West Virginia Surface Mining & Reclamation Association's

Green Lands

Quarterly

Fall 1972

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FALL, 1972

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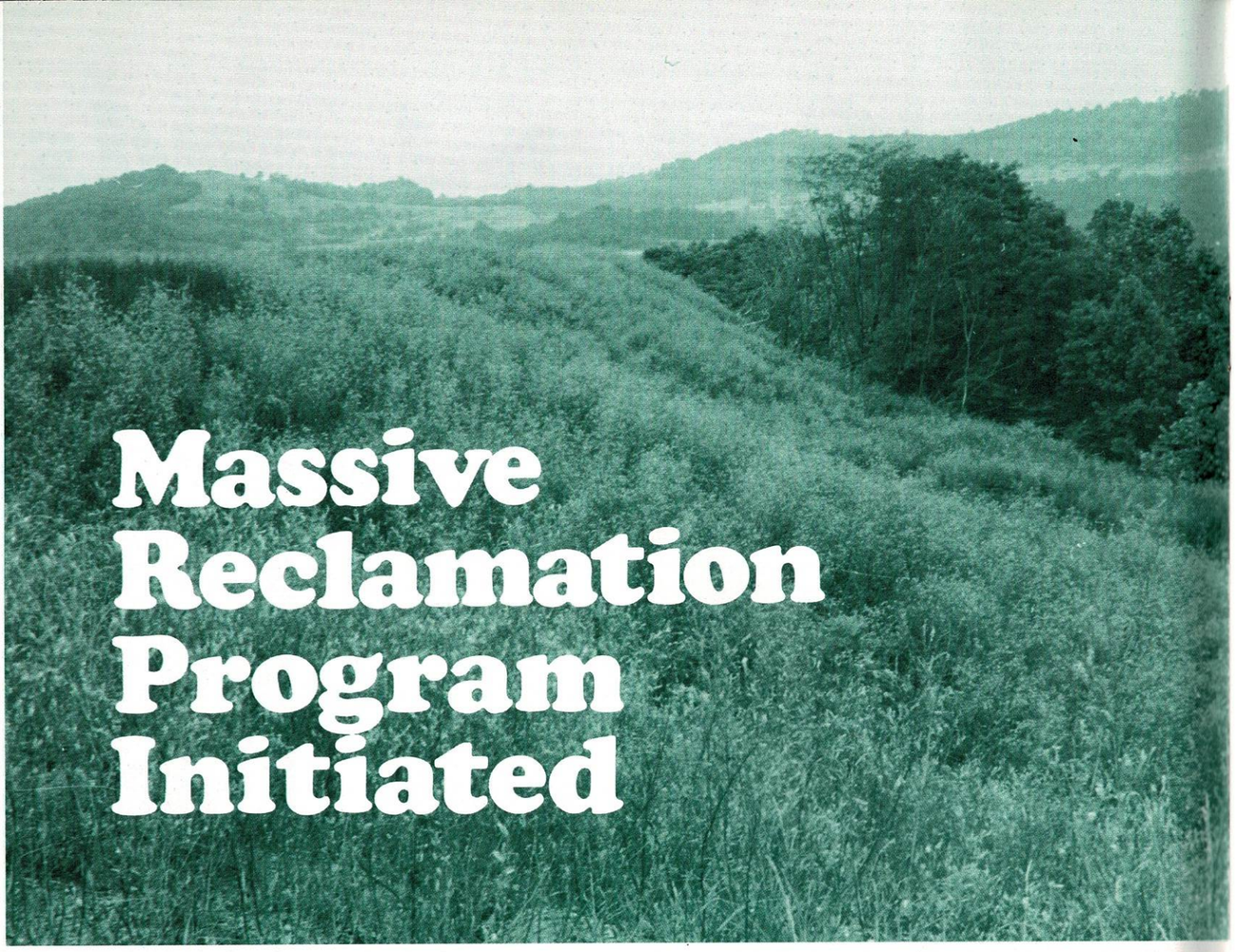
ABOUT THE COVER

The photographs on the front and back covers of this issue of GREEN LANDS are photographs taken of surface mine reclamation which has been accomplished around the Mountain State in the past year.



Massive Reclamation Program Initiated

The West Virginia Surface Mining and Reclamation Association has initiated a massive mined-land reclamation program, according to Jim Wilkinson, new President of the organization.

Wilkinson said, "Although West Virginia has led the nation for the past four years in land reclamation, we intend to do everything possible to keep that position in the coming years."

Since 1968, over 70,000 acres of mined land have been reclaimed in West Virginia, with a record 20,369 acres being treated in 1971 alone, according to statistics released by the National Coal Association. "In 1972, I believe we will have the best year yet," said Wilkinson.

Wilkinson believes that his Association, which represents 250 companies involved directly and indirectly in surface mining, has a responsibility to make sure West Virginia maintains its reclamation leadership.

"By continuing the many successful programs already benefiting the industry and expanding the efforts of the Association, West Virginia can continue to set a pattern of outstanding land reclamation for the rest of the nation to follow," he said.

Wilkinson, who is Vice-President of Kingwood Mining Company in Preston County, believes the factors involved in West Virginia's past success are significant, but he points to the new programs being established by the Association for continued success and improvement in the future.

1. The Association has employed two reclamation specialists, who offer their technical assistance to its members.

"One of our men is considered one of the outstanding reclamationists in the country, and the other has been expertly trained in water quality control," he said. "They help our members with preplanning, revegetation and stabilization, and construction of effective drainage systems, sedimentation impoundments and acid treatment facilities."

2. Through the help of these two men and other experts, Wilkinson is initiating weekly three-hour workshops all across the state, which are designed to better educate the men in the field about the intricate phases of mining and reclamation.
3. Complimenting these weekly programs are the annual week long training sessions coming up in late October. The training sessions have the same objective as the workshops, only they are highlighted by field trips for practical demonstration of lecture material.
4. Operators in West Virginia are taking daily water samples on their operations in order to insure safe clean water for the Mountain State.
5. The formation of an Association "Ethics Committee" to examine all reasonable complaints from the public.

"I believe this to be an extremely important step. It is our duty to guarantee that all private property be protected," he said. "As a safeguard, all surface mining companies carry insurance that will pay triple damages to those effected by surface mining."

