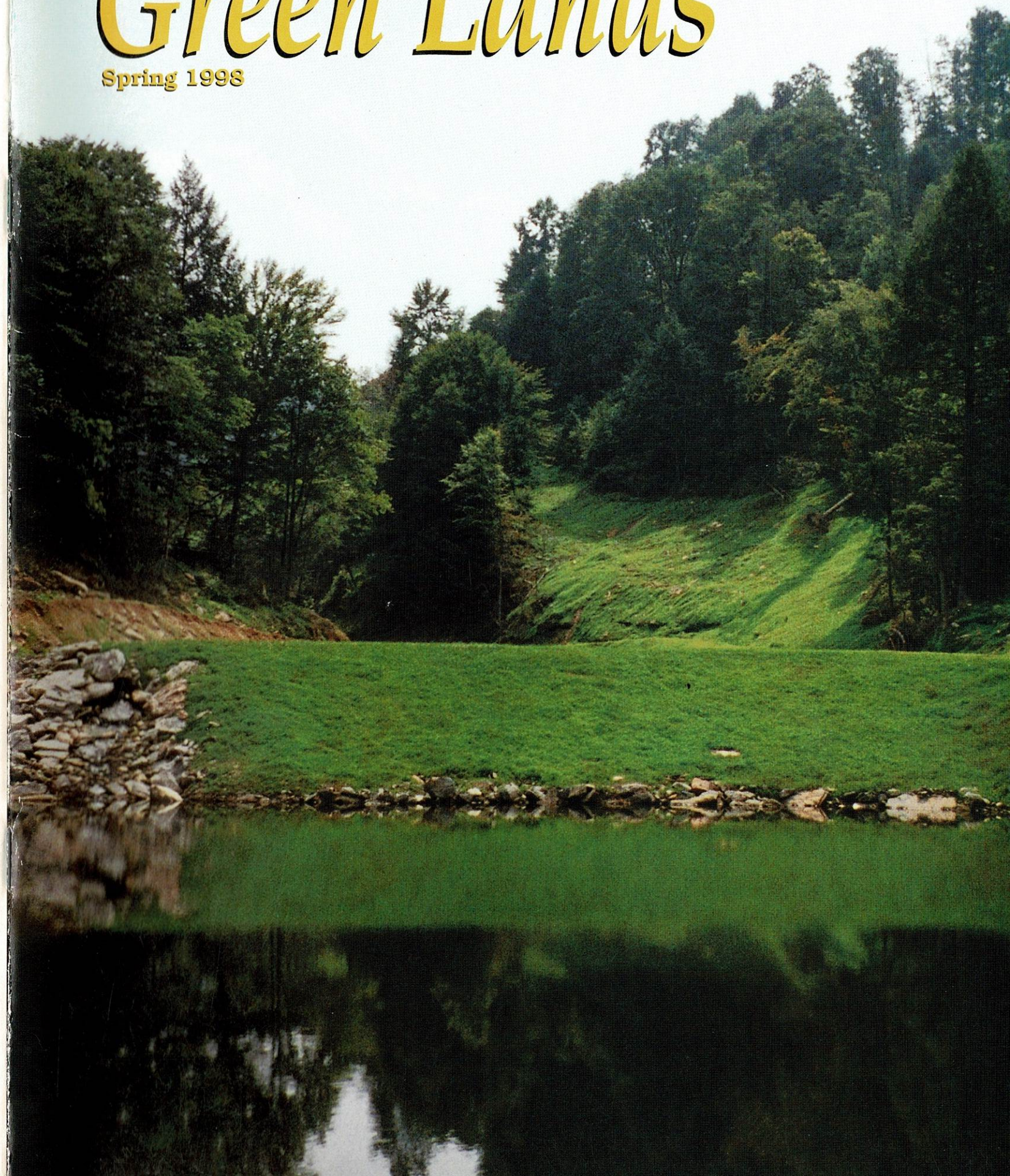
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Green Lands

Spring 1998



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Green Lands

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Mined Land

Green Lands
is a quarterly publication of the
West Virginia Mining & Reclamation Association,
with offices at 1624 Kanawha Boulevard, East
Charleston, West Virginia 25311
(304) 346-5318, FAX 346-5310.



On the Cover

An scenic view of one of the 93 ponds at Pen Coal's
Kiah Creek mine near Dunlow, West Virginia.
Pen Coal is featured in this issue of *Green Lands*.
See story on page 29.

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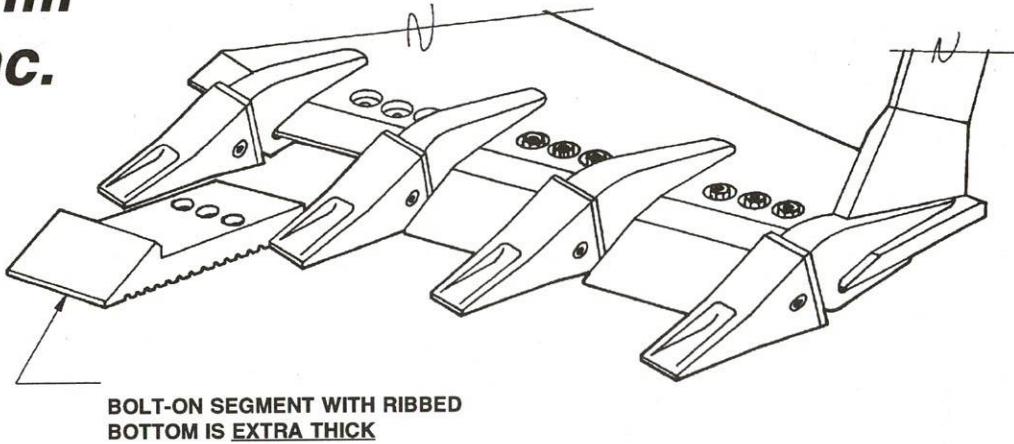
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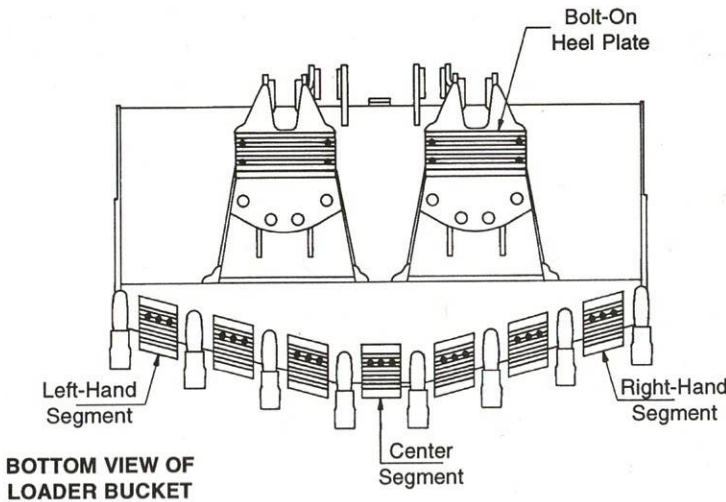
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Coal Calendar

May

- 7-9

West Virginia Coal Association, Annual Meeting, Glade Springs Resort, Daniels, WV. Contact Sandi Davison, WVCA, 1301 Laidley Tower, Charleston, WV 25301, (304) 342-4153, FAX 342-7651.
- 12-14

1998 Kentucky Coal Utilization Conference, Carnahan Conference Center, Lexington, KY. Contact Kim King, OISTL/College of Engineering, Lexington, KY 40506, (606) 257-4634, FAX 257-2173.
- 17-19

1998 Kentucky GIS Conference, Center for Rural Development, Somerset, KY. Contact Kim King, OISTL/College of Engineering, Lexington, KY 40506, (606) 257-4634, FAX 257-2173.
- 7-9

Spring Meeting, Arlington, VA. Contact Glenda Vickers, OISTL/College of Engineering, Lexington, KY 40506, (606) 257-4296, FAX 257-2173.
- 9-11

Longwall USA '98, David L. Lawrence Convention Center, Pittsburgh, PA. Contact Sam Posa, Intertec Presentations, Inc., 6300 South Syracuse Way #650, Englewood, CO 80111, (303) 220-0600.
- 9-11

Wetlands Delineation and Constructed Wetlands, Lexington, KY, University of Kentucky. Contact Kim King (606) 257-4634.

July

- 13

WV Coal Foundation-Virginian Invitational Golf Tournament, Bristol, VA. Contact Patty Bruce, WVMRA, (304) 346-5318.

August

- 4-6

17th Conference on Ground Control in Mining, Lakeview Resort and Conference Center, Morgantown, WV. Contact Karen Centofanti, Department of Mining Engineering, (304) 293-7680.
- 6-9

West Virginia Mining and Reclamation Association Annual Meeting, The Greenbrier, White Sulphur Springs, WV. Contact Patty Bruce, WVMRA, (304) 346-5310.
- 7

11th Annual Kentucky Professional Engineers In Mining Seminar, Holiday Inn North, Lexington, KY. Contact Geaunita Caylor (606) 257-2820.

June

- 2-4

Noise Prediction Software Workshop, Carnahan Conference Center, Lexington, KY. Contact Glenda Vickers, OISTL/College of Engineering, Lexington, KY 40506, (606) 257-4296, FAX 257-2173.
- 4-6

Society for Mining, Metallurgy and Exploration, Inc./Central Appalachian Section (SME/CAS), Annual

Arch Coal To Acquire Atlantic Richfield's Domestic Coal Operations

Arch Coal, Inc. announced recently that it has signed an agreement to acquire Atlantic Richfield's Colorado and Utah coal operations. Also, it will simultaneously combine the acquired operations and its Wyoming operations with ARCO's Wyoming operations in a new joint venture to be known as Arch Western Resources, LLC, which will be 99 percent owned by Arch Coal.

The transaction is valued at approximately \$1.14 billion.

Overall, Arch Coal will become the second largest U.S. coal producer with annual coal sales of close to 110 million tons, or roughly 10 percent of the nation's coal supply, and annual revenues of nearly \$2 billion.

"With the completion of this transaction, Arch Coal will become the largest nation's premier producer of low-cost, low-sulfur coal - one that can and will compete aggressively in virtually every major U.S. coal market," said Steven F. Leer, Arch Coal's president and chief executive officer.

All of ARCO's domestic coal production is compliance coal, which means that it meets the sulfur dioxide emissions requirements of Phase II of the Clean Air Act.

Atlantic Richfield's U.S. coal operations include Thunder Basin Coal Company, LLC; Mountain Coal Company; and 65 percent interest in Canyon Fuel Company, LLC.

Thunder Basin operates the Black Thunder and Coal Creek mines in the Powder River Basin of Wyoming.

Black Thunder is the nation's largest coal mine with 1997 production of 37.7 million tons coal.

In 1997, ARCO's U.S. coal operations generated revenues of \$537 million and after-tax operating income of \$51 million on the sale of 53.2 million tons of low-sulfur coal. ARCO's domestic coal reserves are estimated at 1.3 billion tons.

The transaction is expected to close sometime in the second quarter of 1998.

