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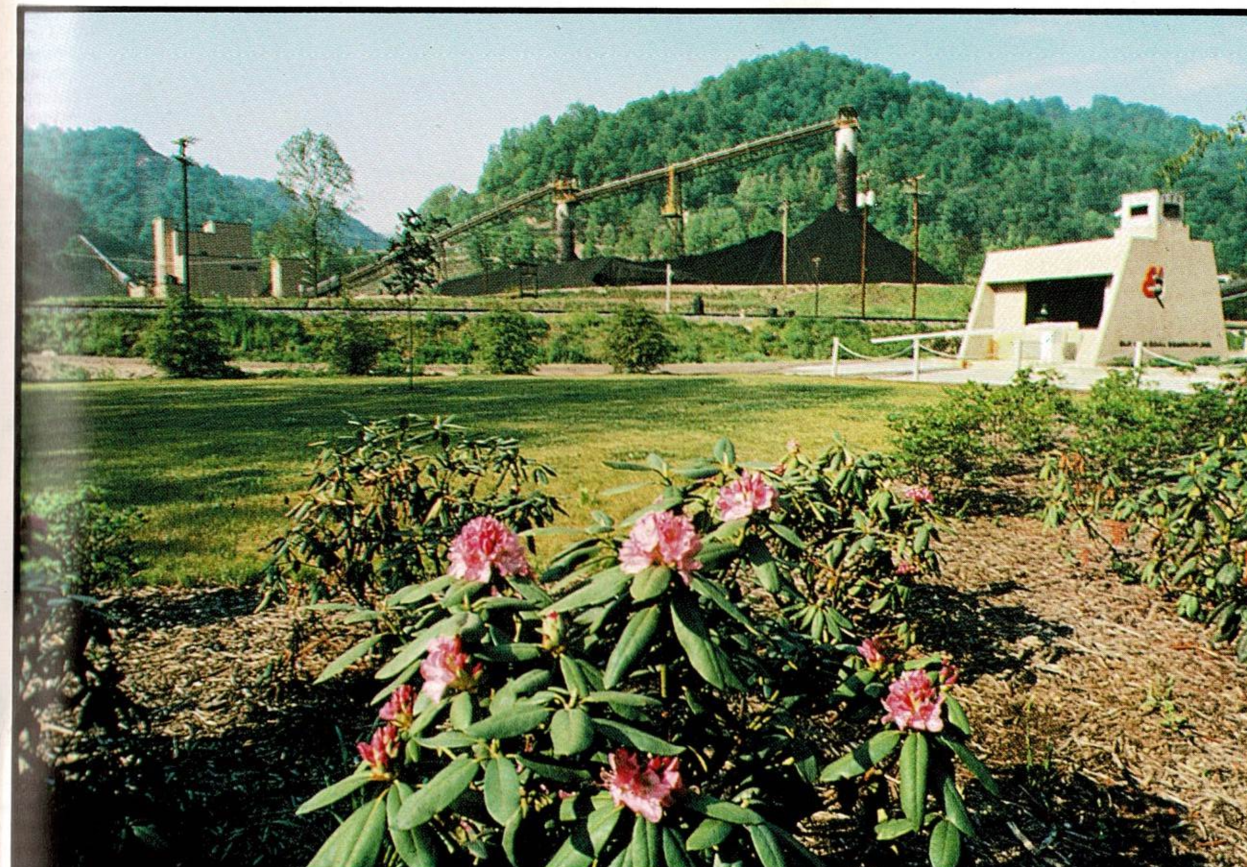

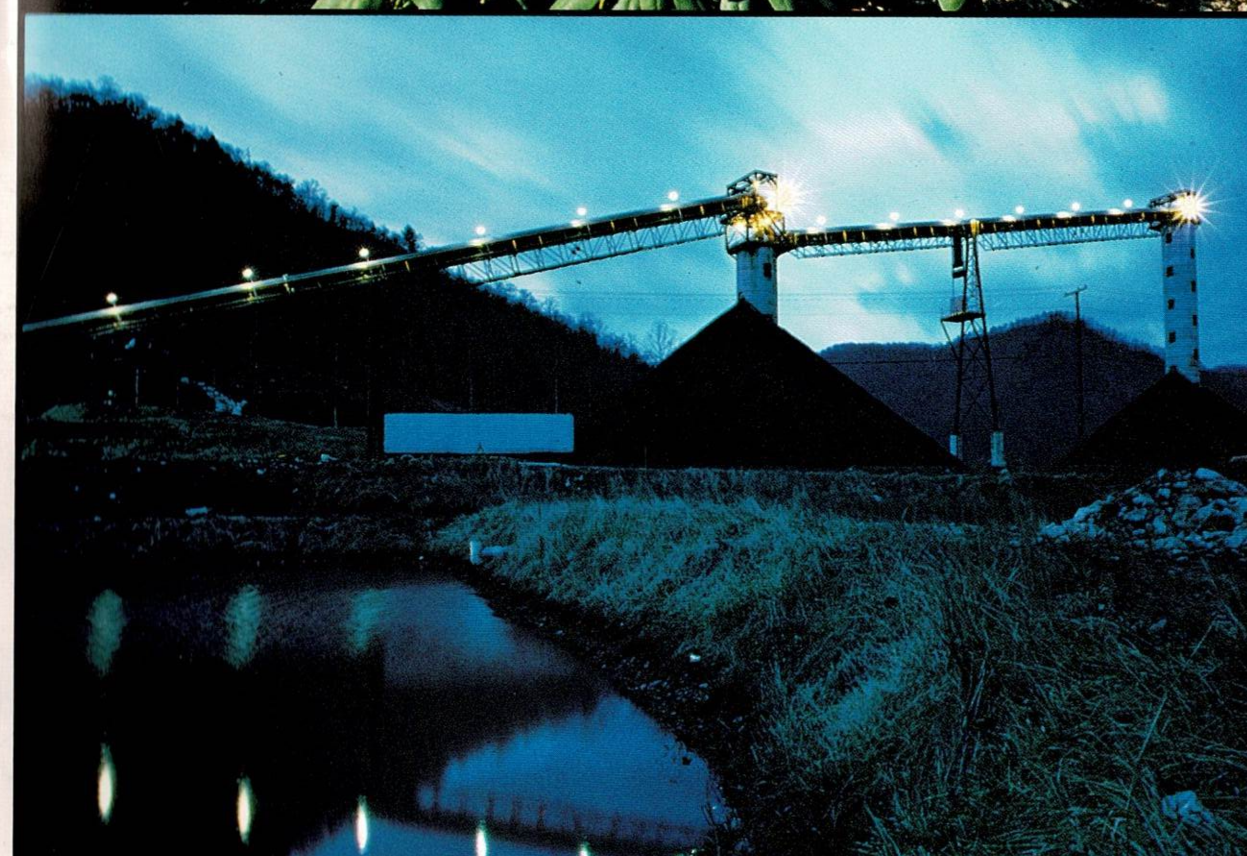

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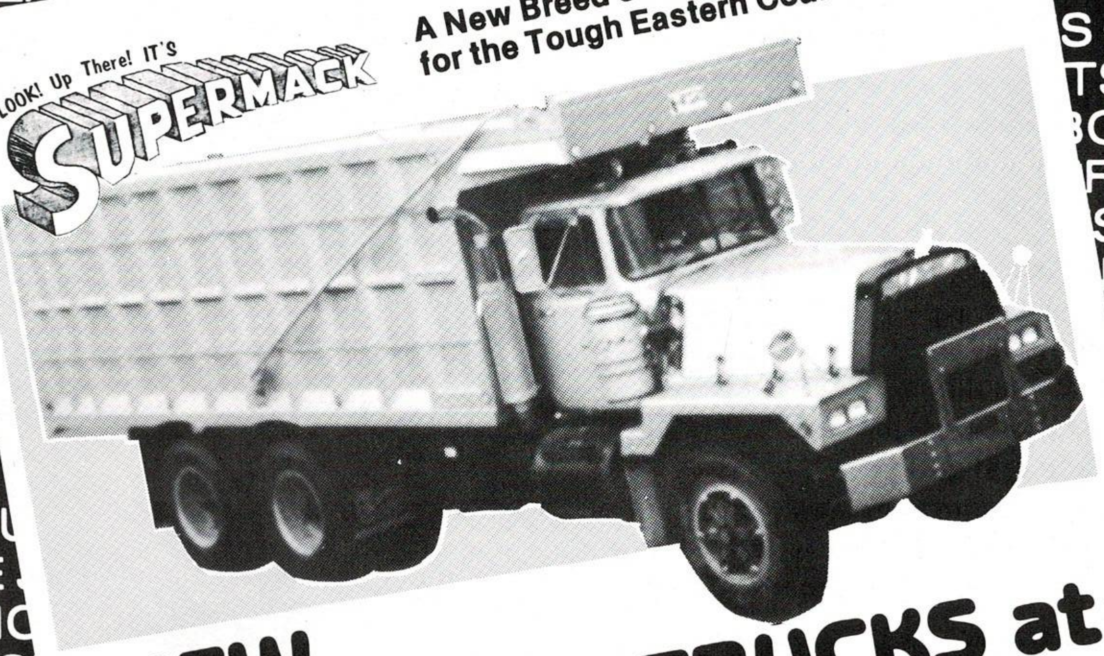

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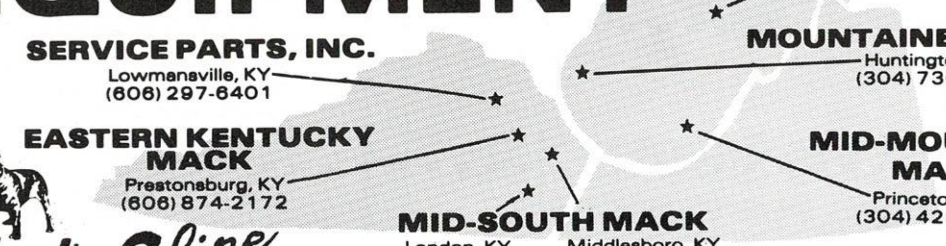

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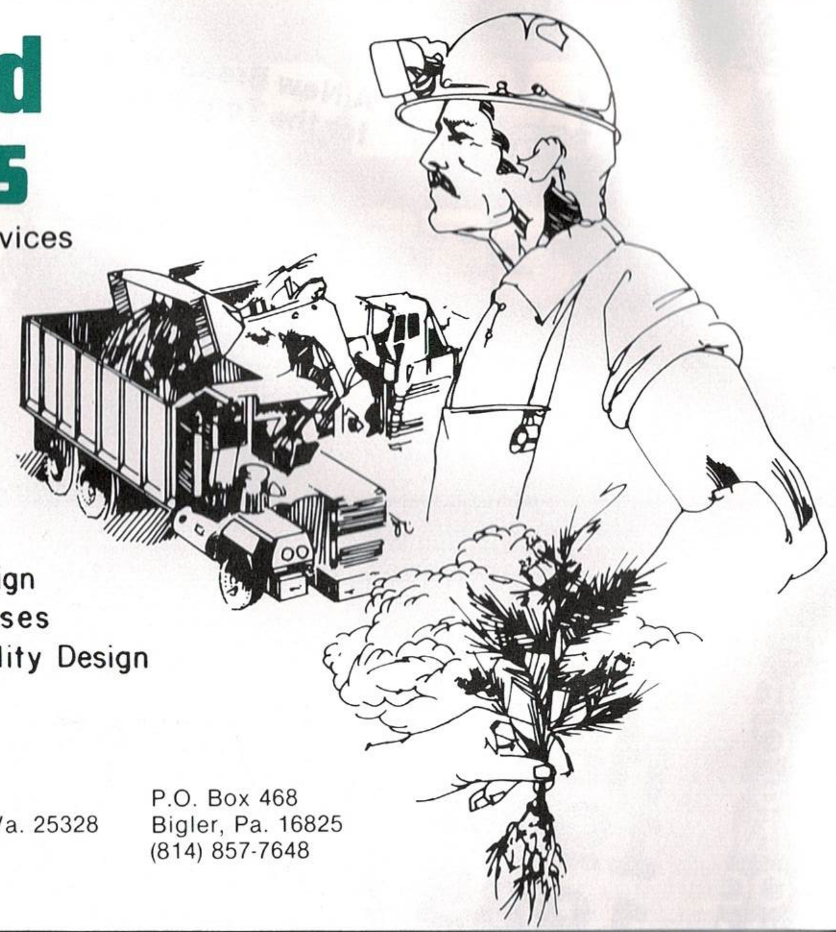

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Green Lands

Volume 13 Number 4

Our Cover — Though still quite new in its production life, Elk Run Coal Co. is well established as a modern, progressive, well operated mining complex. That's one reason the Boone County operation won the first annual "David C. Callaghan award." For more on Elk Run, and other Reclamation Award winners, see the stories beginning on page 12.