6. The organization of a comprehensive land use program to develop land for future beneficial uses, such as housing projects, industrial and commercial sites, sanitary landfills, recreation and wildlife has been initiated.
7. The Association has expanded its efforts to work with the allied industries in an attempt to develop new tools, equipment and methods that will speed up the reclamation process.
8. Turning the emphasis to existing programs, Wilkinson pointed to the Special Reclamation Fund, which surface mining operators pay $60 per every new acre disturbed. The purpose of the program is to fund reclamation work on the orphaned lands, or the areas mined 20 or 30 years ago and never reclaimed.

"The industry voluntarily set up this fund in 1963 and we continue to support it completely and offer our assistance to make sure all the eye-

sores of the past are eliminated within the next ten years," Wilkinson said. "It is interesting to note that because of this unique fund, we are able to reclaim more land each year than we disturb."

9. "We also pledge to continue our massive research programs, which cost our members over $300,000 last year," he said. "Through our past research, we now have technology to effectively reclaim all the lands disturbed by surface mining, but we are continuing to find better and more efficient mining and reclamation techniques."
10. Wilkinson also praised the Soil Conservation Service, which for years had done a great deal of reclamation work, and recently announced plans to accelerate their activities in this area.

"We applaud this action by the Soil Conservation Service and offer any help or cooperation it might desire," he said.

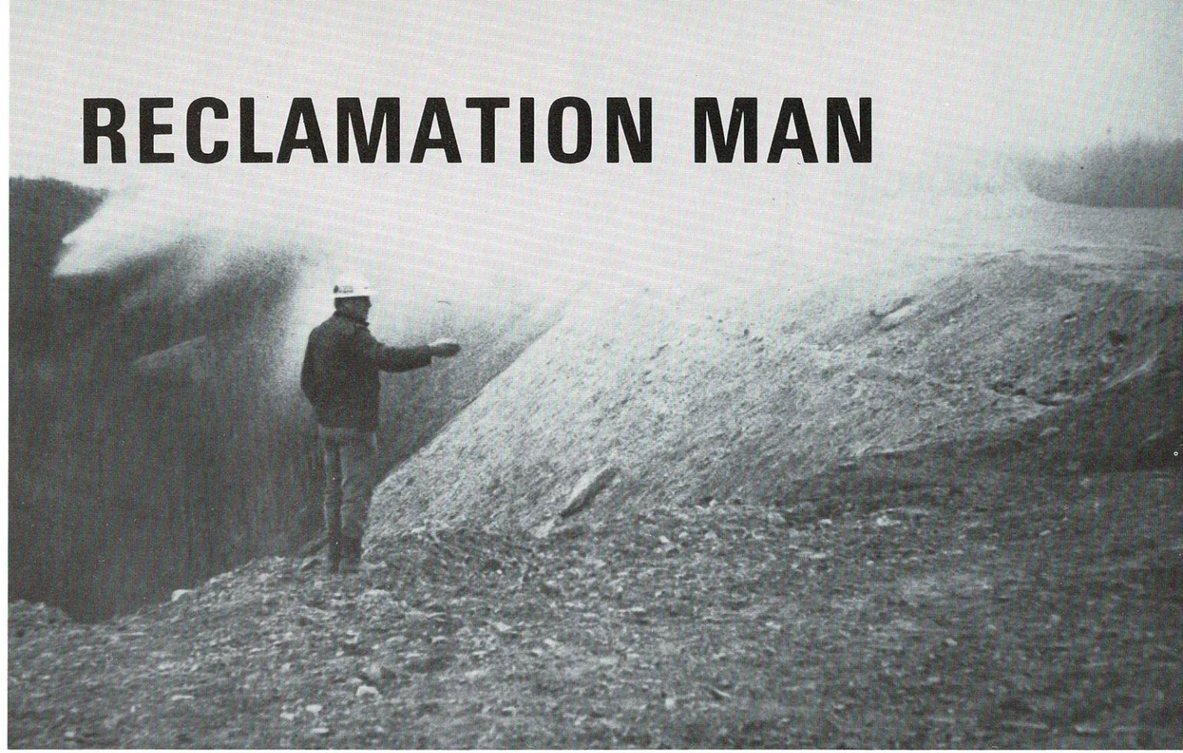
He noted that the recent success in West Virginia has resulted from close cooperation between the general public and industry and that this should show the way for the future.

"If those who oppose us, and particularly those who are experts in forestry, wildlife and geology, would join with us, instead of fight against us, our problems would be solved much quicker," he said. "Working together we can achieve 100% productive and stable reclamation on lands disturbed by surface mining."

"People always criticize the industry for what was done 20 or 30 years ago, not what we're doing today. We stand completely behind everything we've done under the new law," Wilkinson said. "As an Association, we take seriously our environmental responsibilities and we support strict enforcement of existing laws. We also support comprehensive federal legislation which will establish criteria for achieving sound reclamation nationwide."

In closing, Wilkinson said, "As always, the Association is maintaining an open door policy with the public, and anyone who wants to come out and actually see what we're doing should contact our offices in Charleston or Bridgeport."

RECLAMATION MAN



If you go looking for Jim White you'll probably find him somewhere out in the mountains doing what he does best; reclaiming the land.

At this site near Sophia, Jim directs the hydroseeder over the outslope, making sure the entire area is covered.

Jim White Makes It Happen

Everyone is talking about stopping pollution and cleaning up the environment these days. For most people it's just a lot of talk, but for Jim White it's a way of life.

White is the Manager of Surface Reclamation for the Pittston Coal Group and is responsible for cleanup and revegetation of all disturbed areas, whether it be for deep or surface mine operations.

Considered by many to be the most dedicated "reclamation man" in the state, Jim has earned his reputation through years of experience. He has probably personally overseen more reclamation work than anyone else in West Virginia and in some of the roughest terrain anywhere.

According to White, "Surface Reclamation" means his main job is surface mine reclamation, but Pittston is also interested in beautifying areas surrounding their deep mines and cleaning up refuse areas and gob piles.