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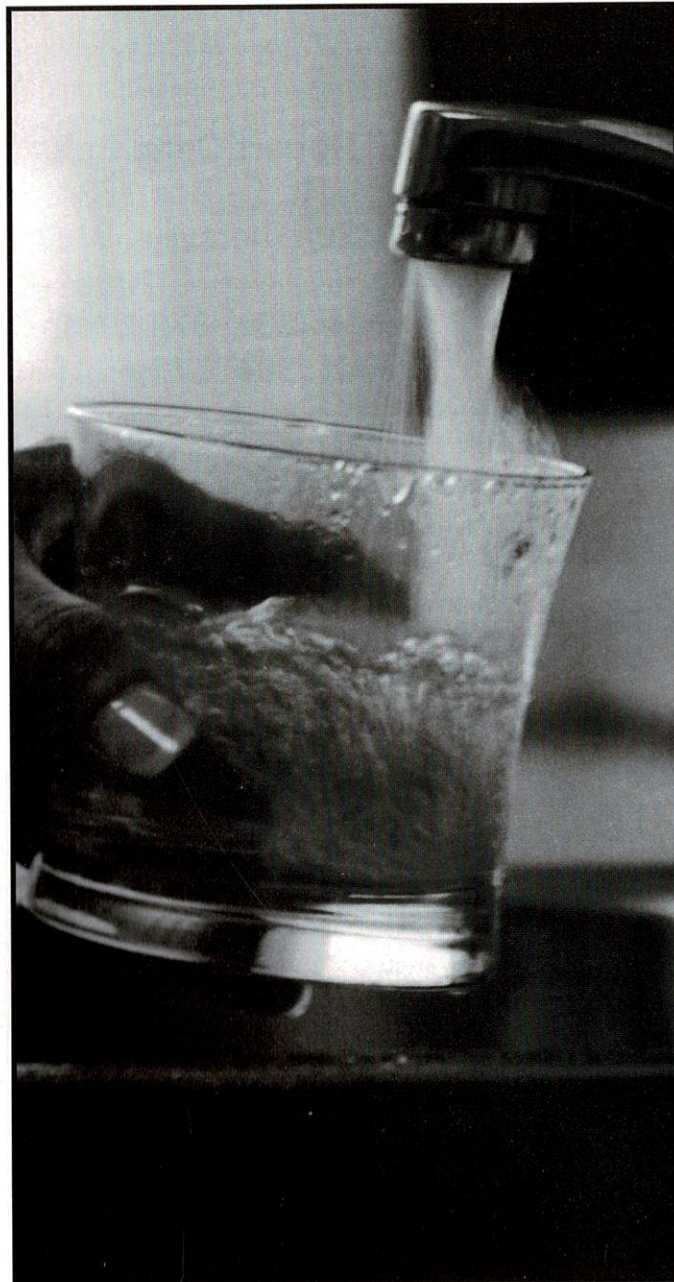


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West Virginia's Coal Industry: Providing Jobs, Resources, Energy, And Clean Water



Coal, West Virginia's best known finished product, has directly or indirectly become a vital part of our everyday lives.

The coal industry is not only the leading job provider in some parts of the state, but every job in the industry supports another eight in the community, as well as paying twice the average salary.

Also, the industry provides more than \$1 billion in payroll and has an economic impact to West Virginia of more than \$17 billion, annually.

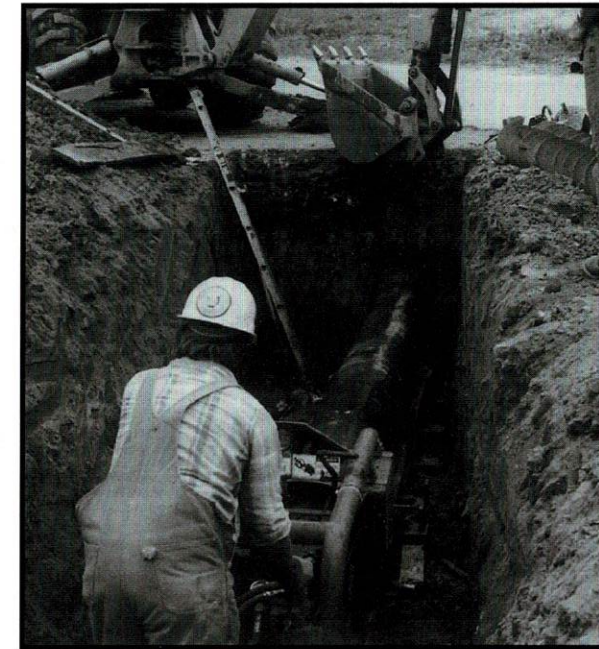
Although more commonly associated with the generation of electricity, West Virginia's coal industry has unobtrusively provided numerous towns with funding to improve their commercial and residential water systems for almost a decade.

Think about it, the West Virginia coal industry is the reason why many families across the state have been able to receive an ample and dependable drinking water system.

Since 1990, more than \$35 million has been quietly spent from money funded by the coal industry to improve water quality and the standard of living for about 15,000 West Virginia residents in 15 counties.

Funding for these water systems originated through the Surface Mining Control and Reclamation Act of 1977.

As a result of this federal law, all coal mining



A worker uses a road bore while installing the Turkey Run Water Supply in Upshur County. Since 1990, West Virginia's coal industry has provided \$35.2 million to help fund installation of drinking water systems across the state.

operators must pay "... a reclamation fee of 35 cents per ton of coal produced by surface coal mining and 15 cents per ton of coal produced by underground mining..." (In 1996, more than 174 million tons of coal were mined in West Virginia, which means the state's contribution to the federal fund was more than \$37 million.)

In 1990, Congress passed the water supply amendment Title IV to the Surface Mining Control and Reclamation Act that stated that any state "...may expend up to 30 percent of the funds allocated to such State..."

As a result, this amendment allowed the West Virginia Division of Environmental Protection (DEP) to use that portion of the grant money contributed by the coal industry "... for the purpose of protecting, repairing, replacing, constructing or enhancing facilities relating to water supply, including water distribution facilities and treatment plants, to replace water supplies

adversely affected by coal mining practices." Consequently, this has become the state's only industry-funded program that provides improvements to the community.

The first West Virginia project was completed in 1992 in the Neibert/Talpin area near Man in Logan County. This water improvement project cost more than \$1.8 million to help nearly 1,000 area residents.

As of today, five water supply projects, totaling about \$8 million, are either completed or under construction and a sixth is in the planning stages in Logan County alone.

"The AML program is a leading provider in Logan County," said Rick Roberts, an engineer with the Logan County Public Service District. "It has been a great help to this county."

In order for an area or town to be eligible for this particular funding, the local Public Service District

must submit an application to the Water Supply System Advisory Committee (WSSAC) showing it is at least 50 percent impacted by pre-1977 mining operations.

The WSSAC, established by the State DEP, is charged with identifying and recommending water supply systems to be included in the State's future Abandoned Mine Lands Reclamation construction grants application.

This committee has representation from the Division of Environmental Protection, the State Bureau of Public Health, the U.S. Office of Surface Mining, the Public Service Commission, the WV Development Office, the Governor's Office of Community and Industrial Development and the West Virginia Rural Water Association.

The WSSAC meets every spring to review applicants to determine qualifications for funding.

Once a water system is approved for installation, the DEP office handles all contractor bidding, awarding of the contract and inspection during construction.

With every water project, fire hydrants and other precautionary measures are installed that help protect homeowners.

"We think that is very important," said Patrick Park of the West Virginia Abandoned Mine Lands and Reclamation Division.

Improving water supply systems throughout West Virginia seems to be the coal industry's "best kept secret."

Nonetheless, in some parts of West Virginia this water supply project is the difference of people having or not having water.

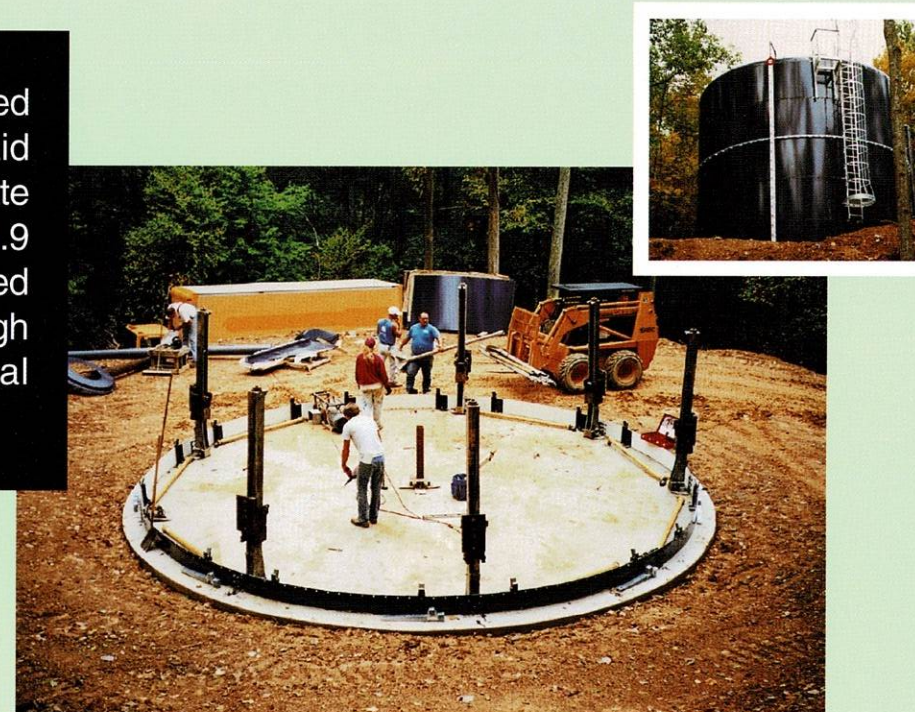
Thanks to West Virginia's modern day mining industry for this much needed improvement in the quality of life throughout the state.

Breaking Ground For A New Water System In Boone County



Elected officials gather at Racine in Boone County to break ground during the dedication ceremony on March 25, 1998. The coal industry contributed more than \$1.3 million to the project. Pictured are (l-r): Chris Jarrett, WV-American Water Company; Gordon Eversole, Boone County Commissioner; Gene Kuhn, Boone County Commissioner; Lloyd Jackson, WV Senator; Earl Ray Tomblin, WV Senate President; Cecil Underwood, WV Governor; Mickey Protan, Boone County Commissioner; Charlotte Lane, WV Public Service Commission; and Dick Nevi, representative for U.S. Congressman Nick Rahall.

A water tank is installed on the Page-Kincaid water line in Fayette County. More than \$1.9 million was contributed to this project through funding by the coal industry.