Cover photos by John Earles

Editor
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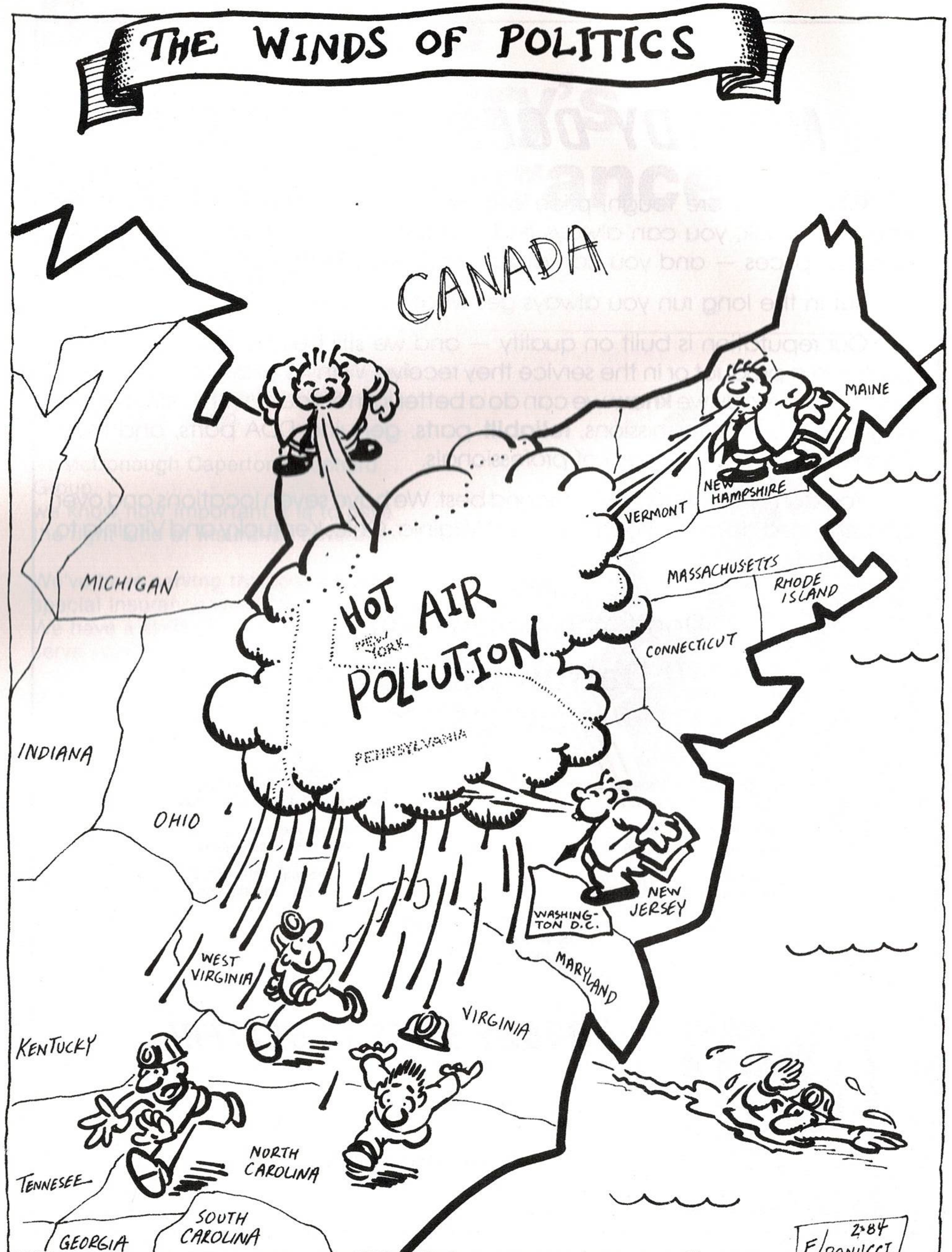
Green Lands is a quarterly publication of the West Virginia Surface Mining and Reclamation Association with offices at 1624 Kanawha Boulevard East, Charleston, West Virginia 25311
Telephone: (304) 346-5318



Editorial

Acid Rain — plain talk

The acid rain question is now firmly entrenched as the environmental issue of the '80's. Like so many other public debates which capture the fancy of editorial page writers, it is steeped in ignorance, misinformation, and emotionalism, and is subject to knee jerk proposals from those who would ride the headlines to personal notoriety.

The issue is at once obscured by its very name. The word "acid" conjures visions of skeletal fish, pitted edifices, and other cartoon fantasies not unlike those associated with nuclear fallout. What we are dealing with, on a worst case basis, is a level of acidity less potent than the vinegar which is sprinkled over fish and chips. A fish cannot survive in vinegar, and it will not thrive when the ph of its watery environment falls below a given level. Every statement which warns of the "dangers of acid rain," and points to scientific data, emphasizes the effect of acidity on fish life. Thus acid rain, to begin with, is not the threat to human welfare depicted in current public mythology.

Even among that minority of North Americans who understand what acid rain is and what it can do, the battle is waged on several different levels, and all positions seem to be at least somewhat undermined by the lack of consensus of any conclusive body of scientific evidence.

First, what effect has increased acidity had on lakes in the northeast United States and southeastern Canada? There are some facts available. In a survey of 2800 lakes in the northeastern United States, 219 were found to have "altered fish populations." This is not to say that these lakes were deemed "dead;" only that the fish population was adversely affected. Of the 219 lakes affected, 206 were in the relatively localized Adirondack Park region of New York. The affected lakes accounted for only 4% of the total lake acreage. A similar survey in southeastern Canada found 155 affected lakes from a total of 4000.

So, in the aftermath of the greatest industrial expansion that this country will likely ever see, the total known effects of increased acidity is the "alteration of the fish population in 4% of the lakewater of one portion of the continent. This does not suggest a threat to the environment that is either imminent, widespread or irreversible.

The second, most long running, and most confusing element of the great debate concerns the cause of causes of increased acidity in these areas. It is here that science is most unscientific, for the record is contradictory and far from complete. To put it simply, we do not yet sufficiently understand the interaction between people and nature to pinpoint the precise source of acidic lakewater. It is well known that acid exists in natural settings. There are pristine streams in West Virginia which bear too much acid to support fishlife. The soil itself in the northeastern U.S. is acidic. Obviously the burning of any fossil fuel contributes to SO_2 in the atmosphere, and eventually to acid content in water. But the question is how to identify the source from among such things as automobiles, oil burning utilities, coal burning facilities locally, and coal burning facilities 1000 miles away. No scientist at this point can responsibly point to a midwestern power plant and say, "This is the source of X% of the acidity in this northeastern lake." Such regional interests are understandable, but such critical issues should not be decided by the relative strengths of various political coalitions. Those who are ready to pass "acid rain" legislation must accept the fact that they are balancing the lives of fish against the livelihoods of people.

One theme ties all of these ideas together. In our approach to this and any legislative problem, we must remember to let balance win out over extremism, information over speculation, and reason over emotion.

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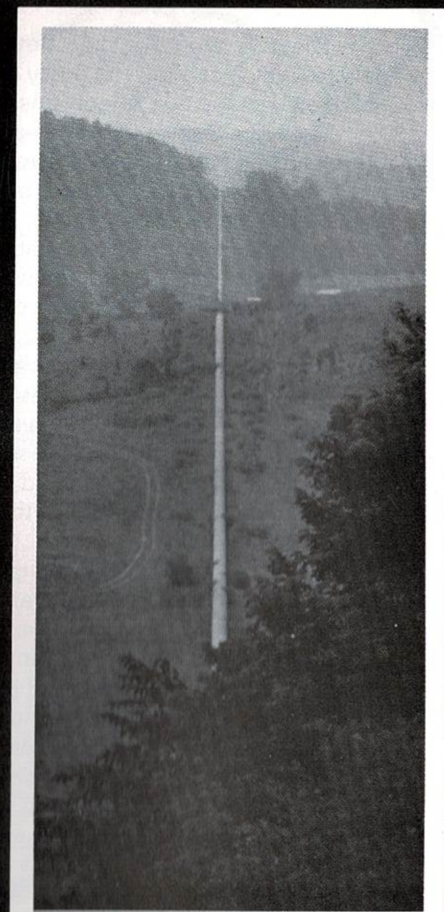

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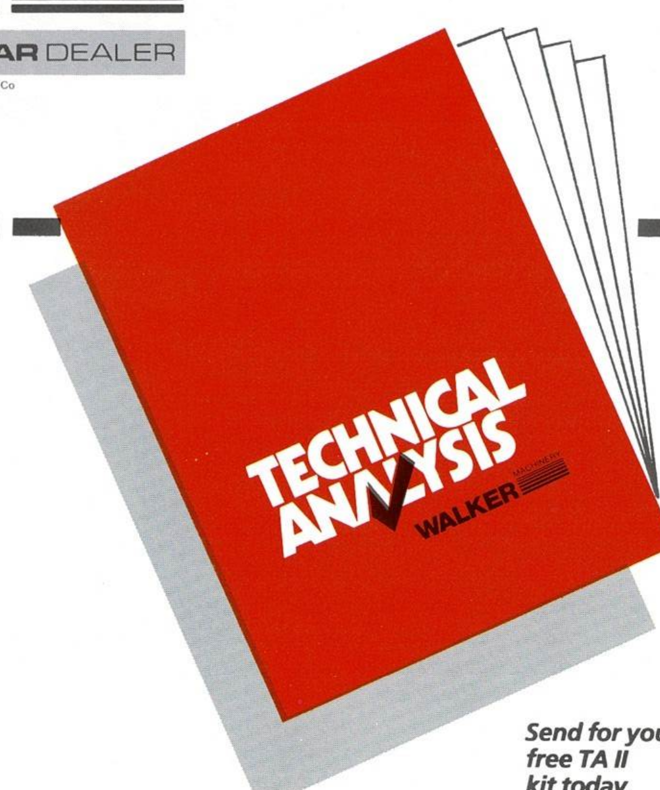

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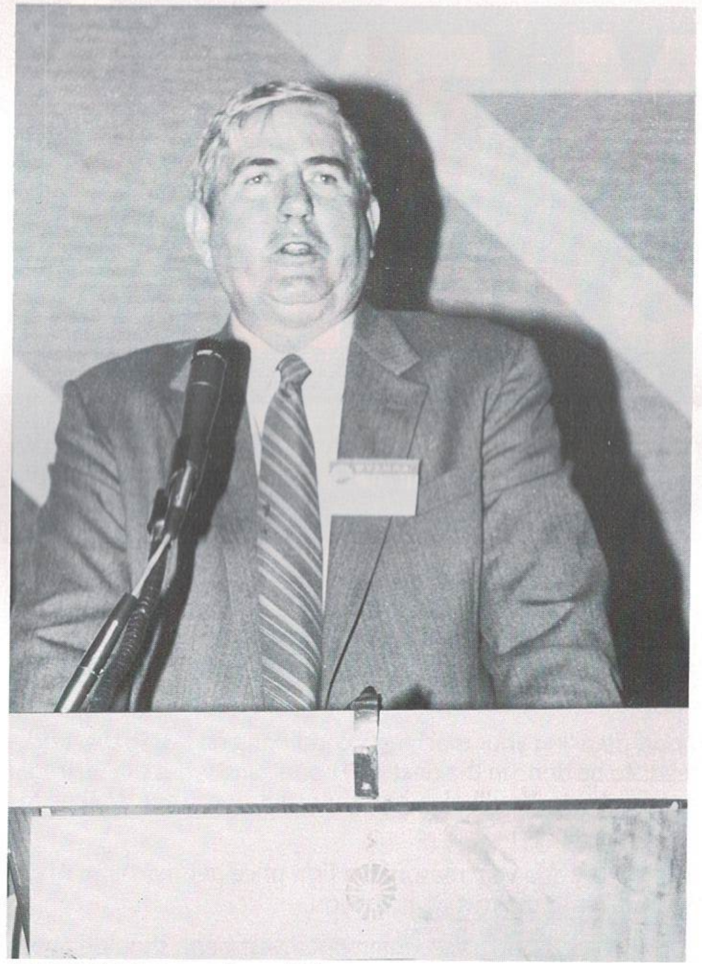
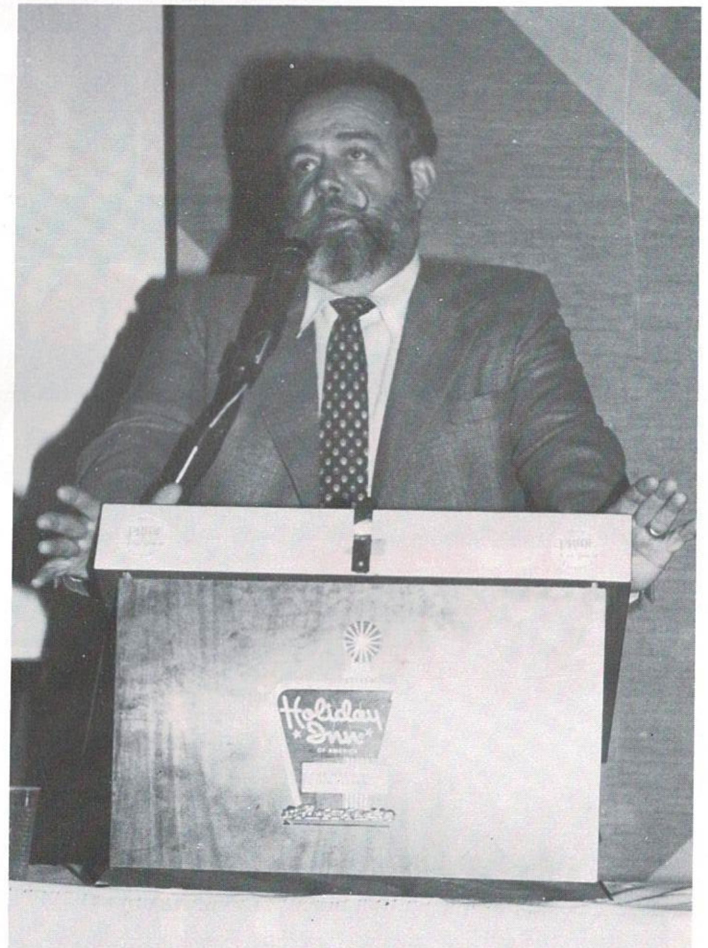