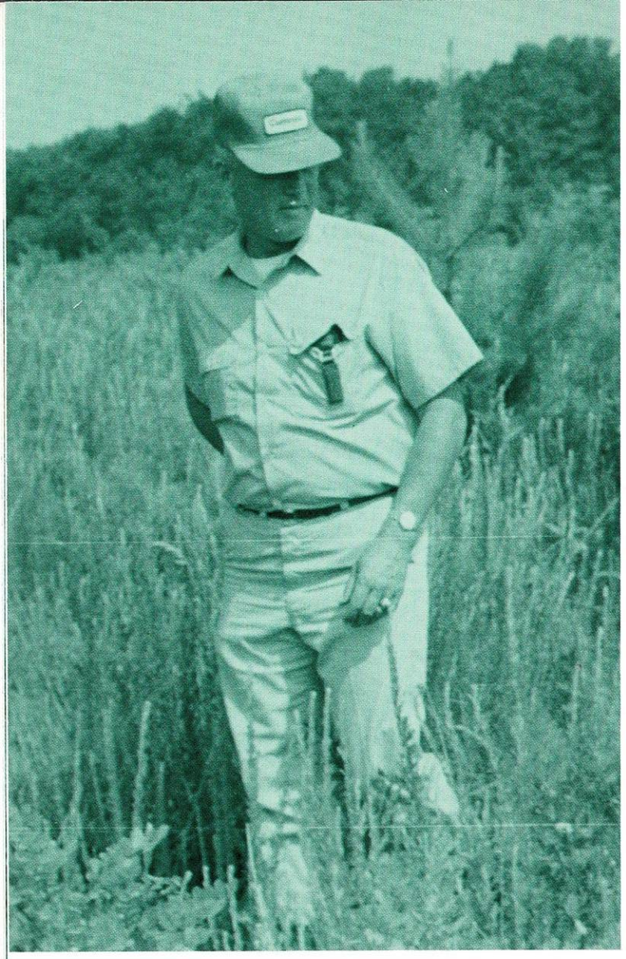
"We're putting in some new mines and revegetating all the surrounding areas," he said, "and in several cases eliminated or revegetated gob piles."

"Basically, I try to visit each of our operations once a month and make arrangements for whatever work they need," he said.

He noted that his other duties include attending the meetings of the surface mine associations of Virginia, Kentucky and West Virginia, as Pittston's representative, and also making sure that all their surface mine operations are in compliance with laws of that particular state.

Concerning the ever increasing and changing laws governing the industry, the Bridgeport, West Virginia, native said, "I just don't see how they can make the laws much more stringent. The new laws have made mining more difficult and cut down on production, but they have made reclamation easier and more effective."

But he stressed that if legislation such as the 20 degree slope limitation now being considered in Washington was passed, selective abolition would become reality in the entire Appalachian area.



With a smile of satisfaction, Jim inspects an area he reclaimed in Raleigh County in 1967. It was one of the first projects in the state to be seeded by helicopter.

Service, and West Virginia University, just to name a few.

"I enjoy working with these organizations because they have the answers to our industry's future," he said. "All the technology we've gained has been through cooperation with these people."

He continued, "Neither can we afford nor will the public stand for the trial and error techniques of the past. The men involved in these research programs have given us the information we need."

For an example, he pointed to the great strides that have been made in the handling and treatment of spoil.

"In some areas there may be only a few inches of top soil, or it may be acidic, but tests can tell us that the best soil to put back on top is a subsoil that was originally 20 or 30 feet down. These are things we didn't know a few years ago."

But Jim does more than utilize the research programs, he gets involved. When ever anyone needs land or equipment or materials for an experimental project, chances are they'll contact White and chances are he'll come through. He is presently assisting in several experiments, including mulch and soil stabilizers and growing hard woods.

But there is one area in which he feels the operators must improve.

"Future use of the land must be first and foremost in our reclamation plans," White said. "We have the opportunity to develop land that can be used for almost anything and we must provide something worthwhile for the public. We have already had some land development, but more is needed."

But White believes the 1971 Surface Mining Act is playing a big role in West Virginia's successful reclamation program.

"The three most important factors are progressive reclamation, or keeping reclamation current with the active operation, segregation and control of acidic materials and enforcement by the Department of Natural Resources."

"I don't know how they could enforce the law more than they are now," he said, "most of our jobs have an inspection every eight or ten days."

White, who graduated from the West Virginia University School of Agriculture, believes the industry owes a great deal of its success to various state and federal agencies involved in reclamation research. Groups such as the Agricultural Research Service, Soil Conservation Service, U. S. Forest

After finishing the initial seeding on another experimental project on Tams Mountain in Raleigh County, Jim talks over future plans with Bill Plass (center) of the U. S. Forest Service and Gene Copeland of Ranger Fuel Corporation of Beckley. Ranger Fuel is providing the land and material for the experiment being conducted by Plass.

White attended a state-wide week long evaluation of mined land reclamation this past summer to study techniques being used by others. Here he chats with Frank Glover of the Soil Conservation Service.

White believes that since 1967, the surface mining industry has made more progress in the area of environmental protection than any other industry in West Virginia.

"Things have changed so much in the last 10 years," he said. "Then everyone talked about how much coal they ran, but now they ask how the grass is coming and if you're getting enough rain."

"Reclamation doesn't just happen, it's got to be planned. There was a time when anyone could be a surface miner, but today a superintendent has to be an engineer, a farmer, a forester, and educator to his employees. It's a whole new ballgame."

As for the abolition movement, he said if they would work with us as hard as they fight against us, we could solve our problems in no time.

"The public has a real stake in our problems, because regardless of how they feel they all use our product. The newspaper that fights us is probably being printed on paper made from a tree cut off one of our jobs."

In concluding, he said, "Whether the abolitionists like it or not, we're West Virginians,interested in schools, hospitals and highways. Our children are growing up here and we are doing everything possible to make West Virginia a good place for everyone."