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Funding Provided By The Coal Industry For Water Projects Throughout West Virginia

Project	County	Coal Industry's Contribution
Cassity Fork	Randolph	883,488
Century Voga/Elk City	Barbour	654,600
County Rt. 9	Preston	1,929,299
Cow Creek/ Sarah Ann	Logan	3,295,515
Crooked Creek	Logan	568,483
Cucumber/Berwind	McDowell	Design Completed
Dogtown Road Waterline	Preston	841,675
Elk Creek/Verner	Logan	App. For Feasibility Study
Ellamore/Camp Mahonegan	Upshur	App. For Feasibility Study
Gauley River	Fayette	689,500
Glen Fork/Sabine	Wyoming	846,000
Godby Branch	Logan	364,868
Heizer/Manila	Putnam	1,470,632
Kanes Creek	Preston	221,450
Kellys Creek	Kanawha	
Kingwood	Preston	App. For Feasibility Study
Marrowbone	Mingo	1,368,975
McDowell County	McDowell	3,657,500
Mill Creek	Logan	3,000,000
Moundsville Waterline	Ohio	245,000
Neibert Tapin	Logan	1,874,352
Norton, Harding, Jimtown	Randolph	840,000
Page/Kincaid	Fayette	1,214,035
Pigeon Creek	Mingo	4,705,277
Ragland/Delbarton	Mingo	389,585
Red Jacket/Matewon/Newton	Mingo	184,3875
Reynolds/Wallace	Harrison	866,320
Rt. 41 Maplewood/Danese	Fayette	968,000
Sand Run	Upshur	App. For Feasibility Study
Spawlick, Beech, Arnolds Run	Barbour	App. For Feasibility Study
Turkey Run	Upshur	410,215
Upper Rum Creek	Logan	704,933
Washington/Jeffrey Heights	Boone	1,350,000
TOTAL		35,203,577



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A Review Of Abandoned Mine Land Projects

The following 11 pages depict outstanding reclamation projects throughout West Virginia.

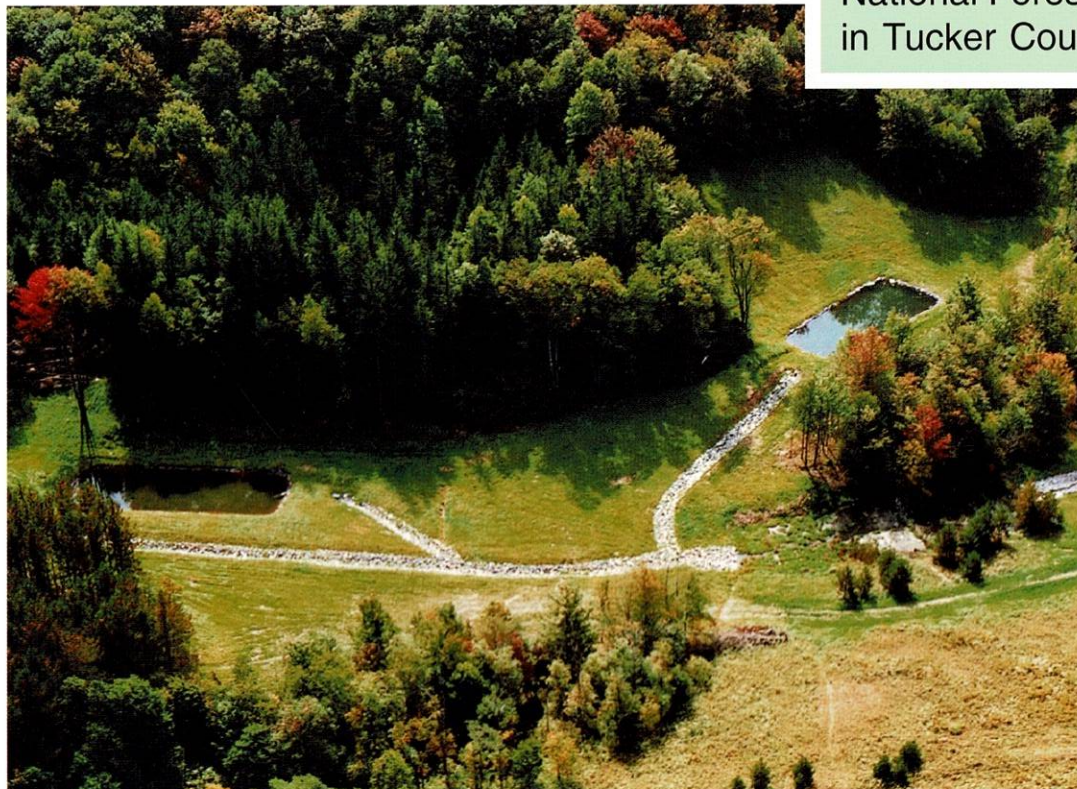
"Before" and "After" photographs are shown for a comparison of how

companies have returned old abandoned areas into modern-day reclamation projects with funding provided by the current West Virginia coal industry.

Blackwater Manor

(Tucker County)

Water quality has improved tremendously in a tributary of the North Fork of the Blackwater River in the Monongahela National Forest due to this work in Tucker County.



Big Cub

(Wyoming County)

An example of excellent reclamation work at the Big Cub abandoned refuse site near Coal Mountain in Wyoming County.



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Utilizing proven diesel-electric power with the lowest center of gravity, LeTourneau loaders operate at a constant engine speed for superior fuel savings and longer engine life. Computerized, no-spin torque is individually controlled to each traction motor, so if traction is lost at one wheel, power is instantly redistributed to the other drive wheels.

LeTourneau loaders offer the most complete range of efficient and productive buckets precisely sized for any material, with solid-state controls providing faster cycle times and greater productivity than any comparably-sized loader.

Superior safety features include an acoustically advanced operator's cabin design with non-obstructive integral ROPs and sloped rear cowling for unequalled visibility. The primary regenerative dynamic-retarding brake system brings the loader to a complete stop, with secondary air-operated disc brakes mounted on each motor.

And when it comes to state-of-the-art technology, LeTourneau continues to lead the pack. The generators, traction motors and solid-state electronic controls are the most advanced in the industry, with interchangeable modular components for easy service and maintenance access.

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SAE-Rated Bucket Capacity			
Standard	17 yd ³ (13.00 m ³)	22 yd ³ (16.82 m ³)	28 yd ³ (21.4 m ³)
High Lift	16 yd ³ (12.00 m ³)	20 yd ³ (15.29 m ³)	26 yd ³ (19.9 m ³)
Dump Heights			
Standard	18'-5" (5.61 m)	18'-10" (5.74 m)	21'-6" (6.55 m)
High Lift	19'-10" (6.04 m)	20'-0" (6.10 m)	23'-6" (7.16 m)

Odd Moore

(Raleigh County)



This Odd Moore site located in Raleigh County, was a junky, garbage and rat infested area until the Abandoned Mine Lands program awarded a reclamation contract to Green Mountain.



Twilight

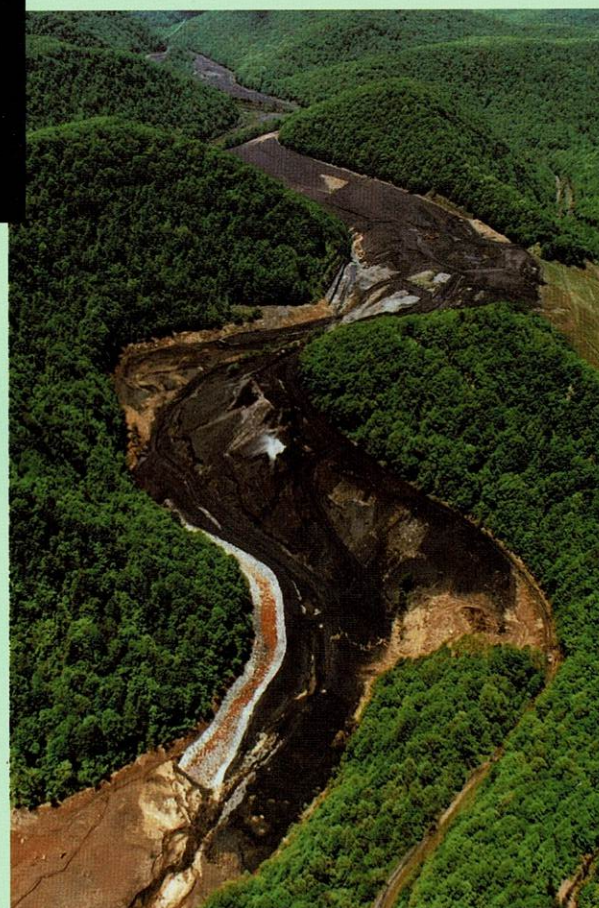
(Boone County)



This side hill refuse fill in Boone County had been abandoned for more than 30 years. A planned wildlife habitat development has now returned this site to a stable and productive area.



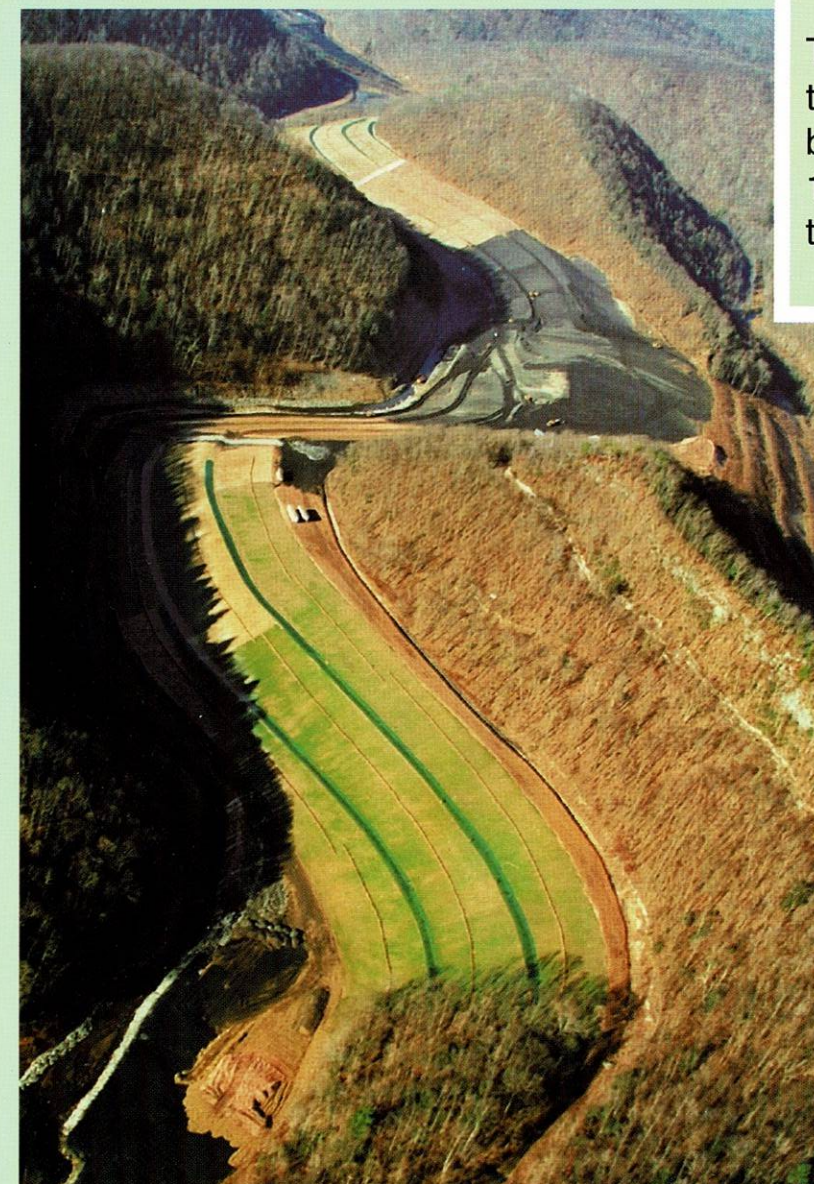
The last major Abandoned Mine Lands project near Widen in Clay County is returning a huge impoundment and highly eroded refuse disposal area to a productive and stable form. Taylor Branch water quality has already shown major improvement with increased benefits downstream to Buffalo Creek.