WVSMRA Chairman Tracy Hylton



Pete Pitsenbarger, Reclamation chief, W. Va. Department of Natural Resources

11th Symposium A 'Huge Success'

Elk Run Coal Co., Inc. is the winner of the first annual David C. Callaghan Award, for the outstanding reclamation achievement in West Virginia during 1983.

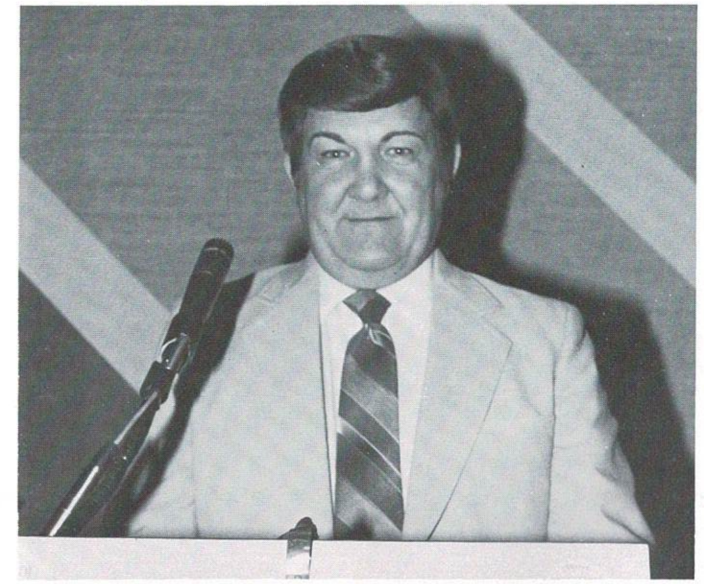
The Callaghan Award was the feature presentation of the Reclamation Awards Luncheon, which marked the closing of the Eleventh Annual West Virginia Surface Mining Symposium, held in January at the Charleston House Holiday Inn in Charleston.

The award is named for former Department of Natural Resources Director David C. Callaghan, who left that post late last year after seven years. Ben Greene, President of the West Virginia Surface Mining and Reclamation Association, which sponsors the awards, discussed the reasons for honoring Callaghan. "Dave Callaghan has been involved in West Virginia's reclamation program for more than 20 years. He's one of the reasons that we have the most outstanding surface mining and reclamation programs in the country. As director, he has earned the respect of all those involved, not only in West Virginia, but throughout the country. We feel privileged to participate in honoring him this way."

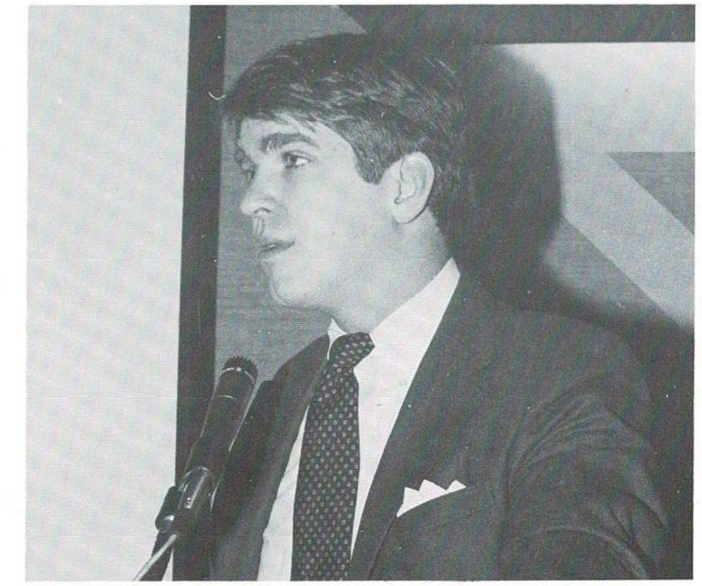
In all, 18 companies were selected for recognition from among more than 60 nominations received from local DNR inspectors. The awards covered all phases of mining including surface, underground, "remining," refuse areas, and preparation facilities.

Elk Run was singled out for its Boone County operation for "demonstrating the utmost of confidence in the future of West Virginia and the highest principles of environmental achievement during the development and operation of a major mining complex in extremely steep, confined topography."

Association President Greene sees the awards as an important part of his organization's program. "We see an amazing amount of pride and competition with these awards every year," Greene commented. "Typically, that pride in workmanship can be seen in owners, foremen, and equipment operators alike. This year's winners reflect that same dedication. Obviously, the results are beneficial both to the industry and to the state."

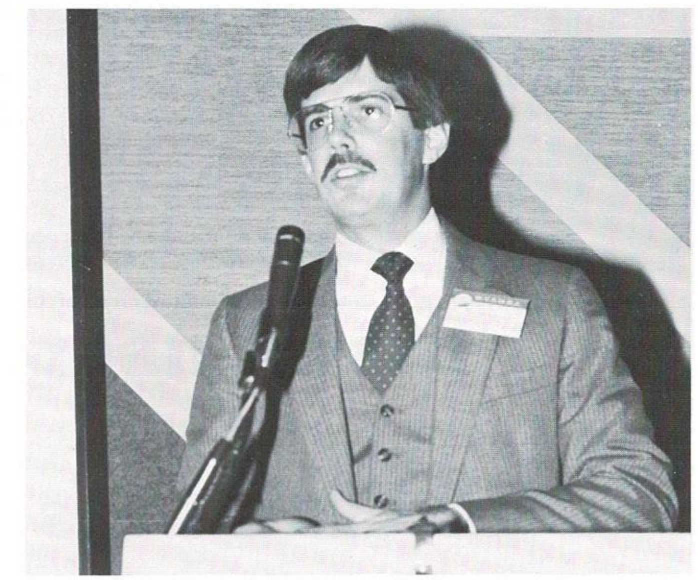


Walter Miller, director, W.Va. Department of Mines



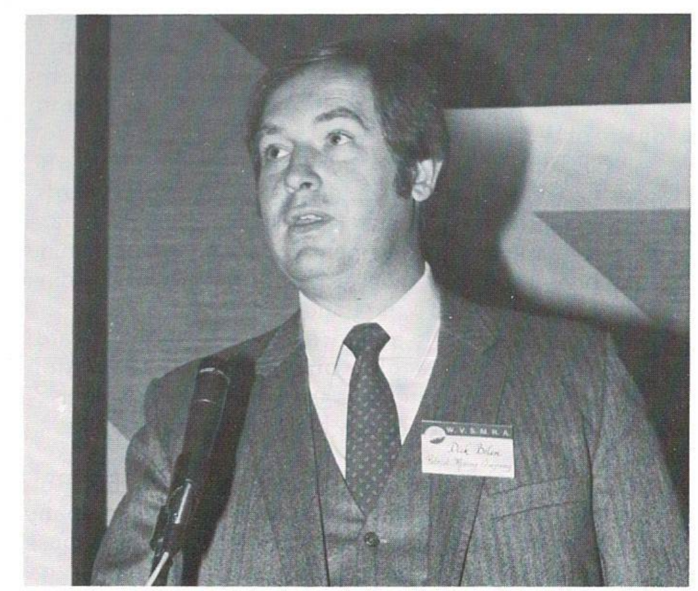
West Virginia Tax Commissioner Ned Rose.

Brent Wahlquist, U.S. Office of Surface Mining.



Ken Woodring, Hobet Mining & Construction

Mike Castle, Marrowbone Development



Dick Bolen, Patriot Mining

The familiar logo of Elk Run is proudly displayed on all of its facilities.

Elk Run wins the 'Callaghan"

The 1984 Reclamation Awards included the presentation of the first annual David C. Callaghan Award. Perhaps it's fitting that the first such award go to a company which represents a hopeful future for the coal industry of West Virginia.

Elk Run Coal Co. of Sylvester, in Boone County, won the Callaghan this year. The Reclamation Awards, long established as a coveted honor, recognize outstanding reclamation achievement in a variety of mining situations -- surface, underground, prep plants, loading facilities, Abandoned Mine Lands, and others.

The Callaghan is a kind of "best of show" award, recognizing the single outstanding reclamation achievement of the previous year. Elk Run, winner of the first Callaghan, has set a high standard for others to follow.

One of the most striking features of the Elk Run operation is the immediate impression that the company is in Sylvester to stay. Every facility from the gatehouse on up the hill to the mine facing, has the look of permanence. That's no accident. Parent company A.T. Massey has a major financial commitment to the area and to the state.

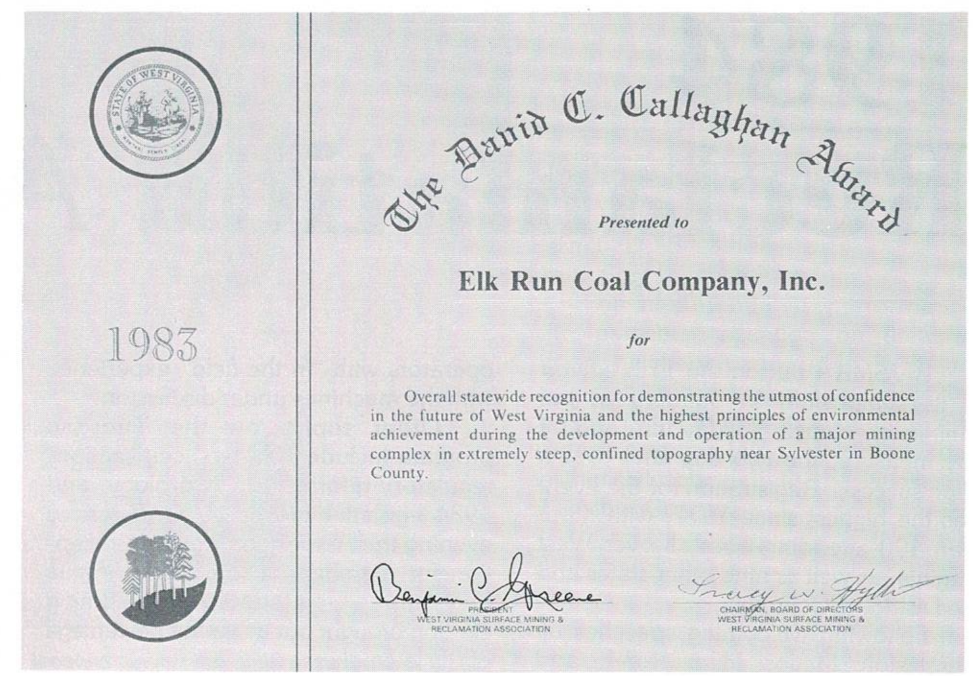
Since Elk Run first appeared on the mountain five years ago, the operation has been marked by professionalism and productivity. As with its other operations, Massey brought in top people at the management level. This professional competence is now ingrained at every level of the work force. The result has been tremendous productivity, a total lack of internal labor problems, and a union free, well paid, secure, and professionally dedicated work force.