RESEARCH REPORT

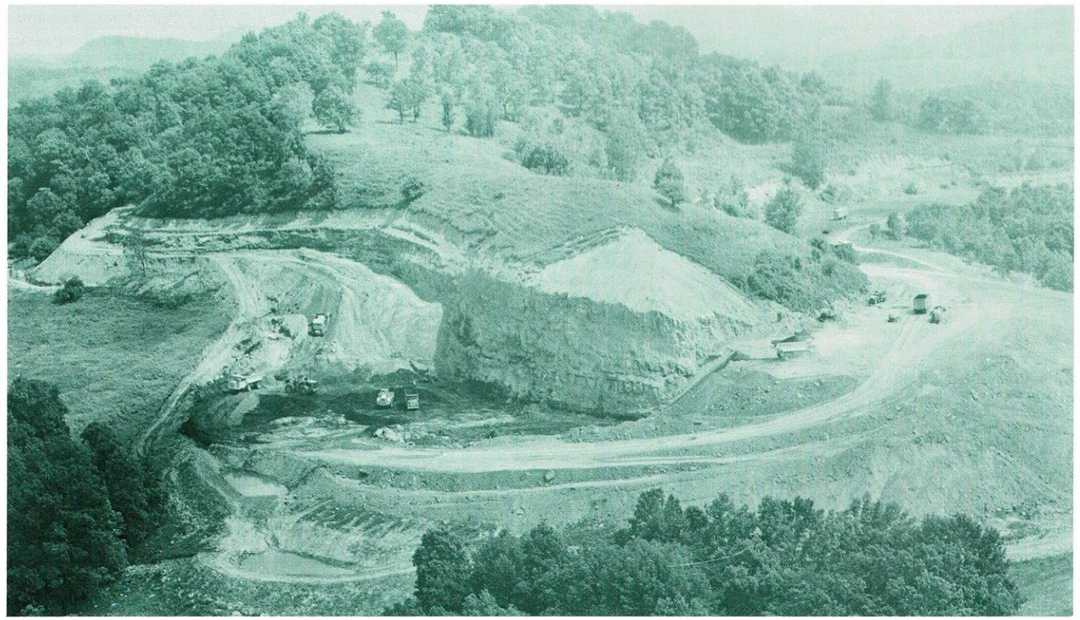
New Mining Methods Being Developed

An experimental surface mining method, that will reduce the disturbed acreage of active surface mines by nearly two-thirds, is becoming a reality in Barbour County after almost two years of study and planning.

This new method which has been developed by Grafton Coal Company, is completely eliminating the outer spoil bank and highwall. The project is located on Brushy Fork about four miles south of Bridgeport, West Virginia.

C. E. Compton, President of the Clarksburg firm, formulated this new concept, which basically consists of hauling the over-burden material directly from the bench and backfilling the mined-out pit immediately behind the operation. This results in absolutely no spoil being placed over the outslope and allows for complete backfill and elimination of highwall.

Compton believes this may be "the mining method of the future," because it is economically, environmentally and aesthetically sound.



This aerial photo shows the new mining method to be compact and efficient. Coal is being hauled from the pit (center) while overburden is taken from the bench and backfilled immediately behind the pit. Of course, the area to the right was the pit only a few weeks earlier. Notice the highwall is being backfilled completely, but there will still be a level bench area for land development in the future. Also note that absolutely no material is being placed on the unstable outer slope.

"Most of our contour surface mines have a ratio of about three disturbed acres for every acre of coal," Compton said, "but this method of mining and reclamation will make that ratio about one to one, because the spoil is not placed over the hill".

"Your costs may be a little higher for moving the material, but you will save on reclamation costs because the disturbed area will be much smaller," and he emphasized, "looking at the total picture, I think mining and reclamation costs will be less and results will be more effective."

He continued, "the most important factor here is that we're not putting any material on the unstable outslope and we're creating level, productive land that can be developed in the future. Our new mining process lets us maintain the valuable level bench, while at the same time eliminating the vertical highwall."

Also, besides cutting the disturbed area of a mine by nearly two-thirds, this backfilling process will reduce the need for elaborate drainage systems and sedimentation ponds, because all the water can be contained on the bench area.

The Brushy Fork operation is utilizing one bulldozer to loosen the overburden, with two front-end-loaders putting the material into two dump trucks, which haul approximately 200 feet to the backfill area.

Another Grafton Coal Company operation near Fairmont is of particular interest because it is one of the first "new law operations" or one that was started and completed entirely under the 1971 Surface Mining Act. All the new provisions for bonding, special reclamation tax, drainage, progressive reclamation, etc. were in effect here.

Mining began in this area in August, 1971, with reclamation work being completed this fall. The actual disturbance time was less than one year.

The active operation came within 200 feet of the residence of Mr. and Mrs. Melvin Chips, without any damage whatsoever to the house or surrounding buildings and the 15% slope was completely graded back to contour.

Besides stablizing and revegetating the hillside for future grazing purposes, reclamation work also sealed off several abandoned deep mines that had been a long time source of acid mine drainage into nearby streams. The water quality improved from a pH of 4.0, before mining, to 6.5 after reclamation.

A closer look shows just how steep the hillside is even after mining. The highwall was eliminated here by blasting it down from the top, then grading. The last few acres at the right were just being prepared for seeding when this photo was taken in August.

It almost looks like it was never mined, but the permit started at the tree line on the left and extended to the grass line on the right. This panoramic view shows that the farm was almost surrounded by the operation, but no damage was done to any of the buildings. The pond near the center of the picture was one of six silt ponds constructed during the operation to control silt runoff. It was left at the owner's request for farm use.

TECHNICAL REPORT

SPOIL, GOB and FLY ASH PRODUCE PLANT SUPPORTING SOILS

Al Babcock
Industrial Development Representative
Monongahela Power Company

Fly ash collected from coal burning electric generating stations can be effective in reclamation work necessary at active surface mining operations and particularly in the restoration of abandoned spoil banks or gob piles.

In fact, the best way to express it might be to simply state its application will help make soil out of spoil! Research to date confirms ash has a useful and long lasting impact on soil as well as spoil.

The material has been tested both in the laboratory and in the field. Yes, it has also been dollar tested. And fly ash has been proclaimed a winner in all categories.

This is not too say that fly ash by itself is the total answer to soil conditioning. However, in conjunction with appropriate mixtures of lime and/or fertilizers, it can substantially assist in providing the necessary nutrients to sustain new ground cover in the acid soils often resulting from mining operations, such as often found in the northern West Virginia coal fields.

New legislation, both at the Federal and State level, make it incumbent upon the surface mine operator to assure a good ground cover upon restored areas. This has resulted in a search for new techniques and applications by the West Virginia Surface Mining and Reclamation Association.