Taylor Creek

(Clay County)

This total project, costing more than \$4 million, is scheduled to be completed in the spring of 1998. This photograph was taken in December 1997.



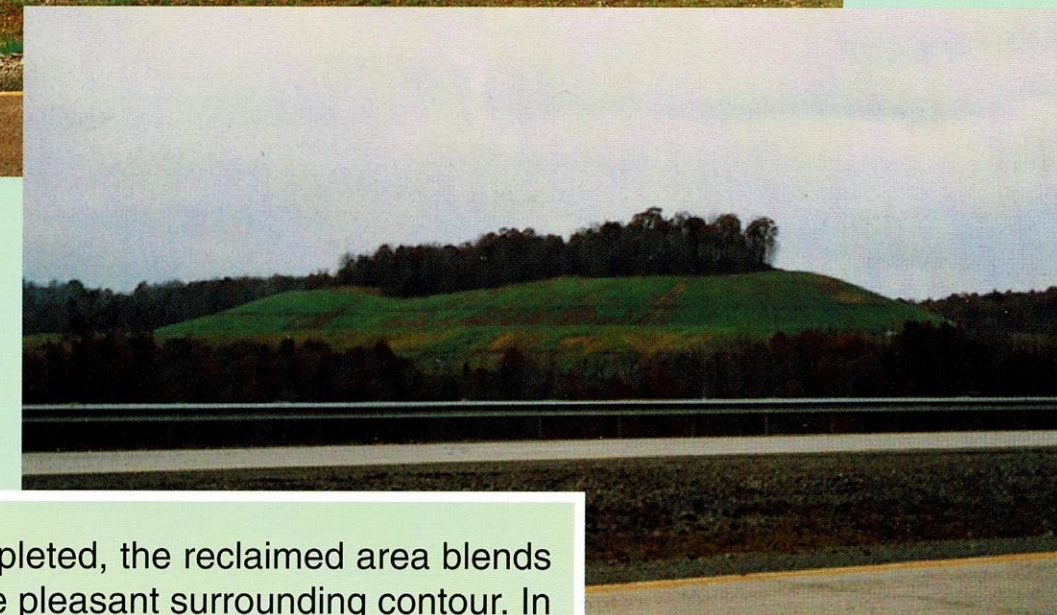
These pictures not only demonstrate an aerial view of a superb reclamation job at Zebs Creek and the Tygart River in Barbour County, but they provide a view of what the majority of the traveling population sees when driving on Corridor H near Elkins.



Zebs Creek

(Barbour County)

Work under contract by Green River Company which was the recipient of the 1997 Abandoned Mine Lands - North Award.



Now completed, the reclaimed area blends in with the pleasant surrounding contour. In the foreground is Corridor H, located between Buckhannon and Elkins.

reclamation

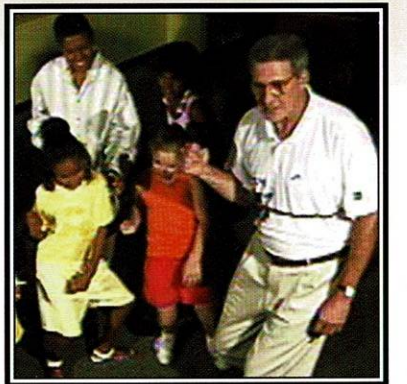
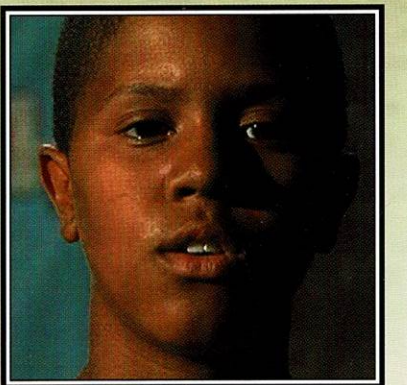
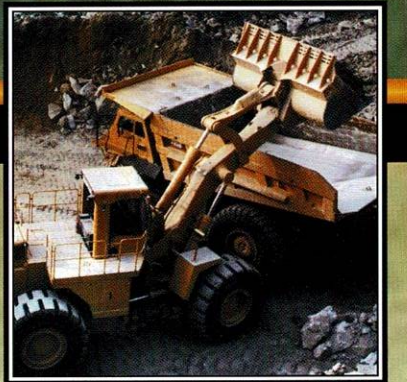
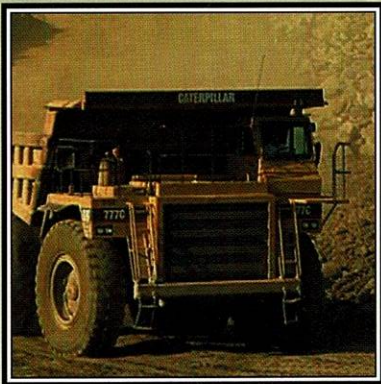


(rek'lə mā'shən)

It's a big word with an important meaning to West Virginians. And with reclamation, previously mined sites like the one transformed by Catenary Coal in Kanawha County are now more beautiful than ever.

Walker Machinery and Caterpillar equipment play a vital role in West Virginia's reclamation success. We'll continue that tradition in the future, for our state and for our children.

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Francis Mine Drainage

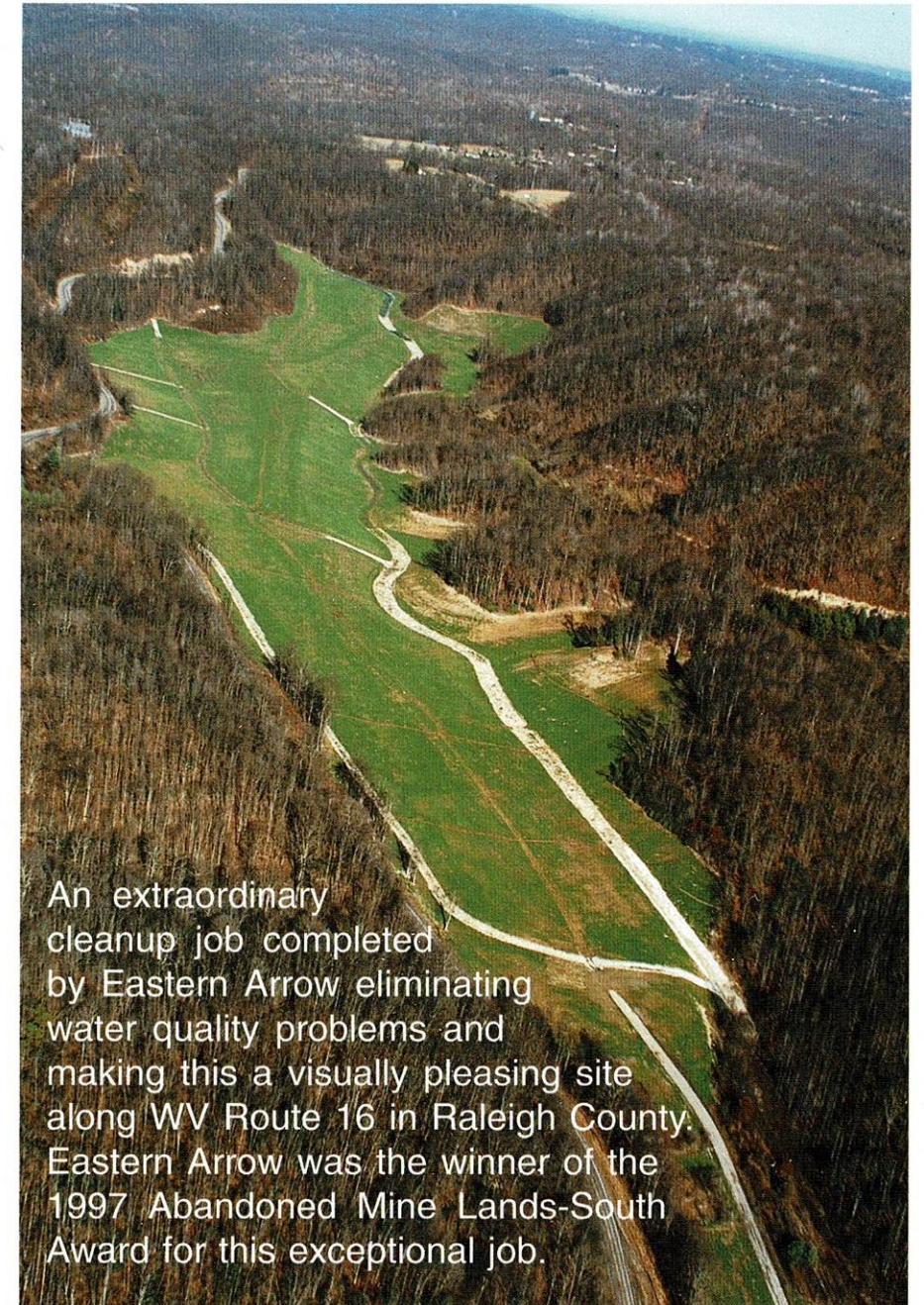
(Harrison County)

This long abandoned surface mine created constant drainage problems and was a mosquito haven until corrected with Abandoned Mine Land Funds in the village of Francis, Harrison County.



Alderson Branch

(Raleigh County)



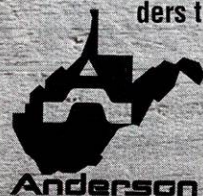
An extraordinary cleanup job completed by Eastern Arrow eliminating water quality problems and making this a visually pleasing site along WV Route 16 in Raleigh County. Eastern Arrow was the winner of the 1997 Abandoned Mine Lands-South Award for this exceptional job.



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Pen Coal, Wayne County's Largest Private Employer

Pen Coal, one of the nation's top exporters of coal used primarily for generation of electricity, continues to grow as a part of West Virginia's economy.

In southern West Virginia, its Kiah Creek mine is perched on top of the hills of Wayne, Lincoln and Mingo counties near Dunlow.

A subsidiary of Pen Holdings, Pen Coal began operations at its Kiah Creek mine in 1987 in an area not known for coal reserves. Nonetheless, it has operated here for 11 years and has coal reserves to provide jobs and resources for another 15 years.

Nestled between the East Lynn Lake and Cabwaylingo State Forest, Pen Coal is very conscious of operating in such an environmentally sensitive area.

"We pay very close attention to our water resources," said Randy Maggard, environmental specialist with Pen Coal.

Each day, employees monitor the water quality of approximately 20 of the total 93 ponds located throughout its operation. Averaging about 1/2 acre in size, these ponds are monitored closely for water quality and aquatic habitat.

Runoff water from the operation is almost always routed through at least two or three polishing ponds before being released into area streams.

"We find most of these ponds create a more diverse aquatic system after mining than before we started to work in this area. We also definitely have more waterfowl like geese and ducks than we did," Maggard said.