Elk Run is in the business of mining coal. Yet its reclamation wins awards. It has no union, but its employment application files are overflowing. It operates in an unstable market, in bleak economic times, yet its entire production is sold before it's mined.

In short, Elk Run Coal represents the good part of West Virginia's future.

Doug Blackburn, Jr. (left) receives the first annual David C. Callaghan Award on behalf of Elk Run Coal Co., Inc. Making the presentation is the man for whom the award is named, former DNR Director Dave Callaghan.

David C. Callaghan Award



1983

The David C. Callaghan Award

Presented to

Elk Run Coal Company, Inc.

for

Overall statewide recognition for demonstrating the utmost of confidence in the future of West Virginia and the highest principles of environmental achievement during the development and operation of a major mining complex in extremely steep, confined topography near Sylvester in Boone County.

PRESIDENT, WEST VIRGINIA SURFACE MINING & RECLAMATION ASSOCIATION

CHAIRMAN, BOARD OF DIRECTORS, WEST VIRGINIA SURFACE MINING & RECLAMATION ASSOCIATION

Leckie Smokeless Coal Co.

Permit #D-32-81/5.67 Acres
Ben Faulkner - Inspector

For exceptional workmanship demonstrated by paved haulroads, advanced drainage control measures and excellent revegetation in the development of an aesthetically appealing underground mining complex that has preserved the environmental integrity of the trout waters of Big Clear Creek in Greenbrier County.

John Plaster (left) and Joe Turley, III (center) of Leckie Smokeless Coal Co. accept their award from new DNR Director Willis Hertig.

1984 Reclamation Awards

WVSMRA put on the 11th edition of its symposium in January at the Charleston House Holiday Inn, and by any measure, the two day affair was a huge success. Registration for the event was the highest since 1977, with more than 400 attending from all over West Virginia, as well as nine other states and the District of Columbia.

Following welcoming speeches by Charleston Mayor Mike Roark and Association Chairman Tracy Hylton, the technical session got off to an innovative start with panel discussions of various means of moving overburden. The presentations were given by operators with "in the field" experience with the machines under discussion.

Other topics on the Tuesday program included blasters' certification, regulatory reform, field hydrology, and 1984 legislative prospects. On Tuesday evening the Association hosted a reception for members of the West Virginia Legislature. Good food and the coming election brought out a healthy percentage of the lawmakers.

Wednesday's program began with a report from West Virginia Tax Commissioner Ned Rose, and then DNR took the podium for discussions on abandoned mine lands, bond release, and the permanent regulatory program.

The Symposium concluded with the Reclamation Awards Luncheon. (See following pages.)

Association President Ben Greene was well pleased with the program and its attendance. "This is always a key part of our year," he commented. "With the Legislature in town and the spring reclamation season coming up, the Symposium, the reception, and the awards luncheon become a very important two days. We strive for a timely and informative program and I think the continued high attendance tell us that we're succeeding."

West Virginia
Surface Mining and Reclamation
Association

Presents This Certificate To

New River Company

19 83

For notable reclamation accomplishment in the development of an underground mining complex displaying good "housekeeping," environmentally-sound refuse operation, and outstanding revegetation which has aesthetically contributed to this area near Beckley in Raleigh County.

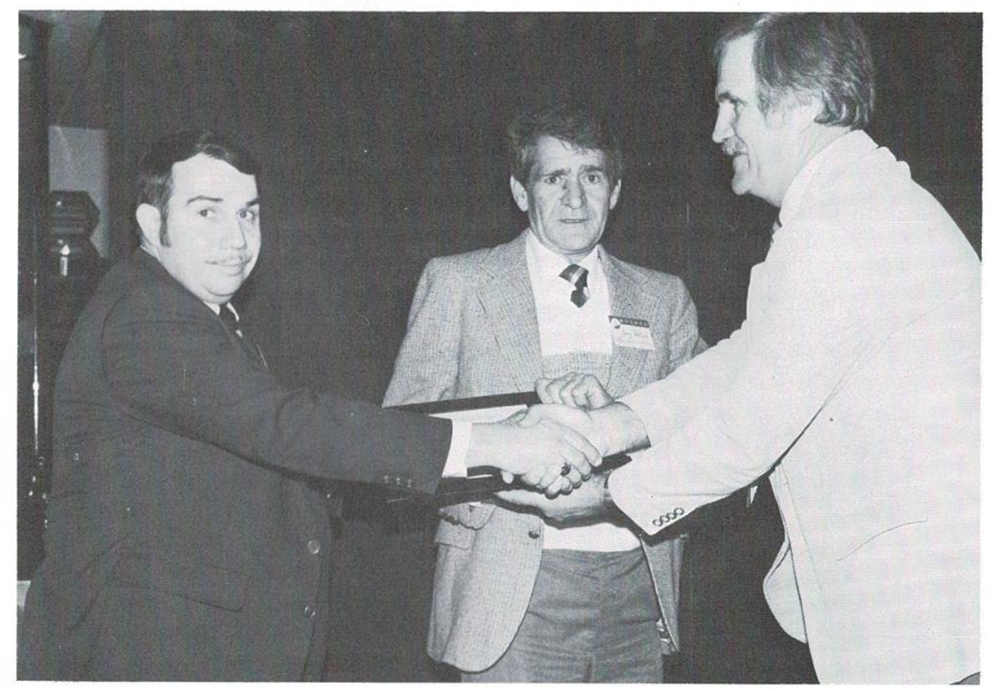
PRESIDENT   CHAIRMAN OF THE BOARD

New River Co. - Permit No. D-53-82-Joe Idleman, Inspector.

Upshur Coals Corporation

Permit #D-35-82
Frank Shreve - Inspector

For commendable performance with particular attention on being a "good neighbor" and pride in maintaining environmental quality during the construction and operation of a modern underground mining complex that aesthetically blends into the landscape of Upshur County.

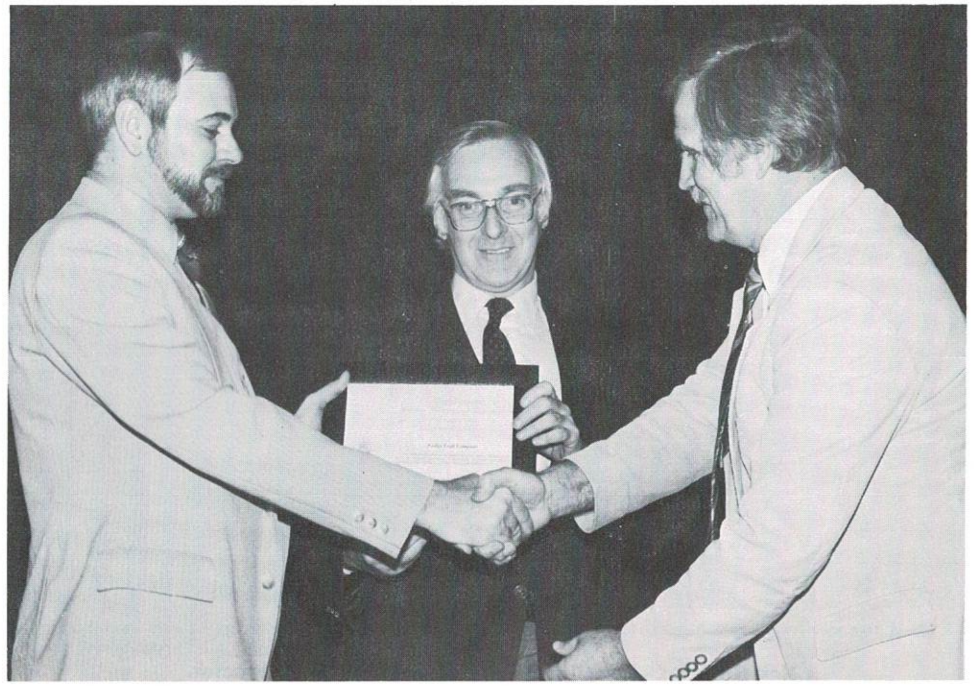


Harry Dunmire (left) and Jerry Westfall (center) accept the award for Upshur Coals Corp.

Cedar Coal Company

Permit #38-80
Bill Simmons - Inspector

For outstanding engineering accomplishment and superior operational control in the "Textbook" construction and reclamation of a conventional valley-fill exhibiting aesthetic symmetry and ideal stability in Kanawha County.



Director Hertig (right) presents Cedar Coal's award to Bill Mathews (left) and Gerald Hartley.

Fernando Schiappa (left) and Richard Delatore (center) accept West Virginia Energy Inc.'s award from DNR Director Willis Hertig.

West Virginia Energy, Inc.

Permit #93-79; 29-80; 82-81; S-69-82; S-20-83 /380 Acres
Ron Sturm - Inspector

For innovative performance dedicated to environmentally-sound mining and "beyond the call of duty" reclamation during the conduct of operations with a high level of public visibility near the Brooke-Ohio County Airport in Ohio County.

West Virginia
Surface Mining and Reclamation
Association

Presents This Certificate To

19 83

D & L Coal Company, Inc.

For exceptional reclamation accomplishment in eliminating existing acid mine drainage and subsidence in the surface "remining" of abandoned underground mines. Outstanding revegetation success has resulted in productive agricultural land that improved the aesthetic and environmental quality of this area near Hartmansville in Mineral County.

PRESIDENT — CHAIRMAN OF THE BOARD

D&L Coal Co. Inc. - Permit No. 3-76-Dave Idleman, Inspector.

Tony Turyn (left) and Winters Dean (center) accept Cherry River Coal & Coke Co. award from Director Hertig.

Cherry River Coal & Coke Co.

Permit #59-77
Virgil Groves - Inspector

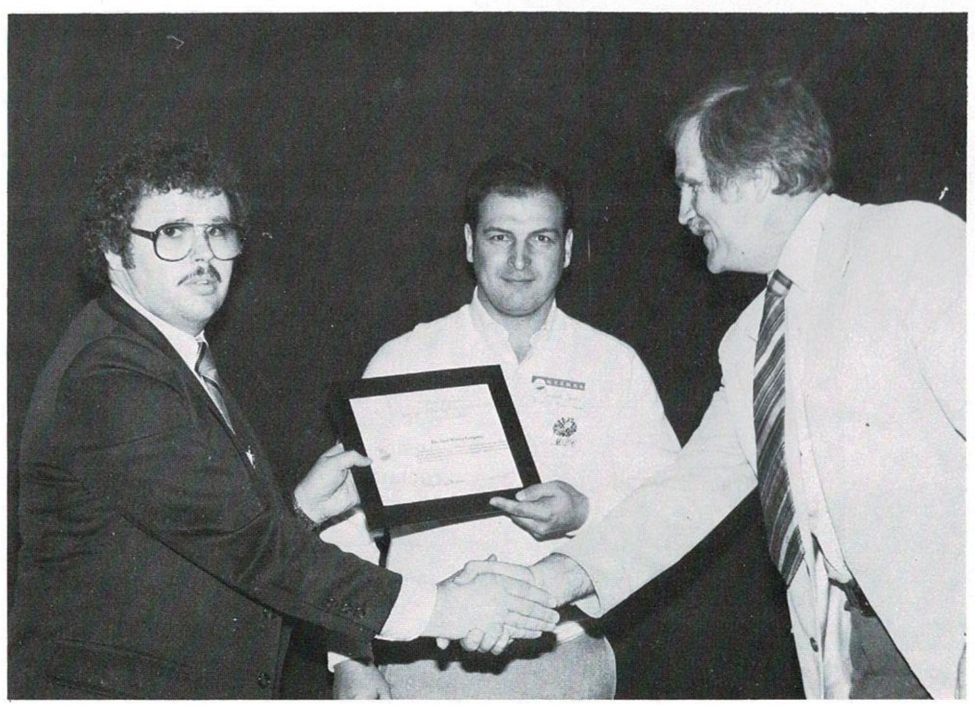
For skillful implementation of sound engineering principles and overall managerial excellence in the design, modification, and effective reclamation of a durable rockfill in Nicholas County.

Gray Realty

Permit #INC-5-81;
Grant Connard - Inspector

For exceptional operational control and outstanding reclamation during surface mining incidental to the development of land for future housing in close proximity to existing residential areas of Raleigh County.

Rick Gray (left) accepts for Gray Realty.



Bluebird Mining Co. was represented by Mike Castle (left) and Randall Sartin (center).