Since surface mine spoil, coal mine refuse, and power plant fly ash are by-products of coal mining and combustion, the Energy Research Center of the U. S. Bureau of Mines has conducted experiments for a number of years on the utilization and reclamation of these materials.

In a presentation before the Third Mineral Waste Utilization Symposium in Chicago last March, Messrs. D. W. Gillmore, L. M. Adams, and J. P. Capp of the Bureau staff characterized its results as follows:

"The fly ash served as a neutralizing agent, diluent, and soil amendment, providing some nutrients that encouraged vegetation of the barren areas while disposing of significant quantities of the power plant waste."

In the eight years it has been studying the problem, the Federal agency has been actively supported in its mission by West Virginia Department of Natural Resources, the National Ash Association, U. S. Soil Conservation Service, Consolidation Coal Company, West Virginia University, Monongahela and Appalachian power companies, and Highway Materials, Inc., of Bridgeport. Additionally, allied agronomy research has been carried out at Virginia Polytechnic Institute and State University at Blacksburg.

Basically, the Morgantown experiments have been carried out on four surface mine spoil banks and three deep mine refuse banks ranging in size from a half-acre to 65 acres. In Virginia, VPI researchers have field plots on agricultural soils at four locations in the state.

The objectives of these cooperative studies at VPI have been to determine the physical and chemical properties of fly ash-soil mixtures, the response of agricultural crops to the mixtures, and the limits of fly ash that may be applied without deleterious effects. Results at the demonstration plots are bearing out laboratory or greenhouse analyses that the proper application of fly ash has a wide range potential of benefits for the farmer including the ability to increase the water retention capability of poor soils, to raise the pH, and to even substantially increase the per acre yield of certain crops. However, preliminary findings indicate indiscriminate use should be avoided. The soil or spoil to be treated should be tested before any chemicals, lime or fertilizers are applied. In other words, look before you leap.

On the other hand, the primary objective of the Bureau's work is to develop and demonstrate a method of utilizing fly ash to reclaim spoil banks and refuse dumps. Other aspects are to determine the effects of the mixtures on pH, moisture holding ability, plant growth, and to select those species with greatest survival potential.

A beneficial side effect has been elimination of factors contributing to stream and air pollution as well as the restoration of degraded lands.

Although the chemical composition of fly ash might vary from station to station, depending on the type of coal, burning techniques, and equipment employed, the ash resembles soil in certain physical and chemical properties, is generally alkaline, contains some plant nutrients, and possesses moisture retaining and soil conditioning capabilities.

In 1964, the Bureau initiated research on the growing of grasses in the greenhouse and this was followed in 1965 by work on a 1/2-acre clay-like strip spoil plot near Westover. Good stands of Kentucky fescus, orchard grass, rye grass, and birdsfoot trefoil were achieved.

This small tract was divided into separate parcels and all areas received equal applications of fertilizer and seed. Two plots, one untreated and the other treated with lime, served as control plots in

These two sets of before and after photographs show the excellent results of revegetation in soil that has been treated with power plant flyash.

The area at the top is a seven acre plot near Cassville in Monongalia County, which was treated and seeded in the fall of 1971. The bottom picture was taken in the spring of 1972. (Photographs compliments of the U. S. Bureau of Mines).

order to compare the results obtained with fly ash treatments. During subsequent growing seasons, the fly ash treated plots consistently out performed the controls by producing higher yields and more vigorous plants. Even though the area has not been monitored since 1968, the benefits achieved through fly ash are still quite evident. A visit to the area will make a believer out of the most ardent doubter.

Equally good results were recorded on a one acre plot of shaly surfaced-mined spoil near Albright in 1966. And in 1970, a full-scale demonstration was begun on a 65-acre rocky spoil area which had been contour surface mined 25 years before and subsequently partly leveled. Work is continuing on the latter project.

Coal refuse bank or gob pile reclamation was first carried out on a leveled refuse dump containing shale, rock, bone coal, and quantities of coal of various sizes and most recently on a large, rough hilly refuse area composed of a variety of wastes including "red dog" and trash. The addition of fly ash greatly improved the pH values and water holding capacity of these acidic materials permitting the growth of a substantial ground cover. Grasses planted last fall at Cassville were more than knee high by this spring.

Applications varied between 150 and 800 tons per acre, depending upon the fly ash, spoil type and buffering capacity, and depth of mixing anticipated, but a good average rate would be about 200 tons per acre. Choice of machinery for spreading and mixing the fly ash with the spoil or refuse depended primarily on the relative roughness of the surface and varied from conventional farm equipment to bulldozers. A "rule of thumb" for fly ash application is a one-inch cover of ash equals 100 tons per acre.

The mixing of large quantities of fly ash with spoil also produces physical changes that enhance plant survival and growth. Bulk density of the mixtures was decreased resulting in greater pore volume, greater moisture availability, and higher air capacity – hence, better conditions for root penetration and growth.

Fly ash, as compared to soil, generally contains greater quantities of all essential plant nutrients except nitrogen. The contents of B, Cu, Mg, Mn, and Mo in plants grown on fly ash or fly ash-soil mixtures indicate these elements are present in soluble form. The pH of fly ash usually is in the range from 6.5 to 10.5. The above data was based on an analysis of samples from 15 coal burning power stations located in nine states by the Department of Agronomy at VPI.

Reclamation costs per acre depend on several variables including the terrain, soil type and age, acreage, equipment used, legislative requirements, and above all else, the degree of reclamation desired.

Costs developed at the Stewartstown Site by the U. S. Bureau of Mines indicate the cost of vegetating the area, which was almost completely devoid of growth and resembled a rock pile, was approximately $360 per acre.

However, a closer examination of the $192 per acre cost ascribed to fly ash indicates that based on an equivalent cost of materials found in the ash and actually added in the reclamation, the area had hidden benefits totaling $529.80 which makes the utilization of this material all the more attractive. A breakdown of this assessment is as follows:

Equivalent Cost of Materials Found in Fly Ash

Item	Percent	Amount in 150-ton Application	Cost
CaO	6.8	10.2 tons 2/	$ 41.60
K_2O	2.0	6000 lbs.)	
P_2O_5	0.5	1500 lbs.) 3/	232.20
Trace Elements	800 ppm	240 lbs.)	
Fine Sand 1/	85.6	128 tons 4/	256.00
		Total	$529.80

1/ 100 - 14.4 (sum of lime fertilizer, ignition loss) = 85.6% fine sand.