With a state recreation facility located nearby, Pen Coal also has an acute awareness and concern for the streams running in close proximity to its property.

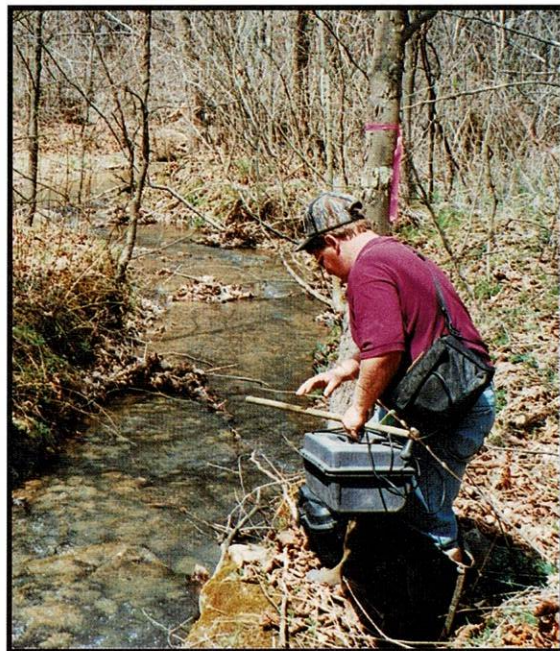
"Every spring and fall we conduct intense monitoring above and below our operation on the east fork of Twelvepole Creek, Trough Fork and Kiah Creek that examines and keeps a close check on aquatic life around the mining area," Maggard said. "We utilize this data to insure that our operations do not adversely impact our receiving streams."

Of course, proper reclamation is extremely important with any coal operation when production is completed. This includes habitat for wildlife.

"We use a seed mixture when planting that provides food for wildlife or insects they eat, said Monte Hieb, manager of engineering for Pen Coal. "In addition to small game species, we are seeing deer, bear, fox and even bobcat in the area."

Coal is transported by truck 42 miles to the Big Sandy River.

A consideration in transporting coal is the Cabwaylingo State Forest on the southwest of the Kiah Creek operation. The company constructed an eight-mile paved haul road to ensure that area residents



Every spring and fall, Pen Coal conducts intense monitoring above and below its operation on Trough Fork, Kiah Creek and the east fork of Twelvepole Creek.

and anyone participating in recreational activities at the state forest, are not disturbed.

Pen Coal continues to be an active part of the surrounding community. It is heavily involved with the "Partners in Education" programs with Tolsia High, Crum Middle, Dunlow Elementary and Atenville Elementary schools. Pen Coal provides funding for computers in the classrooms, athletic facilities and career day, as well as providing tours to colleges nearby.

Additionally, its employees are involved with the community on their own time, such as coaching Little League activities and volunteering with fire and rescue squads.

At Dunlow Elementary, Pen Coal purchased shrubs, plants, trees and mulch and arranged with Tolsia High School horticulture students to landscape the grounds.

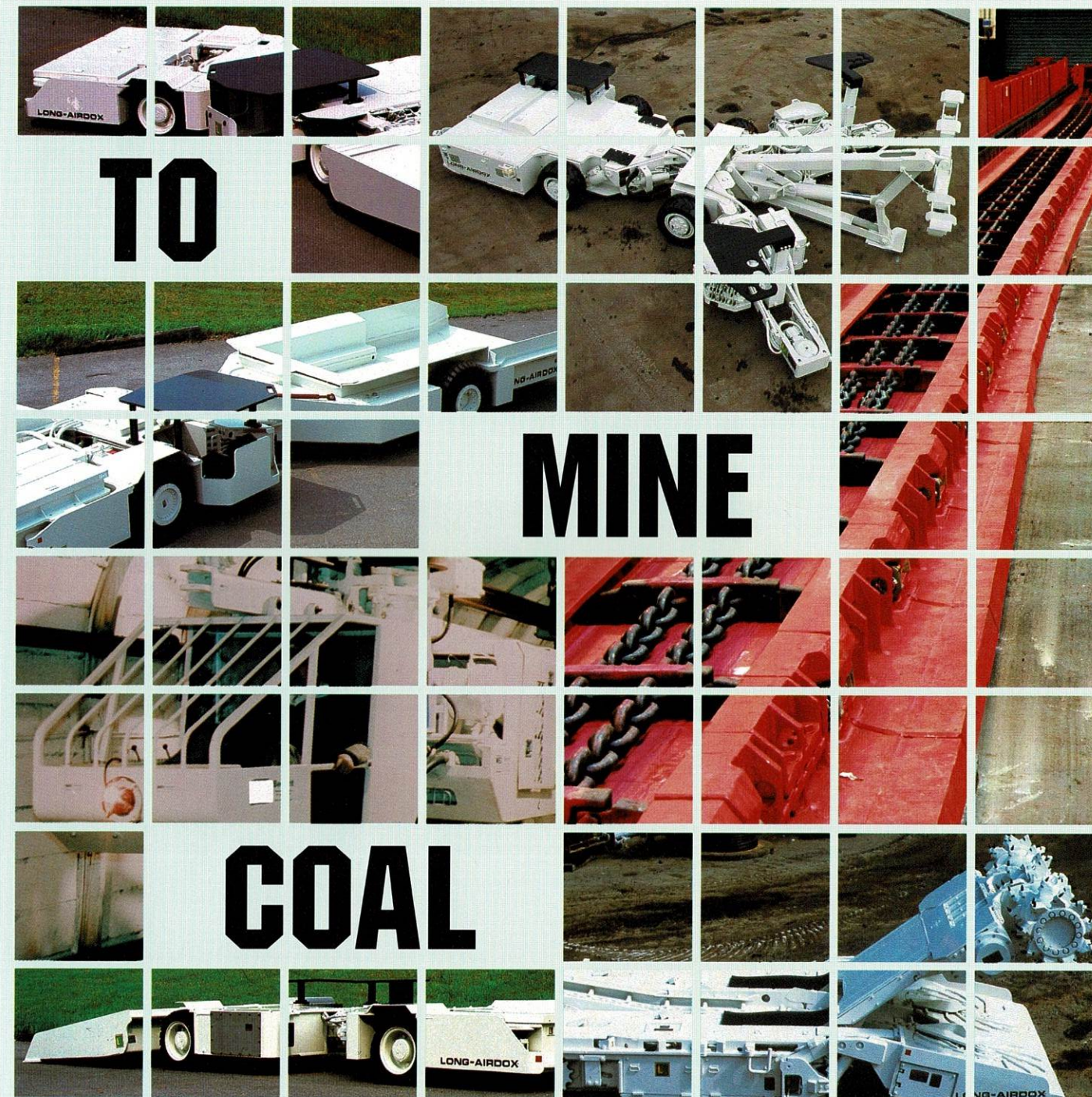
Pen Coal also purchased the equipment for employees to make new benches for baseball dugouts, purchased tetherball poles, painted 4-squares, hop scotch and a basketball court, installed a regulation size volleyball court, replaced basket goals and nets, swings and new paint for existing equipment.

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"Pen Coal may have bought the equipment but it was the employees who took the time and put it all together," said Robert Marsh, supervisor of permitting and planning for Pen Coal. "It was the employees that made it happen."



Pen is working with the "School to Work" program by having employees talk with students and presenting the different career opportunities that are available. There are more than 25 different occupations at the company that would interest any student.

Pen Coal continues to be admired for its production capabilities and as a corporate citizen. It has received awards for its outstanding reclamation work on mining sites by the West Virginia Mining and Reclamation Association in 1989, 1994 and 1997.

Pen Coal is an example of a modern coal company that uses state-of-the-art technology while having a positive impact within the coal industry and contributes to the betterment of West Virginia.

Throughout its operation, Pen Coal's Kiah Creek mine has 93 ponds that average about 1/2 acre in size (previous page). These ponds are monitored closely for water quality and aquatic habitat. Runoff water from the operation is almost always routed through at least two or three polishing ponds before being released into area streams. Presence of waterfowl, such as these geese (below), have increased due to Pen Coal's water quality program.



PEN COAL AT A GLANCE

A Subsidiary of Pen Holdings

Headquarters: Brentwood, TN (Pen Holdings)

Pen Coal Employees: 290 (overall total employees within Pen Holdings, 336)

WEST VIRGINIA

Kiah Creek Mine - Wayne, Lincoln and Mingo Counties in WV

- Purchased in 1987
- 45,000 acres coal
- Annual Production - 3.0 million tons
- 2 Surface mines
- 4 underground mines

- Coal is trucked to Wayne County River Terminal, near Kenova, WV

Fork Creek Mining Co. - Boone, Lincoln and Kanawha counties, WV

- Purchased in 1997
- 28,000 acres coal
- Production scheduled to begin in late 1999

KENTUCKY

The Elk Horn Coal Corporation - 6 eastern Kentucky counties

- Purchased 1994
- 140,000 acres coal

Leasing Division

- 3.5 million tons annually

Operation Division

- 1 Surface mine
- 7 underground mines producing 700,000 tons/year
- Coal is trucked to Wayne County River Terminal, near Kenova, WV

SHIPPING FACILITIES

Big Sandy River

- Wayne County River Terminal, near Kenova, WV
- 5.2 million tons shipped in 1997

Mississippi River

- International Marine Terminals, Myrtle Grove, LA (1/3 owners)

Top International Customer:

Taiwan Power Company

Top Domestic Customer:

Dayton Power And Light Company

A Brief History

Pen Holdings, Inc. began when Mr. Eddie Pen, a native of China, formed P & C Bituminous Coal in 1980. The company was formed primarily to market U.S. produced coal to Taiwan Power Company.

Mr. Pen earned a Master's in engineering from Vanderbilt University in Nashville, Tennessee. It was during his years at Vanderbilt that he used his contacts in several countries to begin business. Upon graduation, he chose to locate his company in the Nashville area and become a citizen of the United States.

Some of the historic developments include P & C's purchase of existing mining permits in Eastern Kentucky and the Big Sandy Dock in 1983.

Pen Holdings, Inc. was formed in 1986 to be the holding company for all of Pen's subsidiary companies. Pen purchased the Kiah Creek reserves in 1987 and surface mining began that year. The Wayne County River Terminal was constructed in 1988.

In 1990, the Kiah Creek Preparation Plant

began operation with its first deep mine production. That year, the coal company name was changed to Pen Coal Corporation.

Today, Pen Coal's customer base largely consists of domestic utilities with plants located on the Ohio and Mississippi River systems.

Pen Holding's only non-coal investment is the

Calhoun Gin Company in St. Matthews, South Carolina. Extensive expansion and modernization of this and construction of an adjacent cotton and cottonseed warehouses have made this into one of the premier cotton operations in the state.

Mr. Pen died in 1993 and in January 1996, Mr. William E. Beckner acquired controlling interest in the Company from the Pen family.

Mr. Beckner, now Chairman, President and Chief Executive Officer of Pen Holdings, Inc. and its subsidiaries, joined the executive team in 1982.

He earned a Master's in Business Administration from the University of Tennessee.