Bluebird Mining Company

Permit #S-47-82; 694 Acres
Mike Nunan - Inspector

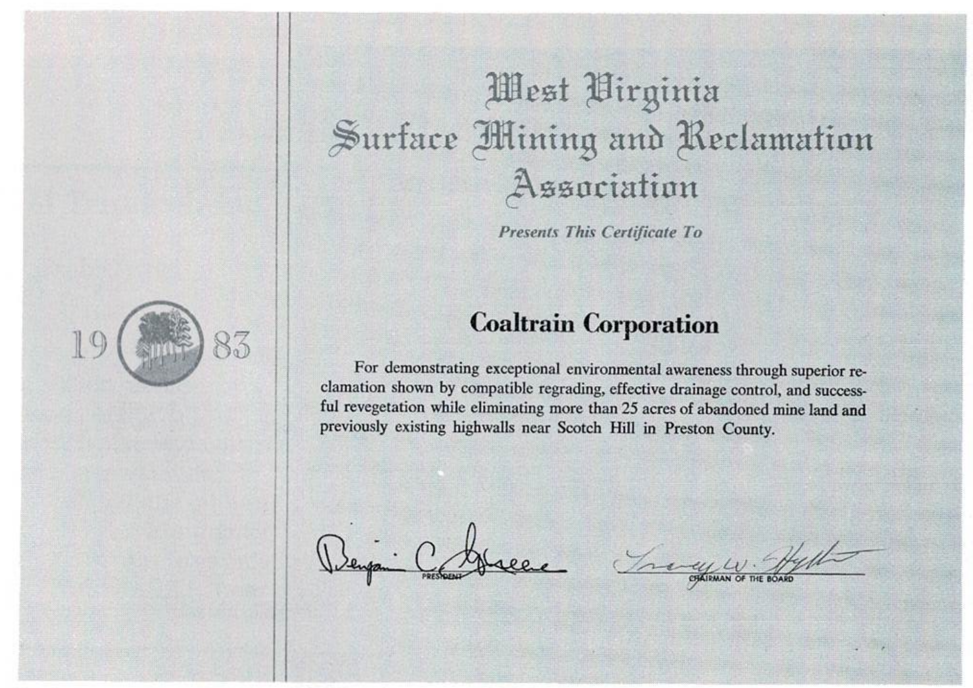
For outstanding operational emphasis in exceeding reclamation requirements and enhancing post-mining wildlife habitat through excellent drainage control and revegetation during the conduct of "controlled placement" operation in the steep slopes of Mingo County.

Jim Compton (left) accepts for Grafton Coal Co.

Grafton Coal Company

Permit #12-81; 580 Acres
Glenn Cox - Inspector

For superior performance and conscientious reclamation efforts demonstrated by effective regrading drainage control and excellent revegetation on the "recut" transformation of abandoned mine land to useful acreage in Harrison County.



West Virginia
Surface Mining and Reclamation
Association

Presents This Certificate To

19 83

Coaltrain Corporation

For demonstrating exceptional environmental awareness through superior reclamation shown by compatible regrading, effective drainage control, and successful revegetation while eliminating more than 25 acres of abandoned mine land and previously existing highwalls near Scotch Hill in Preston County.

PRESIDENT CHAIRMAN OF THE BOARD

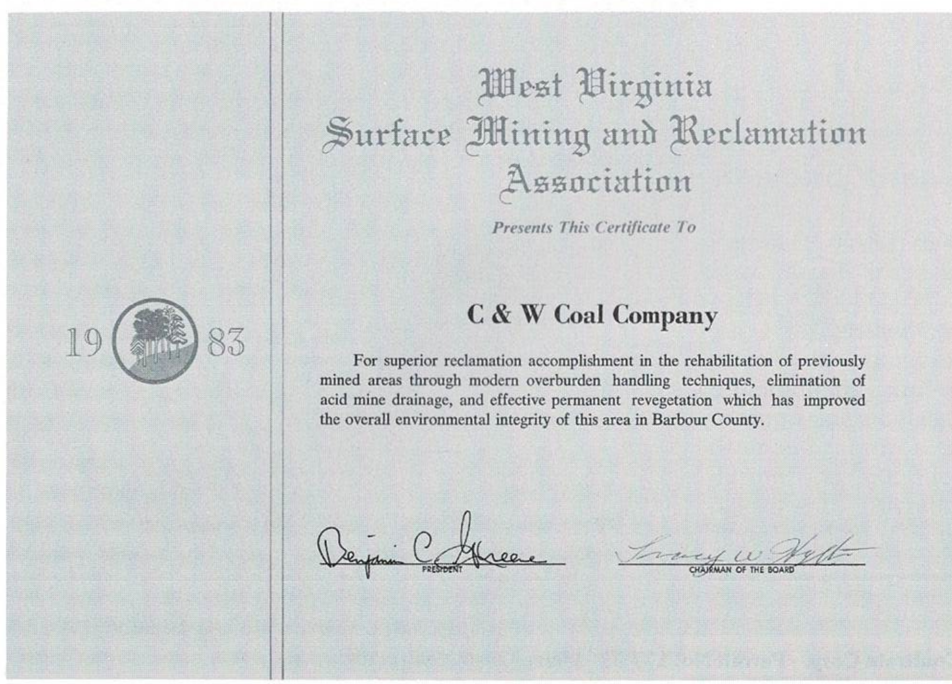
Coaltrain Corp. - Permit No. 177-77 - Harry Travis, Inspector.

Perry & Hylton, Inc.

Permit #S-14-81; 134.0 Acres
Larry Golden - Inspector

For notable environmental improvement through sound water quality control and excellent approximate original contour backfilling which has eliminated two miles of pre-existing highwall in the critically sensitive area of New River Gorge National Park.

Dr. Hertig (left) presents Perry & Hylton, Inc.'s award to N. K. "Gango" Gangopadhyay.



West Virginia
Surface Mining and Reclamation
Association

Presents This Certificate To

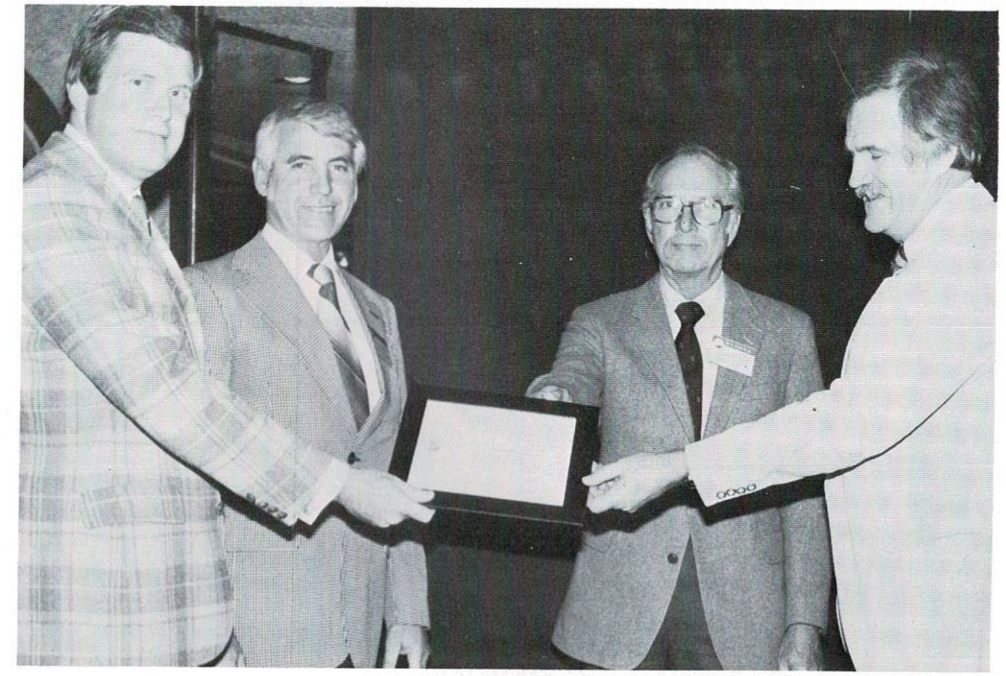
19 83

C & W Coal Company

For superior reclamation accomplishment in the rehabilitation of previously mined areas through modern overburden handling techniques, elimination of acid mine drainage, and effective permanent revegetation which has improved the overall environmental integrity of this area in Barbour County.

PRESIDENT
CHAIRMAN OF THE BOARD

C&W Coal Co. - Permit No. 144-74-Steven Moore, Inspe.



Vecellio & Grogan, Inc. Won for its work under the AML program. Shown from left are Leo Vecellio, Jr., Mike Sherwood, and Howard Lane.

Vecellio & Grogan, Inc.

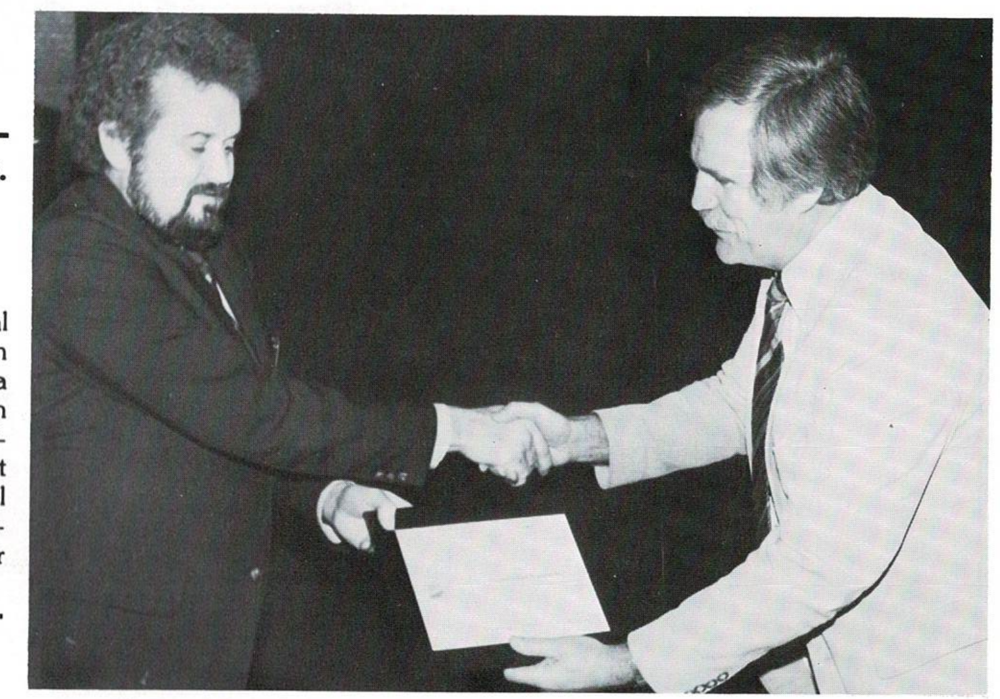
AML Section

Special statewide recognition for outstanding performance and superior accomplishment under the abandoned mine land program. Extraordinary reclamation efforts were dedicated to the successful transformation of the Holden #1 refuse pile, a 50 acre eyesore abandoned more than 30 years ago, to an environmentally-sound, physically-stable, and asthetically pleasing area for Logan county.

Glenhayes Coal Terminal, inc.

Permit #0-119-83; 26.59 Acres
Mike Mace - Inspector

Special recognition for professional diligence and reclamation awareness in the construction and operation of a modern coal handling facility which displays outstanding revegetation, effective drainage control, and the highest regard for protecting the environmental and aesthetic integrity of this area adjacent to U.S. Route 52, near Glenhayes.

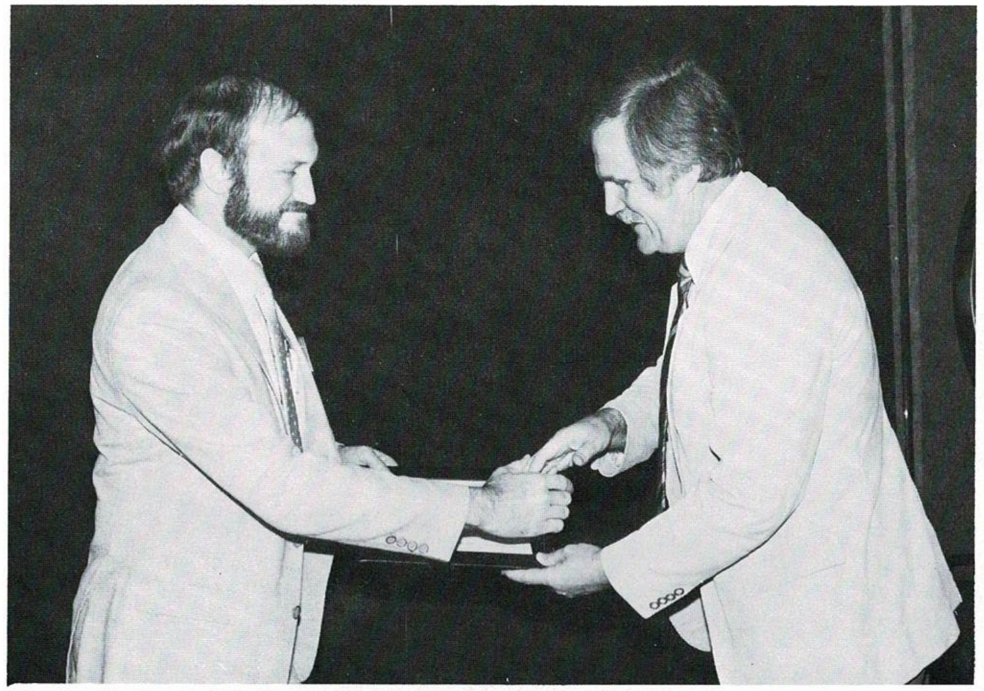


Robert A. Martin (left) accepts for Glenhays Coal Terminal, Inc.