2/ Lime at $4.00/ton.

3/ Fertilizer at $30/1000 lbs.

4/ Fine sand at $2/ton.

The cost story at Stewartstown, admittedly a difficult area to work in, is very much in line with costs estimated recently by a prominent surface mine operator who stated that "concurrent with mining, the per acre cost of reclamation is about $500."

Another individual associated with the industry estimates a good rule of thumb figure for reclamation as $700 to $1,000 per acre – $500 for earth moving and $200-$500 for seeding, fertilizer, soil conditioning.

Reclamation of surface mine spoil and coal mine refuse with fly ash produce the following benefits:

- Partial neutralization of acidic spoil and refuse materials.
- Soil texture changes increase moisture holding capacity and pore space to improve root growth conditions.
- The grasses and legumes establish an immediate cover that resists erosion and reduces stream pollution potential.
- Forage yields comparable to yields from undisturbed pastures and meadows as reported by the West Virginia Cooperative Crop Reporting Service.
- Consumption of tonnages of fly ash.

The electric utility industry is vitally interested in working with its suppliers to arrest costs and eliminate pollution. Our costs affect your costs. In fact, the trend in new midwest coal contracts is for the supplier to assume the responsibility for ash disposal.

Fly ash can assist you in your reclamation efforts. Try it! You'll like it!

On the top is an orphaned area near Albright in Preston County, where a special one acre test plot was established in 1966. It was taken in the spring, and the lower picture was taken in the fall of that year. (Photographs compliments of the U.S. Bureau of Mines).

An Address
by
CARL E. BAGGE
President
NATIONAL COAL ASSOCIATION
at the
1972 WEST VIRGINIA
INDUSTRIAL AND MINING SHOW
Civic Center
Charleston, West Virginia
September 13, 1972

It is a privilege for me to participate in this fashion at this Annual Industrial and Mining Show here in the symbolic heart of the American coal field. I wish that I could report to you from my vantage point in Washington that our nation is making as much progress in constructing rational policies for the intelligent utilization of our vast coal resources as the industry, by this magnificent display, is showing in its production. I regret, however, that this is not the case. Indeed, those of you here in West Virginia know all too well as a people directly engaged in or affected by the mining of coal, The American Coal Industry is today in nothing less than a state of siege battered from all sides by broad elements of our political leadership on both the State and Federal levels, the "new primitives" school of environmentalism, substantial segments of the news media, and a host of self-anointed social critics and cynical demagogues who seek to bring this proud and vital industry to its knees.

I want to speak to you today as citizens of a state which, in a very real sense, provides the litmus test on the state of The American Coal Industry. I want to address myself to the frustrations, to the discouragements, yes, indeed, even to the despair which those of us who serve the American public in the nation's coal industry — miner, mining engineer, foreman, mine manager, executive — all now experience and at times feel deeply: (1) as our markets are increasingly legislated out of existence, (2) as our public image is abused and scorned, (3) as we are shackled in our efforts to mine, (4) as we are denied the right to expand and grow, and finally, the ultimate agony which is now occurring here in West Virginia, (5) as our mines close and miners are unemployed. These results have been brought about:

First, by a national environmental orgy which is so overdone in some respects that it is self-defeating to our total national interest;

Second, by an all too often hostile press which either misunderstands or refuses to comprehend the critical importance of this basic industry to our industrial society;

Third, by some state legislators and members of congress who would emasculate the industry by denying it the right to strip mine for coal, even with proper reclamation, at a time when we are in the midst of an energy crisis;

Fourth, by professed friends of mankind who would deny to men who toil and regard it as honorable, their right to continue to work for a living; these social engineers who would relegate to the dole the lives of thousands of honorable men who toil with us in this industry;

Fifth, by political demagogues who seize upon the problems of our industry to launch their political careers and who persist in the rhetoric or defeat to sustain and nurture these careers;

Finally, by the economic regulators and their theoreticians who would, by ignoring the realities of the real world and the implications of fuel conversion technology, deny to the coal industry its obligation to expand, to affiliate, and to sustain itself by access to sources of capital growth so it may meet future demands.

I want to speak to you of the need for public understanding of the problems of the coal industry which have given rise to many of these issues, issues which are not understood by the American public. Those of us here today who share in the proud mining industry have first-hand experience of the truth that nature seldom bestows favors on resource developers. What we produce comes not from an automated production line. What we produce comes hard, from the hard earth, and this, therefore, is a hard business. Perhaps we should, like the British miners, speak of "winning" coal instead of extracting it, for that term is more descriptive of the process. That term may well provide a basis for better public understanding of the nature of the coal industry. Mining for coal is, as the term "winning" implies, essentially a contest with a broad array of hostile natural forces. It is a contest with nature — not to degrade nature but to serve man, and this elemental fact must be more fully understood by both the public and our political leadership.

This lack of understanding of the coal industry and its vital role in our society is a cause for national concern. As almost everyone who reads the newspapers knows by now, the United States is entering an energy crisis. What the newspaper reader does not know — in fact, what nobody knows — is the intensity and duration of the crisis.

Events have gone so far, and mistakes have gone uncorrected so long, that the crisis now is inevitable. Its beginning stages are upon us even today, and the one thing we can say with certainty is that things will get worse before they get better. But we as a nation, through our elected representatives and the government policies they formulate, do have some control over how much worse the crisis gets, and how much time will pass before it gets better. In fact, our government policies will determine whether it gets better at all — whether we are entering a period of temporary shortage or a prolonged and apparently endless round of energy poverty with all its implications for our national destiny and our style of life.

There are several short-term options available to the United States to meet the energy crisis, and these in turn lead to various long-term courses of action.

The option we should logically take is to hold our dependence on foreign energy sources to a minimum both in extent and in time. Meanwhile, we should develop our own energy resources as fast as possible, removing the artificial barriers of policy and technology which inhibit the full use of our native sources of energy.

The course we seem to be taking — or drifting into — however, is 180 degrees removed from logic. As an energy-consuming nation, we are unconsciously handicapping ourselves in almost every possible way.