Pen Coal Officers

Eddie Pen (deceased)
Founder

William E. Beckner
President/CEO

Stephen G. Capelli
Senior Vice President/Operations

Joseph A. Davis, Jr.
Senior Vice President/Sales & Marketing

Mark A. Oldham
Senior Vice President/Secretary/Treasurer

W. Sherrod Rhodes
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MAXIMIZING THE VALUE OF FORESTS ON RECLAIMED MINED LAND

James A. Burger Professor of Forest Soil Science,
Virginia Polytechnic Institute and State University
and **William R. Maxey**, State Forester, West Virginia Division of Forestry

Introduction

West Virginia is blessed with commercially valuable natural resources, the most notable being timber and coal. Huge amounts of timber were cut and marketed during a 50-year period between 1880 and 1930. Towards the end of the virgin timber harvest, coal mining and marketing became the economic mainstay in West Virginia.

However, the value of West Virginia's second-growth forest is resurging, with a nationwide demand for hardwood products, and the advent of wood processing mills that use timber of all quality grades. This wood products resurgence is evidenced by a dozen major new paper, fiberboard, and lumber mills built or proposed throughout the state in the past five years.

Land reforestation after being drastically disturbed by surface mining can produce high-value commercial forests while providing watershed protection and wildlife habitat. Prior to passage of the 1977 Surface Mining Control and Reclamation Act (SMCRA), most surface-mined land in the east and midwest was reclaimed with trees.

These reclaimed lands varied somewhat in their quality and productivity, but reforestation was generally successful and commercially-valuable forests were created. Many of these new forests are on the verge of maturity and will provide landowners a considerable source of revenue.

Regrettably, since the implementation of the SMCRA, very little mined land is being reforested in West Virginia. A 1995 U.S. Forest Service inventory of West Virginia showed that 111,000 acres of forest land had been lost to mining during the seven-year inventory period between 1989 and 1995. This amounts

to 16,000 acres per year, which closely compares to the 20,192 acres disturbed by mining during one year between October 1, 1996, and September 30, 1997, according to the 1997 West Virginia Annual Evaluation Report by the Office of Surface Mining Reclamation and Enforcement.

Furthermore, post-law reclamation practices have had a major negative influence on post-mining timber value, due to mine soil compaction and the use of unsuitable topsoil substitutes. More-productive minesoils grow larger, higher-quality trees and increase post-mining timber harvest revenues. Forests grown on high-quality soils can be harvested more quickly, produce larger timber volumes, and bring higher stumpage prices than trees grown on minesoils poorly adapted for forestry, such as those produced by typical post-law surface-mining operations.

The purpose of our paper is to provide information that will aid landowners in estimating the effects of "good" reclamation (reclamation that produces high-quality forest soils) on post-mining timber harvest values, and to point out that productive minesoils can be created at no additional cost to the mine operator.

The Problem

With implementation of the Surface Mining Control and Reclamation Act, restoring forests on mined land has become more difficult, and fewer forests are being restored. This is due to three factors that are rooted in the misinterpretation of the law:

1. The law states that mined land must be returned to its pre-mined condition and use, or a use of higher value. Since 1980, most Appalachian mined

land that was originally forested has been reclaimed as "hayland" — grasses and legumes that persist for several years, then succumb to brushy woody vegetation. After 100 to 200 years, a commercially-valuable native forest may develop via natural forest succession. Another common reclaimed post-mining land use is "wildlife habitat," which involves the planting of mostly exotic grasses, legumes, and shrubs.

Neither of these post-mining uses meets the spirit of the law requiring restoration of the original land use or a use of higher value. Abandoned grassland and the planting of mostly exotic shrubs for wildlife cannot be construed as "higher value" than a forest restored to its original approximate composition of commercially-valuable native species that simultaneously provide natural wildlife habitat as well as watershed protection and significant atmospheric carbon recovery.

Landowners can enjoy the benefits of commercial forestry on reclaimed mined land within comparatively few years (Figure 1) by following reclamation guidelines that facilitate productive forests, instead of waiting 120 years or more for nature to produce a commercially-viable forest.

Figure 1 illustrates the approximate time required for a forest to reach commercial maturity after establishment by "default" (natural succession) on mined land reclaimed as hayland/pasture and then abandoned, a common scenario in the central Appalachians. Competitive grasses and legumes such as tall fescue (*Festuca arundinacea*) and sericea lespedeza (*Lespedeza cuneata*) retard natural forest succession by 20 years or more, and compacted mine soils slow the successional facilitation processes commonly associated with forest succession (Ashby 1987; Williamson and Gray 1996).

By contrast, reforestation procedures recommended by Burger and Torbert (1992) would result in a commercially-harvestable hardwood forest in about 60 years, and a commercially-harvestable pine forest in about 30 years (Figure 1).

2. The law (Public Law 95-87) also requires that mined land be returned to its original level of productivity. The Office of Surface Mining (OSM) interpretation of forest productivity is inconsistent with cropland and grassland productivity. Reclaimed crop- and

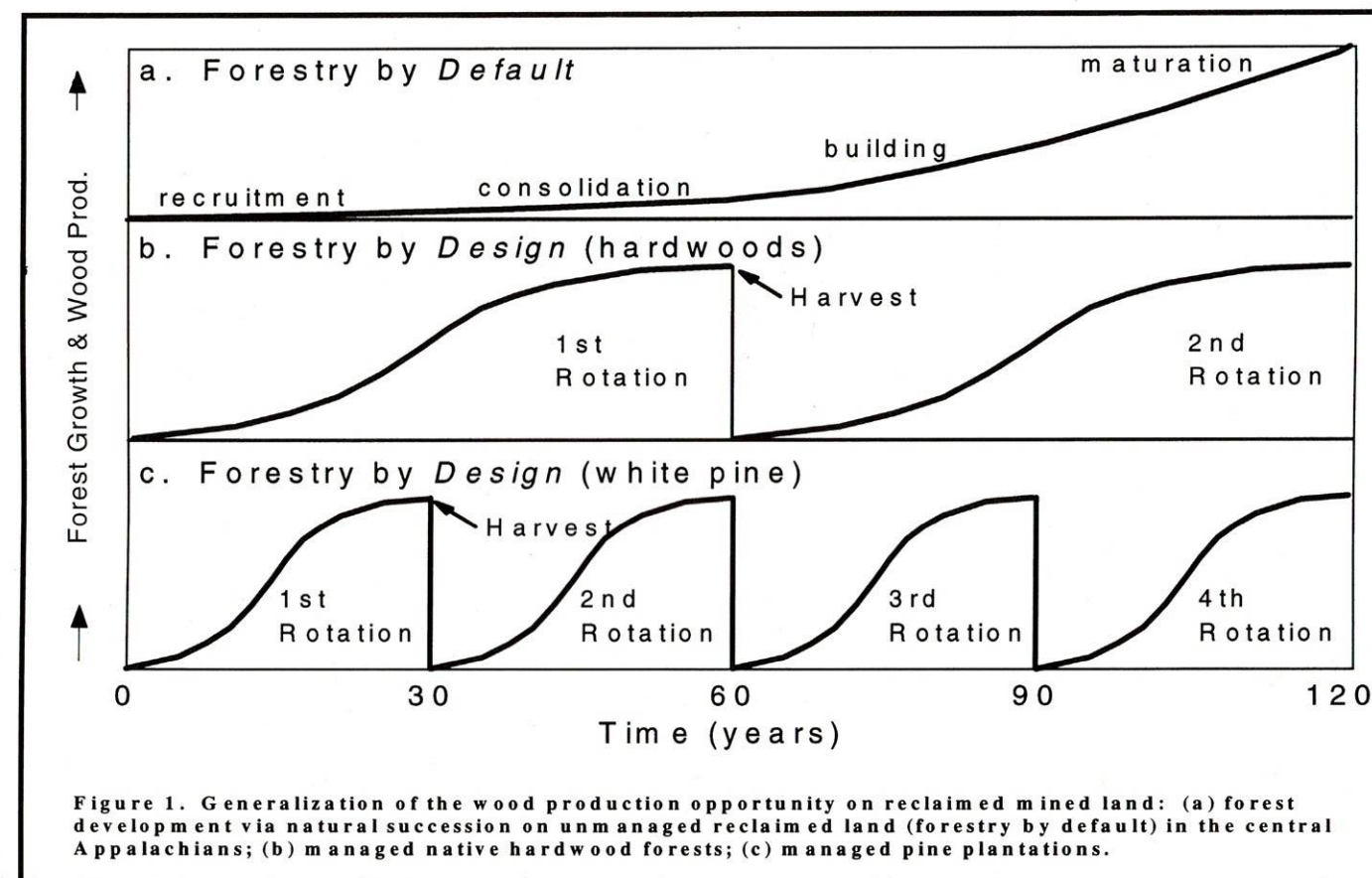
grassland productivity standards are based on the productive potential of similar reference areas. In essence, if cropland produced 150 bushels/acre of corn prior to mining, then the reclaimed cropland must produce 150 bushels/acre after mining.

Similarly, if grassland produced 6 tons/acre of hay prior to mining, the reclaimed grassland must produce 6 tons/acre after mining. However, if forest land was capable of producing 15 MBF/acre (15,000 board feet/acre) of high-quality hardwood sawtimber prior to mining, there is no requirement to reclaim forest land productivity to its original level.

Given the misinterpretation of the law, forest land can be (and is regularly) degraded in the process of mining and reclamation. The only requirement is that a certain number of trees/acre be established, without regard for their potential to grow well or become commercially valuable. This means that a high-quality site with valuable mixed hardwoods can legally be replaced with a degraded, poor-quality site planted with tree species having little or no future commercial value.

3. When reforestation is attempted, the greatest impediment to successful forest land reclamation is an embedded notion within the regulatory community that all reclamation must start with an "agronomic approach" of smooth, compacted, heavily-fertilized minesoils covered with lush, exotic, grasses and legumes. Even when forestry is the intended post-mining land use, dense groundcovers are usually required by regulators. Trees must then be planted in the dense ground covers and often fail due to the unnaturally-competitive environments in which they are forced to survive. Contributing to tree establishment failures are compacted minesoils caused by soil reconstruction and heavy grading used to produce the agronomic land surface.

These problems could be avoided because the law states that the reclamation approach must be appropriate for the approved post-mining land use. Reclamation for forestry requires an approach different from those for other post-mining land uses, one that is, nonetheless, achievable within the constraints of the law and regulations, and less costly because less site preparation, fertilizer, lime, and seed are needed.



The Alternative

Research by reclamation forestry groups throughout the Appalachian and Midwestern coalfields has shown that productive minesoils and forests can be restored by using a "forestry reclamation approach," which basically entails:

1. Using surface soil and/or weathered, sand stone overburdens (surface 10 feet) for the new reclaimed soil and sub-soil medium;
2. Loosely grading noncompacted topsoil or top soil substitutes that include, when possible, woody debris and native seeds;
3. Using native and non-competitive domestic ground covers that quickly protect the site, encourage forest meso- and macro-fauna, and serve a non-competitive, facilitative role in plant, animal, and forest succession; and
4. Planting nurse trees for wildlife and soil improvement along with valuable crop trees for their commercial value to the landowner

and adjacent communities (Burger and Torbert, 1992).