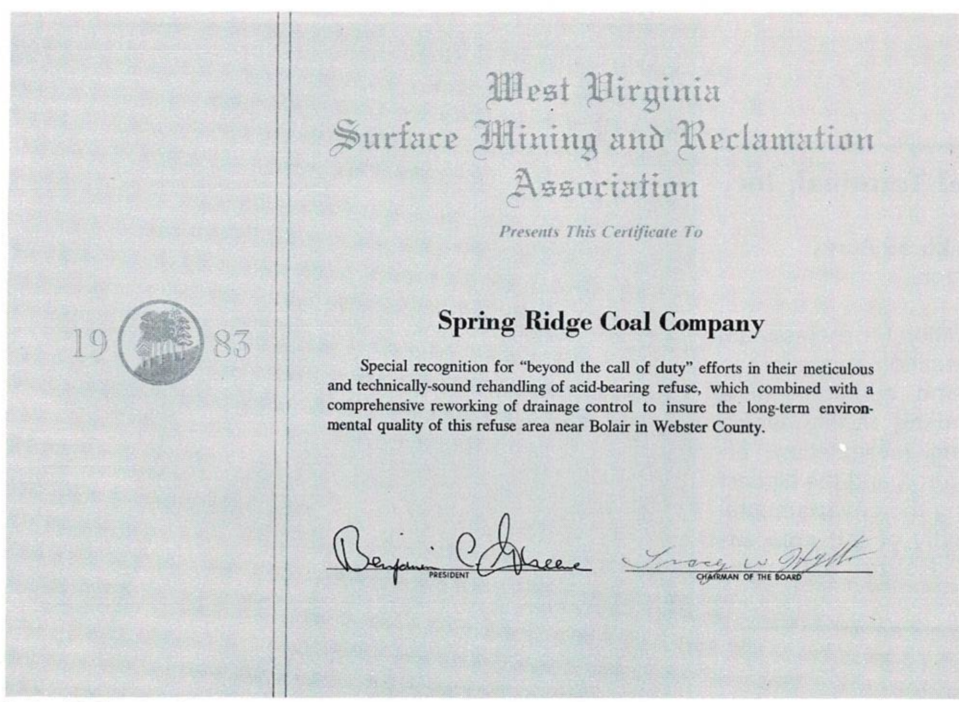
Ranger Fuel Corporation

Permit # P-726; EM-105
Grant Connard - Inspector

Exceptional recognition for their confidence in the West Virginia coal industry and their high regard for the state's environment as demonstrated by the conscientious employment of a well-engineered plan for the development and operation of a major underground mine/preparation plant complex before reclamation permits were required, which has preserved the highest of standards on the quality waters of Laurel Fork in Wyoming County.



Director Hertig presents Ranger Fuel Corp.'s award to Ken Job.



West Virginia
Surface Mining and Reclamation
Association

Presents This Certificate To

19 83

Spring Ridge Coal Company

Special recognition for "beyond the call of duty" efforts in their meticulous and technically-sound rehandling of acid-bearing refuse, which combined with a comprehensive reworking of drainage control to insure the long-term environmental quality of this refuse area near Bolair in Webster County.

PRESIDENT CHAIRMAN OF THE BOARD

Spring Ridge Coal Co. - Permit No. R-722 - Don Gilkeson, Inspector.

Award Nominees

The following companies, in addition to the award winners, were nominated for Reclamation Awards by their local DNR inspectors.

Green Lands magazine adds its congratulations to those of DNR Director Willis Hertig for a job well done. The fact that State regulatory officials thought 60 operators worthy of awards is a very positive reflection on the industry.

1. **Appalachian Coal Company** - Permit No. 98-80, Julian, WV.
2. **Armco, Inc.** - Permit No. S-11-81
3 **Barbour Coal Company** - Permit No.117-79.
4. Beckley Coal Mining Co. - Permit No. U-127-83
5. **Beckley Lick Run Co.** - Permit No. R-737
6. **Buffalo Coal Co.** - Permit No. 0-96-83
7 **Buffalo Mining Co.** -Permit No. 203-73; U-98-83; U-114-83
8. **S.S. "Joe" Burford, Inc.** - Permit No. 211-74
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Establishing Trees by Direct-Seeding

T.W. Richards
UNIVERSITY OF KENTUCKY
COLLEGE OF AGRICULTURE

Direct-seeding is an alternative to planting seedlings as a method for establishing trees. It offers attractive advantages over planting seedlings, including lower labor costs less planting time per acre, greater species availability, longer planting season and less chance of root deformity. Direct-seeding pre-dates planting nursery-grown stock, but planting seedlings is more popular for most species because seedlings are believed to be more reliable. Reports of direct-seeding failures are common and some references discourage the use of direct-seeding rather than explain the reasons for failure. Many factors can cause seeding failures but most failures are a result of improper handling and poor planning. Knowing what is involved and how to properly direct-seed trees can reduce the chance of failure and expand the potential for tree establishment beyond the limits of planting seedlings.

Mined land offers some unique advantages for direct-seeding. The fact that mine revegetation is determined by man rather than nature allows for manipulations that could benefit direct-seeding. Seed loss due to small mammal predation and seeding mortality due to competing vegetation which are common problems on natural sites could be controlled on mined land.

Old mine sites are proof that direct-seeding can succeed. Observation of many old sites reveals a diversty of woody plants that nature has direct-seeded on these areas. Many trials with a variety of large-and-small seeded tree species have shown that man too can successfully direct-seed mined land. The advantages that man has over nature are the ability to shorten the time it takes to establish a stand of trees and the ability to plan the species composition for his future use.

Black Locust. The most successful use of direct-seeding has been in the establishment of Black Locust (Robinia pseudococacia). Black Locust seeds are commonly broadcast on mined land to establish tree cover. The success of this practice is obvious from the thousands of acres revegetated with this species.

Black Locust is suited to this type of establishment because it has small hard seeds that can be stored dry, survive rough handling and germinate easily. The seeds fit into small cracks and openings in the soil where the impact of raindrops is enough to cover the seeds with soil.

It is estimated that in Kentucky approximately 50,000 pounds of Black Locust seeds are used to revegetate mined land each year. This is partially due to the high success rate of Black Locust seedings, but it is also the result of good economics. At a cost of $1.20 per pound and a recommended seeding rate of 5 pounds per acre the total cost for seed is $6.00 per acre. Labor costs vary, but even if the seeds are broadcast by hand, one person should be able to seed 2 or more acres in one hour. In comparison, Black Locust and most other seedlings cost $40.00 per thousand and one man can reasonably plant one acre per day.

Other Species. Although no other tree species can compare with the direct-seeding success of Black Locust, many other species have been tried and proven successful when direct-seeded on mined land. The best have been large-seeded species including many Oaks (Quercus spp.), Black Walnut (Juglans nigra) and Chinese Chestnut (Castanea mollissima). The importance of these species is that they are hardwoods of major commercial value as well as being valuable mast producing species for wildlife.

Handling. Most tree seeds, require special handling. Unlike Black Locust which can be stored dry for a number of years, acorns, chestnuts, walnuts, buckeyes and hickory nuts require a high moisture content to retain viability. They should be collected and placed in storage as soon as they fall. Time is important because seeds can dry rapidly in hot weather. There is also the need to gather seeds before they are damaged or taken by squirrels (Sciurus spp.) and other animals. Hulls should be removed from species such as black walnut and hickory (Carya spp.) and floated to separate hollow and dry seeds. This is done by placing the seeds in water. Only seeds that sink should be saved. Broken seeds and seeds that show signs of insect damage should also be discarded before bagging seeds for storage. Seeds should be sealed in plastic bags to retain moisture and placed in storage at 35°F.

Cold storage reduces rot and is important in preparing the seeds for germination. Most seeds require a period of cold stratification before they can germinate. For many species, stratification takes 30 to 90 days. White oak acorns are an exception in that they will initiate germination by producing a radical or early root soon after they fall to the grounds, but they still need a period of cold stratification before continuing growth. White oaks that initiate radical growth in the fall and other seeds that produce radicals in the spring can be planted with a radical present. However, for convenience in handling and for improved storability, seeds should be planted before they germinate. White oak acorns should therefore be planted in the fall and other species either in the fall or early spring.

Seeds may also be mixed with moist sand or a sand and peat mixture before they are bagged for storage. This separates seeds and keeps the seeds moist while allowing oxygen to reach the seeds. Seed viability may be improved by using sand, but this method may encourage seeds to germinate sooner, even while in storage.

Seeds do not have to stratify in cold storage. They can be planted the same year they are produced and stratify over winter. The land manager has the option to plant seeds beginning in September or October, when they fall, or at any time through April. Tree seeds can be stored and planted whenever soil conditions permit.

There is a limit to the length of time seeds with high moisture requirements can be stored. All of the large-seeded species mentioned should be planted within 9 months of the time they are harvested. This time limit plus the variability of crops from year to year will result in low seed availability some years.

Seed supply in general is an important question in direct-seeding. Moisture requirements and cold storage limit the collecting and handling of many tree seeds by normal seed suppliers. There is also little demand at the present to encourage dealers to supply tree seeds. However, anyone who is interested in direct-seeding oaks or other large-seeded species should be able to collect seeds locally. Again it should be noted that some years may have poor crops, but an example of local supplies is over 52 bushels of northern red oak acorns (Quercus rubra) collected in the Lexington area in 1982. There is an abundance of seeds that are never collected because the only demands is for research and for planting at state nurseries.

The best reference for seed handling, storage and planting requirements is Agriculture Handbook No. 450, Seeds of Woody Plants in the United States. It is available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. This book gives specific information about requirements for most woody plants in the United States and covers general principles of seed production.

Planting. There are many ways to direct-seed. Smaller sized seeds can be broadcast on open ground and will in effect plant themselves. Larger seeds can also be broadcast but there is no guarantee that they will be covered with soil so some form of planting is advised. Seeds must make contact with mineral soil. The soil protects the seed from temperature extremes while conducting moisture and oxygen to the seed.

Planting alternatives may include working the soil after the seeds are scattered or may involve planting individual seedspots. Seedspots are holes or small areas where one or more seeds are placed and covered with soil. Seedspots require more time and effort, but they require fewer seeds and spacing can be controlled. Instead of the random spacing of a broadcast seeding, seedspots can be spaced evenly to reduce competition and allow access into the planting area later.

Much of the work can be mechanized to reduce time and labor costs. Hydroseeding may work for some smaller seeds, but may damage some species. Also the addition of fertilizer or other chemicals to the slurry may kill some tree seeds.

Many seeds are roughly spherical and can be planted mechanically. University of Kentucky Department of Forestry trials with a modified agricultural unit planter have shown that acorns can be row planted in mine soil with relative accuracy. Continuing research is aimed ad developing a plan that will make tree seed planting a one-man, one-step operation.

Plan a seeding operation with a knowledge of the species to be planted and the density of trees desired. The number of seeds planted per area should depend on how many trees are desired and the expected germination of the seeds. Small-seeded species may have a very low expected germination, while large-seeded species may have an expected germination of 25 percent or more. Black Locust, for example, is planted expecting low germination. Five pounds of seeds per acre amounts to 120,000 seeds. If 10 percent of the seeds germinate and grow the area would have more than enough seedlings to produce a thick tree canopy. In comparison, 4,000 acorns planted per acre should result in at least 1,000 seedlings which is a good density.

The care in collecting and storing seeds to maintain good quality planting material should be continued through planting operations. Successful plantings depend on good quality seeds. Seeds that are taken to the field and left exposed to freezing temperatures or excessively hot conditions may lose viability. Planting non-viable seeds is a worthless endeavor.

Planting Site. Good quality seeds and proper planting techniques are not enough to guarantee success. The planting site plays an important role in seed survival, germination and growth. Small mammals, especially mice, are often present and pose a major threat to planted seeds. Seeds that do survive may rot if soil compaction pools water and inundates the seeds. Compaction may also restrict root development of germinating seeds and keep roots from penetrating to a depth where they can reach needed moisture and nutrients. Another problem for developing seedlings is competition for light, water and nutrients from planted groundcover species. Unless these problems are considered and dealt with during the planning stages of a planting operation there is a good chance for failure. This is true for seeds but also applies to operations where seedlings are planted.