In the name of consumerism, we have kept the price of natural gas artificially low. This has not only encouraged the use of gas for any and all purposes, to the detriment of other fuels, but is has also destroyed the incentive to explore and develop new fields.

In the effort to respond to the gas shortage, there are projects, now far advanced, to import large quantities of natural gas in liquid form from Algeria and from Russia. Such arrangements may be desirable and even necessary in the short term, in view of the dilemma we have drifted into, but I believe these are commitments we should approach with the greatest caution. Neither the Soviet Union nor the volatile and frequently hostile governments of the Arab world scorn commercial advantage, and selling us gas gives them a long-term claim on enormous amounts of American dollars. But the point here is that some time in the future, **not** selling us gas may seem even more attractive to them. When they control the fuel supply for thousands, perhaps millions, of American homes, does anyone believe the Arabs or Russians would not exploit that face in some future diplomatic face-off?

This is only the latest act of what might be called Uncle Sam's Fuel Follies. At the same time we are turning to the Middle East and to Russia for natural gas, we are greatly increasing our purchases of Middle East oil. I speak here principally of residual fuel oil, the bottom-of-the-barrel fuel which competes with coal from West Virginia and elsewhere in the United States. In the late 1950's and early 60's, residual oil imported from the Caribbean steadily eroded coal's utility and industrial markets on the East Coast. The contest was chiefly on the basis of price, and even in those days of low prices, oil generally won. Integrated oil companies could sell resid at whatever price was necessary to undercut coal, and make up any loss on other products; coal companies, selling only coal, could not handle that kind of competition.

Beginning in the middle 60's, however, the battle began to be fought on new grounds. Increasingly stringent air pollution controls began to push coal out of many of its remaining East Coast markets. The replacement fuel was residual oil, which could be desulfurized — at a price — if it were the normally high-sulfur oil from Caribbean fields. By now, the Caribbean fields are producing at capacity, and the new supplies which are entering this country to meet demands for low-sulfur fuel are the naturally low-sulfur oil from Africa and the Middle East. And it is from these sources that future supplies will come.

Thus the pending imports of liquefied natural gas will only compound the dangers already imposed by oil imports.

We are already making an increasing share of our petroleum supply the hostage of Middle East governments, to an extent that deeply worries our own state department. James Akins, Director of the State Department's Office of Fuels and Energy, told the National Coal Association Convention last June that if present trends continue, we will be importing half our petroleum in 1980, most of it from the Middle East, and we will — as he put it — "find it very difficult to conduct a foreign policy with the degree of independence we would like."

A second danger from fuel imports threatens the national economy. The recent projection by the National Petroleum Council of our energy needs in 1985 indicates a need for 14.8 million barrels of imported oil daily by 1985, which would mean $19 billion we would be spending each year for foreign oil. For that same year, 1985, The National Petroleum Council projected a demand for natural gas so large that, if the shortage had to be made up by gas imports, we would be spending another $25 billion per year. That makes a total of some $45 billion per year for foreign fuel. The effect on our balance of payments would be utterly devastating. The administration has been highly worried over a trade deficit which topped $3 billion last year, but we are dealing here with expenditures for fuel imports alone more than the value of all our exports in 1971.

Such massive energy needs for the future should, in a rational world, create great new opportunities for coal. After all, while the reserves of petroleum and natural gas are running critically short, we have coal in great abundance — more than one and a half trillion tons mapped and explored, and the U. S. Geological Survey says there is probably that much again waiting to be found.

West Virginia alone has about 100 billion tons of coal. Figuring half of that coal to be recoverable, West Virginia could supply all the United States at current production rates for the better part of a century.

However, under short-sighted government policies — or lack of policies — coal is being treated as if it were not most of the solution, but part of the problem.

The simplest-sounding solution is, "burn low-sulfur coal." This is the answer often uttered in the past by environmentalists — and by many members of congress and by the Environmental Protection Agency. It has good historical background — when Marie Antoinette was told the French peasants were complaining that they had no

bread, she had the answer — "let them eat cake." But there wasn't that much cake. And there isn't that much low-sulfur coal — certainly not in the areas east of the Mississippi where most of our industrial coal is mined. Only eight per cent of the reserves in the east have a sulfur content low enough to meet the EPA standards for new plants — and the bulk of that low-sulfur coal is owned by steel companies and committed to the metallurgical market.

Therefore, to meet air quality standards with the use of coal, the sulfur must be removed from coal either before burning or afterward. Improved washing of coal and other methods of removing pyritic sulfur do not clean up coal sufficiently, because they do not reach the organic sulfur which is chemically bound to the cole molecule. That requires chemical change, which occurs in burning, converting the sulfur to sulfur oxides.

Twenty or more processes have been developed for taking sulfur oxides out of stack gases. Several of these are undergoing large-scale tests on units of electric generating plants. However, it takes time to perfect these processes, manufacture the equipment and install them. Thus, sulfur dioxide removal equipment is a promising interim solution, but is is not yet ready, and will not be installed in significant amounts until late in this decade.

That leaves the alternative of taking the sulfur out of coal in a chemical change before combustion. Here the prospects are bright, but the timetable is even longer. One avenue is the solvent refined coal process developed by the Pittsburg and Midway Coal Mining Company under contract with the Office of Coal Research. This produces a fuel extremely low in ash and sulfur it has a low melting point and can be handled either as pellets or as a fluid. OCR obtained funds this year to begin a pilot plant at Tacoma, Washington, and only last week a group of Alabama utilities and the Edison Electric Institute announced plans for a second pilot plant in Alabama. Ground has not yet been broken for these pilot plants, so it is obvious that commercial application of the process is several years away.

Coal's answer to the natural gas shortage is to make a sulfur-free synthetic gas from coal. We have all heard a lot about the process, or family of processes, for converting coal to pipeline-quality gas. At least four methods are in the pilot plant stage. Just last month, I was privileged to attend the dedication of Consolidation Coal Company's Lignite Gasification Plant at Rapid City, South Dakota. In July I was present at the ground-breaking for a pilot plant at Homer City, Pennsylvania, which will use the bi-gas process developed by Bituminous Coal Research, Inc., NCA's research affiliate. As Federal Power Commissioner, I had the privilege of participating in both the ground-breaking and dedication of the Institute of Gas Technology Pilot Plant which is operating today in Chicago.