This forestry reclamation approach has been used operationally and proven successful. An important feature is that it costs about \$400 less per acre due to reduced grading costs and less expensive ground cover seed mixtures. It has been approved and advocated by Virginia's Department of Mines, Minerals, and Energy in a July 9, 1996, memo on reforestation guidelines. Approximately 80% of Virginia's operators/landowners are now opting for a post-mining land use of forestry.

New reforestation reclamation guidelines have also been approved and advocated as a reforestation initiative by Kentucky's Department for Surface Mining and Reclamation and Enforcement in Reclamation Advisory Memorandum #124. A number of implementation workshops have been held to present and demonstrate procedures for reclaiming land for forestry. Due to this initiative, over 50% of new permits

issued in Kentucky designate forestry as the post-mining land use.

Minesoil Quality and Forest Value

The opportunity and value of properly-reclaimed mined land is compelling because the productivity and value of forests and wood produced can be greater than levels prior to mining. Instead of bushels/acre or tons/acre, foresters judge minesoil quality based upon the average height of trees at a given index age, such as age 25 or 50.

Trees grow slowly on poor-quality mine sites and are relatively short by age 25 (site index = 45 ft) compared to trees of the same age on average minesoil quality (site index = 56 ft), or trees of the same age on good mine soil quality (site index = 70 ft) (Figure 2).

The height-over-age curves in Figure 2 show that tree height can vary greatly at the same tree age as a function of minesoil quality. This height comparison at a selected age is commonly used to "index" soil, site,

or land potential for forestry and is referred to as "site index." A generalization for most tree stands is that wood volume and wood value increase exponentially with tree height or site index. Figure 2 shows that trees on good-quality mine soils that are 1.5 times taller than trees on poor quality minesoils (45 versus 70 ft) can be 20 times more valuable due to their disproportionately-greater stem volume and the disproportionately-greater value of the large dimensional wood contained in the log (e.g., 10 ft³ of wood as one piece from a large tree is many times more valuable than 10 ft³ of wood in many small pieces from small trees).

The research data in Table 1 show the effects of reclamation technique on white pine productivity and stand value at age 30.

For perspective and reference, Case I shows the estimated value of an average 30-year-old white pine stand growing on undisturbed soils in the Appalachians. Average site quality measured by site index (height at age 50) is 80. At the harvestable age of 30,

about 35,100 board feet per acre (Vimmerstedt, 1962) as small sawtimber will be worth an estimated \$3510 per acre (Timber Mart-South, 1997).

Based on our research on 78 reclaimed mined sites in Virginia, Kentucky, and West Virginia on which conventional reclamation procedures were used, we estimate that forest site quality has been reduced to an average value of site index 60 (Case II in Table 1).

The productive capacity is greatly reduced (Figure 3) and the timber value will be just a small fraction of its original potential, \$126 versus \$3510 per acre (Table 1). Case III represents data from a site that was mined and planted to white pine, now 17 years old.

Mine soil and ground cover conditions at time of planting were similar to those described above in the four steps for successful forestry reclamation. The measured site quality is 110 and the projected volume at harvest age 30 is 46,400 board feet per acre (Vimmerstedt, 1962).

Due to the higher value of large sawtimber, the value per acre would be \$8352/acre at today's prices (Timber Mart-South, 1997). This shows that mined land, when properly reclaimed, can be very productive and even exceed undisturbed soils (primarily due to deeper soils created by mining). Furthermore, the value of wood products is disproportionately higher on better-quality sites (\$ value increases exponentially with site quality) because large timber is worth more than small timber.

White pine was used in the analysis above because of its predominant use and availability on post-law mined land. Although wood volumes would be less for hardwoods, the same general relationships between site quality and value per acre would hold true. For example, relative site index for white pine, red oak, and white oak are shown in Figure 4. A site with a white pine site index of 80 (age 50) has an average oak site index of 65, which is an average

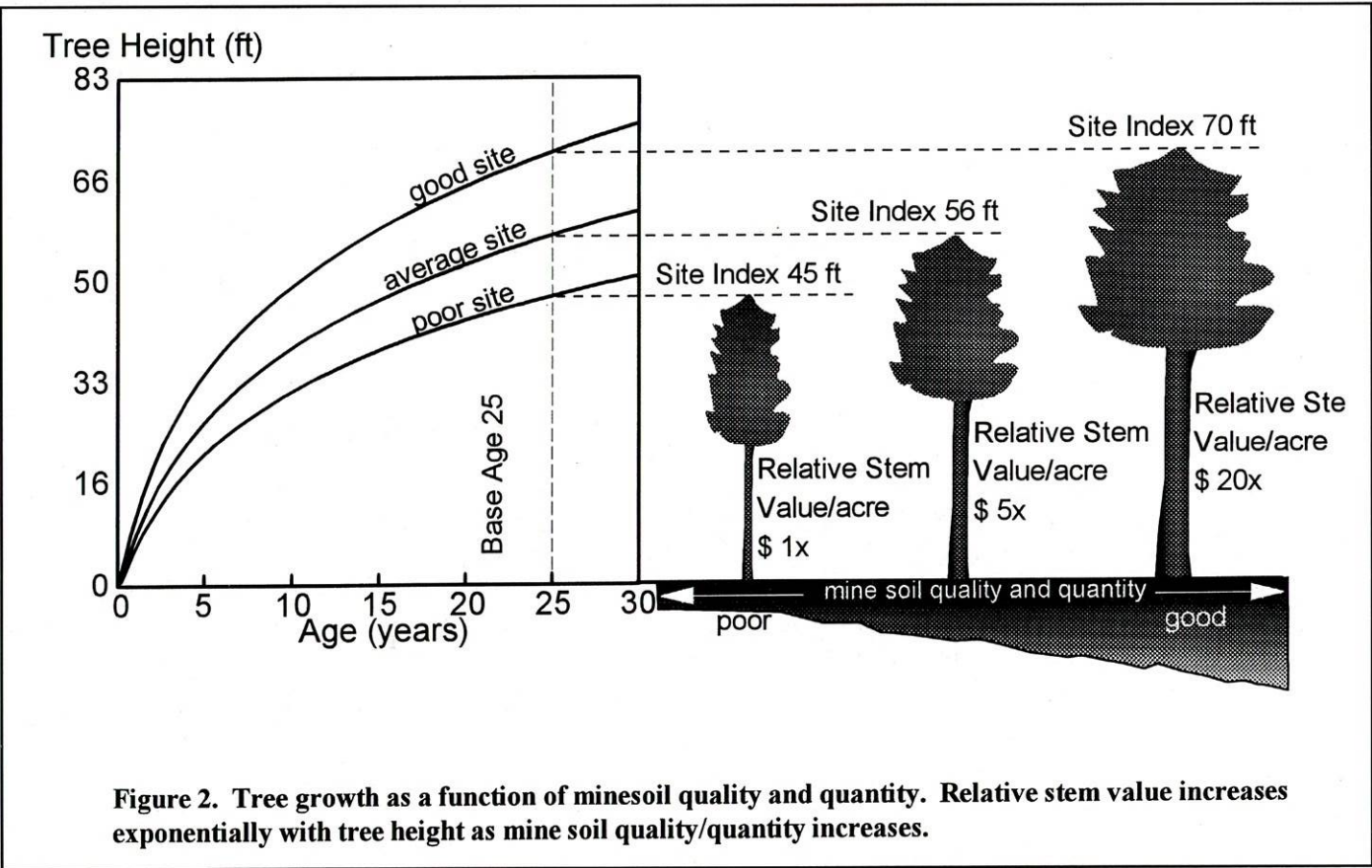
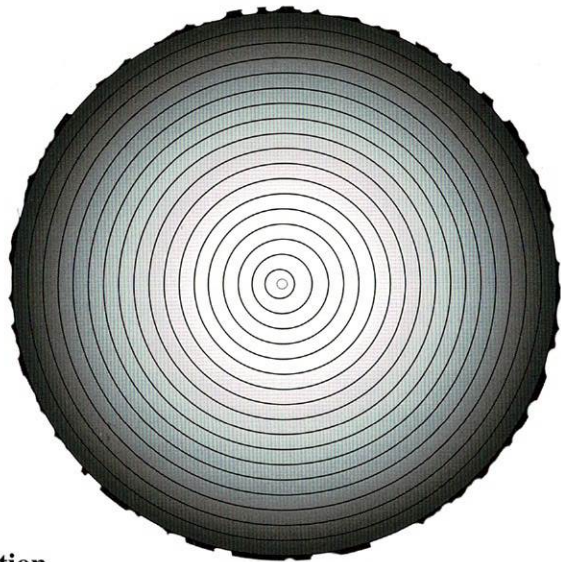


Table 1. The effects of reclamation technique on white pine productivity and stand value at 30 years.						
Case	White Pine Site Type	Site Index * (Base Age 50)	Bd.Ft.Vol. at Age 30 (MBF**/ac)	Harvestable Wood Products	Harvest Price (\$/MBF)	Total Value (\$/acre)
I	Average quality of an undisturbed Appalachian forest site (Doolittle 1958)	80	35.1	small sawtimber	50	1755
II	Projected average quality of a post-SMCRA reclaimed mine soil (Torbert et al., 1994)	60	6.1	pulp	20	122
III	Actual quality of a white pine stand on a good minesoil in Virginia (Kelting et al., 1997)	110	46.4	large sawtimber	75	3480

*Site Index = Expected tree height after 50 years.
**MBF = thousand board feet (Vimmerstedt, 1962).

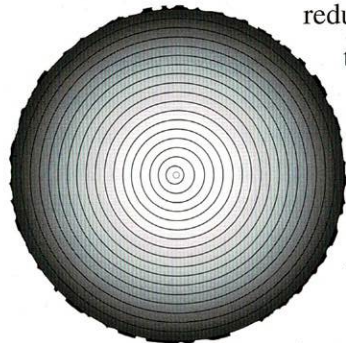
Undisturbed Soils

17-year-old white pine cross section exhibiting an average 8 inch diameter (SI=80) on undisturbed soils in the Central Appalachians.



Agronomic Reclamation

17-year-old white pine cross section exhibiting a reduced 6 inch diameter (SI=60) on typical post-SMCRA minesoils selected, compacted, and otherwise prepared for revegetation. Projected to a rotation age of 30 years, its value is greatly reduced compared to timber value potential before mining (Table 1).



Forestry Reclamation

17-year-old white pine cross section exhibiting an enhanced 12 inch diameter (SI=110) on a slightly-acid, brown, weathered sandstone minesoil, 3 to 4 feet deep, uncompacted, and moderately-well drained. Projected to a rotation area of 30 years, the value (\$) of timber from a white pine stand growing at this rate would be approximately 2.4 times greater than that of average stands growing on undisturbed sites with SI=80 (Table 1).