Mice are common inhabitants of mined lands. They move into revegetated areas soon after cover is established and are found on even barren mined land close to existing cover. These small animals eat tree seeds and are able to locate and excavate planted seeds. Seeding trials planted in barren ground away from vegetative cover have resulted in no visible seed loss while seeds planted in existing cover have resulted in over 90 percent seed loss. Any time seeds are planted in or next to existing ground cover seed loss should be expected because of small mammal predation.

Grasses and legumes planted before or at the same time trees are planted not only offer a habitat for mice but compete with growing trees for light, moisture and nutrients. Groundcover species that are commonly planted on mined land are rapid growing plants that can produce thick cover. They easily overtop young tree seedlings and can smother the trees with a thatch of dead leaves and stems. The thick above-ground growth mirrors the root growth below the ground where competition for moisture can stress young trees during hot dry summer months and result in tree death.

Herbicides can be used to reduce competing vegetation. Applications in strips or spots produce an opening in which a tree can become established before vegetation reestablishes. These chemicals must be used according to label instructions. They vary as to when and how they should be applied and can kill trees as well as competing vegetation if not used properly.

Soil compaction can also stress trees by forcing the trees to root abnormally and by limiting oxygen and water movement in the soil. Compaction is not obvious, but with the traffic of heavy equipment that is common during the backfilling and grading operations of mines today, it is a probable condition. Compaction reduces the size of pores between soil particles. Tightly packed soils will not allow roots to penetrate. One obvious result of compaction is persistent pools of water in shallow depressions.

Discing can loosen the upper 6 to 8 inches of soil at the surface. Grasses and some legumes can do well in this shallow soil depth, but trees need a deeper rooting zone. They may survive in a shallow less compacted surface zone but they may stress easily and die after a few years. Where surface runoff and percolation are poor seasonal saturation can kill roots and stunt or kill trees.

Conclusions

Direct-seeding is an alternative method for establishing trees. It should be viewed as a supplement to tree planting activities not as a substitute to planting seedlings. Limited or variable seed supplies and problematic site conditions restrict direct-seeding except for black locust. However, when seeds are available and conditions are right, direct-seeding offers an economic benefit as a reforestation tool.


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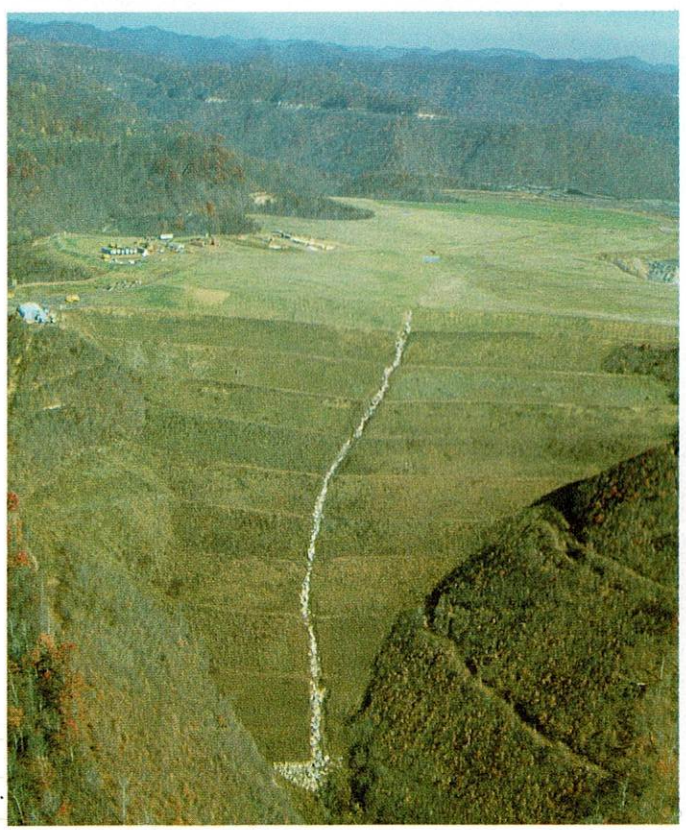


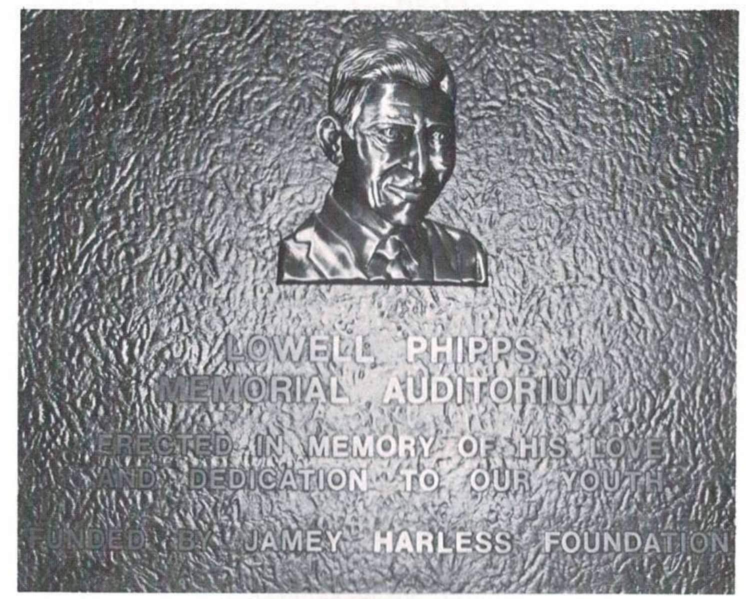
Man of the hour, 'West Virginian of the Year'

It's still early in 1984, but it's already been a very satisfying year for Buck Harless. James H. Harless, "Buck" to his legion of friends and admirers, started the new year right with his picture prominently displayed in the (Charleston) Sunday Gazette Mail, announcing his selection as the "1983 West Virginian of the Year."

The newspaper didn't list its criteria for the honor, but the full page article which accompanied the announcement left little doubt as to Buck's qualifications. Certainly no one in his native Gilbert would argue the point. Buck has long been a leading citizen of that Mingo County community, and widely known for his contributions to

Gilbert High School, completed in 1981, owes its modern auditorium to the philanthropic efforts of Buck Harless.

June and Buck Harless, shown here with West Virginia Congressman Nick Rahall, recently celebrated 45 years together.



As the plaque notes, the Lowell Phipps Memorial Auditorium was funded by the Jamey Harless Foundation, named for Buck's grandson.

Former WVSMRA Chairman James H. "Buck" Harless.

the business, civic, religious, and educational climates across the Mountain State.

In addition to his lofty status as "West Virginian of the Year," Buck was recently honored as the "Spirit of Life" recipient by the City of Hope, a medical research organization.

And, as icing on the 1984 cake, Buck and June Harless have just celebrated their 45th wedding anniversary. It's been quite a quarter for Mr. Harless, but no one is more deserving. May the rest of 1984 be just as fulfilling.

NEUTRALIZATION POTENTIAL: A Closer Look

Paul A. Shelton, J. T. Ammons, John R. Freeman

INTRODUCTION

Acid-base accounting, a procedure described in **Field and Laboratory Methods Applicable to Overburdens and Minesoils** (Sobek *et al.* 1978), is presently the most widely used method of evaluating overburden for its ability to generate or neutralize acidity. The procedure consists of two parts (1) determination of either total or pyritic sulfur and (2) determination of neutralization potential (NP). Both determinations are converted into tons $CaCO_3$ equivalents per thousand tons of material and the acidity capable of being produced is weighed against the amount of neutralizers present in the material. From this procedure, potentially toxic material can be identified. It should be understood that the use of total sulfur in the acid-base account is based on the assumption that almost all of the sulfur occurs in pyritic forms. Moreover, if this assumption is not true, it should be understood that total potential acidity and potential acid toxicity are being over-estimated.

The test for neutralization potential tends to overestimate the amount of neutralizers present, particularly when iron carbonate (siderite) is present in the overburden (Carrucio and Geidel 1981, Meek 1981). According to this theory, the NP test accounts for the carbonate found in the mineral while only accounting for a very small part of the iron. During the NP analysis the reaction proceeds as follows:

$$FeCO_3 + 2HCl \longrightarrow FeCl_2 + H_2CO_3$$
$$H_2CO_3 \longrightarrow H_2O + CO_2$$

In the initial part of the chain of reactions, the carbonate is consumed. If the reaction ended here, the siderite would appear to be a basic substance. However, the reaction continues as:

$$FeCL_2 + 1/4O_2 + HCL \longrightarrow FeCl_3 + 1/2H_2O$$

This is the slowest step in the reaction, as iron becomes oxidized slow at pH's less than 7.0. After the iron is oxidized from the ferrous to ferric state the reaction is as follows:

$$FeCl_3 + 3NaOH \longrightarrow Fe(OH)_3 + 3NaCl$$

It can be seen from these equations that although three moles of HCL are consumed, three moles of NaOH are also consumed. Therefore pure iron carbonate alone should result in an NP value of 0.0.

Other metallica carbonates are commonly found in association with iron carbonate. Meek (1981) found that a sample of Greenland siderite contained 4.62% $MnCO_3$, 0.42% $MgCO_3$, and 0.14% $CaCO_3$, with the remainder being $FeCO_3$. He theorized that any neutralizing potential derived from the sample would be caused by manganese, magnesium, and calcium carbonates, as the iron carbonate was neutral. However, theoretically calculated values and observed values for the NP did not agree and Meed concluded that the NP test was not valid for siderite samples because most of the iron did not become oxidized and react with the NaOH. If this is the case, then the NP test would not be valid for any sample which is high in ferrous iron. Such a sample would not reflect a grossly basic nature, it simply would not reflect the acid nature of the ferrous iron present.

MATERIALS AND METHODS

The purpose of this study was to determine if the NP test was invalid as concluded by Meek (1981), and to evaluate two methods of correction. This was to be accomplished by comparing calculated NP values with results obtained from the original NP procedure and the procedures implementing corrective measures. Most of the methodology used in this study was according to Meek (1981).

One of the corrections was the addition of five drops of concentrated hydrogen peroxide after a pH of 7.0 was first attained, producing an oxidizing environment to speed conversion of ferrous iron to the ferric state. After this addition, titration was resumed until the pH of the solution was again 7.0. This was the correction proposed by Meek. The second corrective measure involved bubbling oxygen into the sample during titration. This correction was a result of our reluctance to introduce foreign substances into the solution, particularly because hydrogen peroxide usually has a stabilizer in it. In light of the following equation:

$$FeCl_2 + 1/4O_2 + HCL \longrightarrow FeCl_3 + 1/2H_2O$$

It was decided that saturating the NP solution with oxygen during titration would result in more rapid oxidation of iron. This was accomplished by slowly bubbling oxygen into the solution during titration through Tygon tubing attached to the electrode support. The oxygen method was favored as a corrective measure because it seemed to be closer to "natural" conditions. It was also feared that the hydrogen peroxide might conceivably begin to oxidize pyrite in high sulfur samples, producing acid.

Nine different samples were analyzed during the course of this study. One was a siderite sample obtained from the Geology Department at Tennessee Technological University which we will refer to as "Mills siderite". One other siderite sample was obtained from a West Virginia surface lmine and identified as siderite. This samplw will be referred to as "WVA siderite". These samples were similar in color and appearance and fizzed when 10% HCL was added to them. Three of the samples (897-40, 897-22, and 894-10) were from overburden cores taken from the Divide Section of the Tennessee Tombigbee Waterway in Mississippi. These were selected because of their diversity of NP values. Three other samples (1509-A1, 1509-A2, and 1504-CKS) were taken from the surface of disposal areas along the Tennessee Tombigbee Waterway. The analysis of these three samples was less complete, being used only to check results between the original NP method and the oxygen method. The last sample (S-144) was taken from a West Virginia coal overburden core. This sample was of particular interest because it had an extremely high concentration of "non-sideritic" ferrous iron (44.51 mg/2g (22255 ppm) extracted during the NP digestion).

Several replicates of each sample were digested for neutralization potential using the procedure described by Sobek *et al* (1978). One replicate of each siderite sample was filtered after digestion and analyzed by atomic absorption spectroscopy for iron, manganese, calcium, and magnesium to determine the amount of each metal dissolved during the digestion process. A scan was carried out to determine if other elements were present, and only negligible quantities of sodium and potassium were found. The concentrations of the four major elements were used to calculate calcium carbonate equivalents and expected neutralization potential values (Table 1). Two values for the NP were calculated: (1) assuming that all iron was oxidized and reacted with NaOH, and (2) assuming that the iron was not oxidized. These values were calculated for comparison with results obtained from the actual tests.