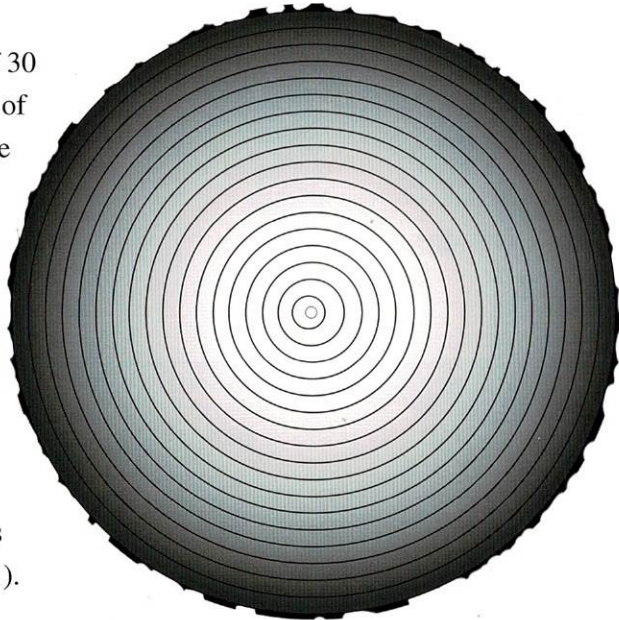


Figure 3. Relative size of white pine cross sections from 17-year-old trees growing on minesoils of different site qualities.

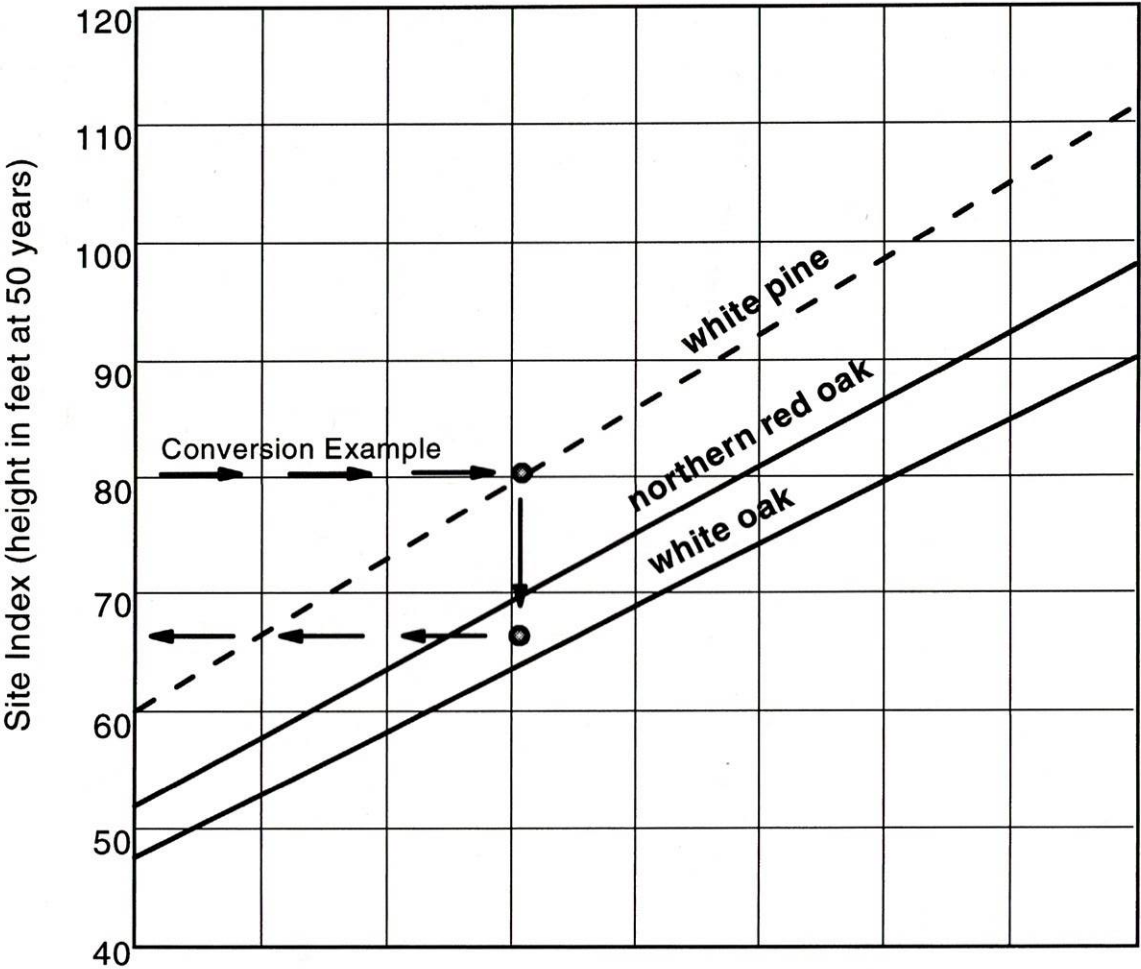


Figure 4. Species-specific site index conversion graph (Doolittle, 1958).

Table 2. The relative effect of site quality on Appalachian oak harvest volumes and stumpage value at age 60.					
Site Index	Appalachian Oak Site Index (ft) (Age 50)	Bd.Ft.Vol. at Age 60 (MBF/ac)*	Harvestable Wood Products	Stumpage Price (\$/MBF**)	Total Value (\$/acre)
Poor	50	5.6	small sawtimber	200	1120
Average	65	11.8	sawtimber	360	4250
Good	85	16.2	large sawtimber, veneer	520	8425



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value for oaks across most of the Appalachians. This species-to-species relationship shows that average post-SMCRA reclamation site quality for oaks would be about 50, and the site quality potential for oaks of properly-reclaimed mine sites would be about 85. This estimate is corroborated by Ashby et al. (1984) who evaluated minesoil productivities for oak species.

Table 2 shows the relative influence of site quality in oak site index, wood yield, and harvest value. Average oak sawtimber value on average quality sites (SI = 65) is about \$4250 per acre. When forest sites are degraded from SI 65 to 50, potential harvest value becomes one-fourth of what it was originally. If sites are upgraded from SI 65 to 85, harvest value doubles. These estimates show the dramatic effect site quality has on forest land value, and it shows why landowners and the mining community should strive for proper reclamation of forest land.

Other Values of Mined Land Reforestation

Tax treatment is a further short-term incentive for landowners to insist on a forestry post-mining land use. By reclaiming mined land to trees and having the property classed under the Managed Timberland Tax Incentive Act, a landowner can get the property appraised at its capacity to produce timber. This appraisal is approximately 50% of what it would be if used for wildlife.

A long-term reason for coal operators to promote forestry as a post-mining land use is to voluntarily share in the global responsibility of lowering net emissions of CO₂ to the atmosphere. At some point, the coal industry will probably be called upon to help meet treaty requirements for greenhouse gas emissions. Planting trees is a way to produce a measurable carbon sink to offset carbon emissions from coal burning. Besides stabilizing minesoils, maintaining clean water, enhancing wildlife habitat, and improving aesthetic landscapes, forests play an important role in global carbon cycles.

Conclusion

Proper reclamation and reforestation techniques should be used for forest land reclamation in order to meet the spirit of the law requiring that forest land be

returned to its former use and level of productivity. Our research has shown that landowners, miners, and society at large would benefit economically from the use of improved forest reclamation techniques; however, this opportunity has largely been missed in the Appalachian region, even by landowners who are also in the business of timber production.

A number of Virginia Cooperative Extension Publications (VCEP) describe various important aspects of reforesting mined land. VCEP 460-123, "Restoring Forests on Surface-Mined Land" (Burger and Torbert, 1992), outlines the principles and procedures of mined land reforestation silviculture. VCEP 460-136, "Commercial Forestry as a Post-Mining Land Use" (Torbert et al., 1994) describes the economic opportunities of managed forests and stresses the importance of landowner participation in the reclamation process. A recently published VCEP, "Reforestation Guidelines for Appalachian Minesoils" (Burger et al., in press), provides "how-to" information on the tree planting process from writing reforestation language in the mining permit, to determining when, how, and what to plant. These publications are available to anyone interested in mined land reforestation.

Acknowledgments

Much of the technical content of this article is based on a new Virginia Cooperative Extension Publication by J. A. Burger, D. L. Kelting, and C. Zipper that is currently in press. Research on which this summary article is based was funded by the Powell River Project, the USDO Office of Surface Mining, and Pocahontas Land Corporation.

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References

- Ashby, W. C., W. G. Vogel, C. A. Kolar, and G. R. Philo. 1984. Productivity of stony soils on strip mines. p. 31-44. In: J. D. Nichols et al. (eds.). Erosion and productivity of soils containing rock fragments. Spec. Pub. 13. Soil Sci. Soc. Am., Madison, WI.
- Ashby, W. C. 1987. Forests. p. 89-108. In: W. R. Jordon III, M. E. Gilpin, and J. D. Aber (ed.). Restoration Ecology. Cambridge Univ. Press, New York.
- Burger, J. A., and J. L. Torbert. Restoring forests on surface-mined land. Virginia Cooperative Extension Publication 460-123. 16p.
- Doolittle, W. T. 1958. Site index comparisons for several forest species in the Southern Appalachians. Soil Sci. Soc. Am. Proc. 22:450-458.
- Kelting, D. L., C. M. Siegel, and J. A. Burger. 1997. Value of commercial forestry as a post-mining land use. P. 344-348. In: J. E. Brandt (ed.) Proc., 14th Ann. Mtg., Amer. Soc. for Surface Mining and Reclamation, Princeton, WV.
- Kentucky Department for Surface Mining Reclamation and Enforcement. 1997. Reclamation Advisory Memorandum No. 124.
- Schnur, G. L. 1937. Yield, stand, and volume tables for even-aged upland oak forests. USDA Tech. Bull. 560. 87p.
- Timber Mart-South. First Quarter 1997. Stumpage Price Mart. Daniel B. Warnell School of Forest Resources, Univ. of Georgia, Athens.
- Torbert, J. L., J. A. Burger, J. E. Johnson, and J. A. Andrews. 1994. Indices for indirect estimates of productivity of tree crops. Office of Surface Mining Cooperative Agreement OR 966511 Final Report. Virginia Polytechnic Institute and State University, Blacksburg.
- Vimmerstedt, J. P. 1962. Southern Appalachian white pine plantations: site, volume, and yield. USDA For. Serv. Southeastern For. Exp. Sta. Pap. No. 149. 13p.
- Virginia Dept. of Mines, Minerals, and Energy. 1996. Guidelines for husbandry and reclamation practices appropriate for forestry post-mining land uses. Memorandum July 15, 1996. Division of Mined Land Reclamation. Big Stone Gap, VA.
- Williamson, D. L., and R. B. Gray. 1996. Evaluation of natural succession on reclaimed coal mine land in western Kentucky. P. 629-636. In: W. L. Daniels, J. A. Burger, and C. E. Zipper (ed.) Proc. 13th Ann. Mtg. Am. Soc. for Surface Mining and Reclamation, Princeton, WV.

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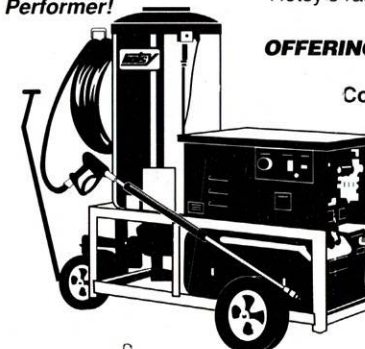
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