The rest of the replicates were titrated with NaOH to an endpoint of pH 7.00 using the three methods discussed previously. The original procedure outlined by Sobek *et al.* (1978) instructs that titration should continue until a constant reading of pH 7.0 is maintained for at least 30 seconds. For this study, an expanded scale electrometer was used and titration was ended when a pH of 7.00 on the expanded scale registered for 30 seconds. After titration, a small amount of each sample was filtered for analysis by atomic absorption. The beakers containing the remaining sample were covered with a watch glass and allowed to stand overnight, after which the pH was taken while stirring the solution.

RESULTS AND DISCUSSION

Table 2 presents the calculated values for neutralization potential for the siderite samples and the actual values obtained using the three titration methods. According to these data, no "corrective measures" are necessary to obtain a valid NP result. Table 2 also shows a comparison of the results of the methods for the remainder of the samples. Variations among the results are within an extremely narrow range. Iron determinations were carried out by atomic spectroscopy on each titrated sample with negative results — the amount of iron left in solution in all cases was below the detection limit of the spectrophotometer.

However, NP values obtained using the peroxide method tended to be slightly lower than values obtained by the other methods. This poses an interesting question: if all the iron has been precipitated, where does additional acidity come from? Table 2 contains the pH values of the titrated samples which had been allowed to stand overnight. Only sample 897-22 exhibits a marked difference in pH values. In this case, the pH of the peroxide-treated replicate was significantly lower than the pH of the replicates which had been titrated using other methods. Sample 897-22 was the only sample which contained significant levels of pyritic sulfur (0.3733%). It appears that the hydrogen peroxide oxidized pyrite in the sample, generating sulfuric acid and lowering the pH. It is possible that a small amount of pyrite could be oxidized during the titration if peroxide is added, especially if the pyrite concentration is high. This could result in lowered NP values for samples with significant amounts of pyrite.

Perhaps the most interesting difference in the three tests was the amount of manganese remaining in solution after the titration with NaOH (Table 2). All of the replicates of a sample would contain approximately equal concentrations of manganese after digestion. However, those replicates which are titrated in the presence of peroxide contained less manganese after titration than the others. The amount of manganese consumed was especially high in the siderite samples to which peroxide was added. If the manganese ions are being oxidized and reacting with the hydroxide, this could also contribute to the lower NP values obtained by the peroxide method.

If the manganese is in fact reacting with the sodium hydroxide, the expected NP values calculated in Table 1 would be slight overestimations. The NP for Mills siderite should fall between 44.64 and 41.57 (44.64 minus 3.075), depending on the amount of manganese which reacted. This brings the calculated value even closer to the observed values, which ranged from 40.15 to 41.79. The same holds true for WVA siderite: the calculated NP value should fall between 34.33 and 32.49, and the observed range was from 29.72 to 31.29. The discrepancy between calculated and observed ranges could be caused by evaporation of a part of the original volume of liquid during the digestion process, thus slightly increasing the concentration of dissolved substances in the sample analyzed by atomic absorption. This would result in an overestimation for the calculated neutralized potential.

An important difference among the three methods was the amount of time required for titration of a sample. Although the original NP method yielded results which were comparable to the others, the amount of time required for titration was approximately 45-60 minutes each for the siderite samples, and 10-15 minutes for the other samples. With the addition of oxygen or hydrogen peroxide the amount of time was reduced considerably for the siderite samples. However, this investigator would recommend that if one of the "accelerating" measures was used, it should be the introduction of gaseous oxygen. Too many questions remain concerning the effect of the peroxide oxidation on pyrite or manganese.

Table 1. Amounts of iron, calcium, magnesium, and manganese solubilized during NP digestion, with calculated and observed NP values.

	Amount extracted mg/g sample	Total mg solubilized	mgq solubilized	mg CaCO3 eq per 2g sample	Tons CaCO3 eq Per 1000 tons
MILLS SIDERITE					
Fe	42.375	84.75	3.035	151.924	75.962
Ca	0.9375	1.875	0.094	4.682	2.341
Mg	9.525	19.05	1.567	78.449	39.225
Mn	1.6875	3.375	0.123	6.149	3.075
Calculated NP if iron is not oxidized (Total of all four) =					120.60
Calculated NP if iron completely reacts (Ca + Mg + Mn) =					44.64
OBSERVED NP (Original Method) =					41.34
WEST VIRGINIA SIDERITE					
Fe	46.125	92.25	3.304	165.331	82.666
Ca	5.5875	11.175	0.558	27.907	13.954
Mg	4.500	9.00	0.741	37.062	18.531
Mn	1.0125	2.025	0.074	3.689	1.845
Calculated NP if iron is not oxidized (Total of all four) =					117.00
Calculated NP if iron completely reacts (Ca + Mg + Mn) =					34.33
OBSERVED NP (Original Method) =					30.83

SUMMARY

Results obtained from the original NP procedure and two procedures with accelerated oxidation rates did not differ significantly from each other or from calculated values, although those samples treated with hydrogen peroxide had lower NP's. In all three tests the ferrous iron in solution was oxidized and formed iron (III) hydroxide, as indicated by atomic spectroscopy. To achieve accurate results using the original procedure, it is recommended that an expanded scale pH meter be used and a steady reading of pH 7.00 be obtained for 30 seconds before titration ceases. This is necessary because of the slow oxidation of ferrous iron, which might not cause a perceptible pH drop in 30 seconds when a normal pH meter is being used, but which is readily observed on the expanded scale meters. However, it should be stressed that the original NP procedure using an expanded scale pH meter is a valid test which does account for ferrous iron in a sample, and no corrective measures need to be implemented to improve the accuracy of the test.

Table 2. Neutralization potential, standing pH, and manganese content of samples titrated using three different techniques. *All pH values are for 24 hrs except for S-144 which is three days.

SAMPLE	NP	pH*	Original extracted Mn (mg)	Total remaining Mn (mg)	% Mn consumed
SIDERITE WVA (34.33 calculated)			2.025		
Original	30.83	6.9		1.027	49.28
w/O_2	30.60	7.0		1.403	30.72
	31.29	6.7			
	31.06	6.8			
	31.06	6.8			
w/H_2O_2	30.99	7.1		.043	97.88
	30.63	6.8		.149	92.64
	28.72	6.8		.066	96.74
SIDERITE MILLS (44.64 calculated)			3.375		
Original	41.34	6.9		2.192	35.05
w/O_2	41.57	6.8		2.545	24.59
	41.79	6.8			
	41.57	6.7			
w/H_2O_2	40.26	6.9		.319	90.55
	39.25	6.7		.197	95.16
	40.15	6.8		.205	93.93
897-40			6.353		
Original	27.60	6.5		2.584	59.89
w/O_2	26.69	6.5		2.043	67.84
w/H_2O_2	26.24	6.6		1.916	69.84
897-22			.289		
Original	-18.66	6.5		.130	55.02
w/O_2	-17.98	6.4		.102	64.71
w/H_2O_2	-19.11	5.0		.080	72.32
894-10			.126		
Original	-1.81	6.4		.062	50.79
w/O_2	-2.26	6.3		.060	52.38
w/H_2O_2	-1.92	6.3		0.44	65.08
S-144			1.327		
Original	-5.03	6.1		.622	53.12
	-5.23	6.2		.610	54.03
w/O_2	-5.00	6.1		.462	65.18
	-4.78	6.1		.506	61.87
w/H_2O_2	-5.68	6.2		.332	74.98
	-5.46	6.1		.194	85.38

Neutralization Potential values for Remaining Three Samples

	1509-A1	1509-A2	1504CKS
Original	-5.17	-4.48	2.18
w/O_2	-4.48	-4.02	2.41
"	-5.17	-4.25	2.87

LITERATURE CITED

Cargeid. 1981. An Evaluation of the Proposed Holly Grove Mine (Canaan, W.V.) to Impact the Little Kanawha River with Acid Waters. Report to U.S.E.P.A. Columbia, South Carolina.

Meek, F.A. 1981. Development of a Procedure to Accurately Account for the Presence of Siderite During Mine Overburden Analysis. Presented Dec., 1981 to the Acid Mine Drainage Task Force, West Virginia.

Sobek, A.A., W.A. Schuller, J.R. Freeman, R.M. Smith. 1978. Field and Laboratory Methods Applicable to Overburdens and Minesoils. EPA-600/2-78-054, Cincinatti, Ohio.

Coal Calendar

APRIL

3-4 Workshop, "How to Establish and Maintain Union FREE Employee Relations," Boone Lake Training Center, Bristol, Tenn., contact Gracie Gilliam, SESCO Management Consultants, P.O. Box 1846, Bristol, Tenn., 37621, (615) 764-4127.

10-12 "Fundamentals of Surface Mining for Nonmining Personnel," University Park, PA., contact J. Bennett, Penn State University, 122 Mineral Sciences Bldg. University Park, PA., 16802, (814) 865-7472.

12-13 "Establishing Forests on Surfaces Mined in Eastern United States," Holiday Inn, Cumberland Gap, Tenn., contact Nancy Hopper, OISTL, P.O. Box 13015, Lexington, KY., 40512, (606) 252-5535.

13-14 Big Sandy-Elkhorn Coal Mining Institute, Seventh Annual Coal Mining Seminar, Jenny Wiley State Resort Park, Prestonsburg, KY., contact Nancy Hopper, OISTL, P.O. Box 13015, Lexington, KY., 40512, (606) 252-5535.

16-18 Second Workshop and Symposium on the Application of Microcomputers in the Mining Industry, University Park, PA., contact J. Bennett, Penn State University, 122 Mineral Sciences Bldg., University Park, PA., 16802, (814) 865-7472.

24-26 Workshop, "Effective Supervision," Boone Lake Training Center, Bristol, Tenn., contact Gracie Gilliam, SESCO Management Consultants, P.O. Box 1848, Bristol, Tenn., 37621, (615) 764-4127.

24-26 "Elements of Underground Coal Mining, " University Park, PA., contact J. Bennett, Penn State University, 122 Mineral Sciences Bldg., University Park, PA., 16802, (814) 7472.

25-26 Fundamentals of Geotechnical Engineering (Soil Mechanics), Kentucky Center for Energy Research, Lexington, KY., contact Nancy Hopper, OISTL, P.O. Box 13015, Lexington, KY., 40512, (606) 252-5535.

26-28 National Independent Coal Operators Association (NICOA) Annual Meeting, Holiday Inn North, Lexingtonton, KY. Contact Louis Hunter, 1514 Front St., Richlands, VA 24641, (703) 963-9011.

29-May 3 1984 American Mining Congress International Coal Show, McCormick Place, Chicago, IL., contact Program Committee, AMC, 1920 N St. NW, Suite 300, Washington, D.C., 20036, (202) 861-2800.

29-May 2 1984 Conference for Coal Industry Executives, Greenbrier Hotel, White Sulphur Springs, contact Mary Neale, West Virginia Society of CPA's, P.O. Box 1142, Charleston, 25324, (304) 342-5461.

MAY

7-8 4th Annual International Coal Trade Conference, Washington, D.C., contact John Ekberg, Coal Outlook, 1401 Wilson Blvd., Arlington, VA., 22209, (703)528-1244.

8-9 WVSMRA Congressional Visit, Capital Hill Hotel, Washington, D.C., contact Patty Bruce, WV-SMRA, 1624 Kanawha Blvd. E., Charleston, 25311, (304) 346-5318.

14-16 "Elements of Coal Preparation," University Park, PA., contact J. Bennett, Penn State University, 122 Mineral Science Bldg., University Park, PA., 16802, (814)865-7472.

14-16 "Hydrological Design for Surface Coal Mining," University Park, PA., contact J. Bennett, Penn State University, 122 Mineral Sciences Bldg., University Park, PA., 16802, (814) 865-7472.

16-18 "Coal Geology," Lexington, KY., contact Nancy Hopper, OISTL, P.O. Box 13015, Lexington, KY., 40512, (606) 252-5535.

17-19 Pike County Area Coal Exhibition (P.A.C.E.), Pikeville College athletic facilities, Pikeville, KY, Features coal mining equipment exhibits. Contact: Webb Lail, P.O. Box 897; Pikeville, KY 41501, (606) 432-5504.

21-23 "Computer Analysis of Mine Ventilation Systems," University Park, PA., contact J. Bennett, 122 Mineral Sciences Bldg., Penn State University, University Park, PA., 16802, (814) 7472.

23-25 "Stability Analysis of Earth Slopes," Lexington, KY., contact Nancy Hopper, OISTL, P.O.Box 13015, Lexington, KY., 40512, (606) 252-5535.