These processes are intended to produce a high-BTU gas, of 900 or more BTU per cubic foot, compatible with natural gas. Their economics will require, it now appears, that they be employed in mine-mouth plants in the great coal fields of the west, where hundreds of millions of tons of reserves can be assembled in a contiguous block for the life of the facility. Thus, few if any of them are likely to be installed in West Virginia. On the other hand, by the time their gas is ready for market — probably in the early or middle 1980's — the demand for it will be so great that it will probably go entirely to home heating. Thus, the production of high-BTU gas from coal is unlikely either to add to or subtract from the industrial markets for West Virginia Coal.

Utilities are already ordering combined cycle units for use with other fuels, and the prospect of merging this concept to low-BTU coal has received much attention, including that of Senator Jennings Randolph. OCR has obtained some funds for low-BTU gas research. Amax Coal Company, Westinghouse and Public Service Company of Indiana plan a test installation, and Commonwealth Edison of Chicago has proposed joining other utilities in still another. In short, the low-BTU gasification process, either by itself or with the combined cycle, may prove to be a real boon to the coal producers of the east, including those of West Virginia.

However, that lies in the future, and today the coal industry, here and elsewhere, is hard pressed. Today the nation faces an energy crisis, and yet our most abundant fuel is already regulated out of many markets. We import foreign oil, at increasing risk and expense — and in West Virginia, mines are closing and men are being laid off. We negotiate with uncertain foreign sources for natural gas, but the immediate future of coal is so uncertain that investors hesitate to finance new mines with no assurance of a market. Prospects for coal look good in the decade of the 1980's, but to coal men that is like being promised a medal posthumously. This is 1972, and the crunch is now.

You and I are concerned in an immediate way because of the coal industry and its importance to West Virginia. But we are also consumers of energy, and we are also Americans, and we have a concern that our nation have an adequate supply of the energy which is the lifeblood of a modern industrial state.

The coal industry has long and earnestly advocated a national energy policy. We have urged a sound, comprehensive program, based primarily on domestic energy sources, to assure our country adequate supplies of energy in harmony with the need for an improved environment.

I wish I could report victory; I cannot. I can report progress. Thanks in good part to the efforts of Senator Randolph, the Senate Interior Committee is holding extensive hearings on energy policy.

The compounding factor in the energy dilemma has been our national enthusiasm for an improved environment. This has resulted in sweeping and stringent legislation and accompanying regulations, written with more zeal than foresight. The most mischievous of these high-hearted efforts to improve the world is the Clean Air Act. Admittedly, the quality of our air in many metropolitan centers and some industrial sites needed — and still needs — improvement. But the act and the EPA regulations issued under it set standards so high and timetables so short that there is simply no way of attaining them with the available supplies of domestic fuels and available technology.

Thus in the name of clean air our government is forcing a major — and vastly significant — change in our foreign trade patterns, our national economy and our national security posture. It is time to re-examine our priorities. We need clean air, but what are we willing to pay for it? The direct cost in dollars to the consumer will be painful but probably bearable — but what other risks are we prepared to take in terms of trade deficts and loss of national independence?

The National Coal Association has launched another attempted injection of realism, this time in the courts. You may be familiar with the Pratt Decision, in which a Federal District Court, acting in a suit filed by the Sierra Club and other Environmental Groups, has enjoined EPA from approving any state air quality plan that would permit any significant deterioration of air quality anywhere, even if the resulting degree of pollution is well below the most stringent federal standards.

This would mean in effect that you could not build a new coal-burning plant anywhere — not in New York City and not in the remotest corner of Alaska. Nor, I should add, could you build an oil-burning plant, either.

NCA has filed an **amicus curiae** brief intervening to show that the decision, if allowed to stand, could have a catastrophic effect on energy development essential to meeting human needs. We think that while the congress has passed air pollution control laws, it has not made them supreme over all other issues. We believe that the interests of the United States in a secure and ample energy supply are paramount.

Therefore, we have advocated that some agency besides EPA have a voice in these crucial decisions. Since they do deal with matters concerning our national welfare and our readiness to meet emergencies, we have suggested that the Office of Emergency Preparedness make the final decision when an existing plant is faced with the necessity to import foreign fuel to meet air quality standards. In such a case, OEP should decide whether the ambient air quality in that region requires this additional strain on our economy and security.

We also advocate that new plants be allowed to burn domestic fuels, including coal, with a provision that they must install necessary air pollution control equipment when it is proven and commercially available. On the other side of the coin, once a plant has complied with this requirement, it should be considered in compliance with the law so long as the equipment is properly maintained and operated, or at least until it is amortized under the tax laws.

The question of strip mining is a controversial one throughout the nation and particularly here in West Virginia. Too often there is a public and political outcry to ban strip mining entirely without regard to either the necessity or the consequences of such an action. These demands ignore the fact that surface mined land can be reclaimed to useful purposes. I am the first to admit that the industry has made mistakes in the past, and that in many cases these mistakes are persistent and highly visible. I also concede that an active strip mine, before the land is graded and revegetated, is unattractive to the eye. So is a highway or almost any construction job.

Responsible coal operators are effectively reclaiming mined land now to productive use, and that effective regulation will make sure that all operators achieve this result. The National Coal Association has supported legislation for effective regulation of this sort. We further maintain that strip mining should not be prohibited out of hand. The Regulatory Authority should decide on the basis of each permit application and reclamation plan whether the land in question can be effectively reclaimed by the methods proposed. If it cannot, the permit should be denied, **in that case,** until a satisfactory plan is offered and approved. This is far more logical than any arbitrary ban on stripping which disregards the prospect of reclamation and forever locks up our strippable coal resources out of man's reach.

The Coal Industry in West Virginia is a national leader in the number of acres of mined land reclaimed in recent years. In 1971 alone, reclamation work was performed on more than 20,000 acres, and the industry is not only increasing the amount of grading and revegetation, but is using its forces in a more trained and sophisticated manner.

Last week in Washington, the House Interior Committee approved a strip mine bill which would prohibit mining on slopes above 20 degrees. NCA has strongly opposed the 20 degree restriction on grounds that it totally ignores the fact that effective reclamation can and is being done on such slopes. This provision would mean the end of surface mining in much of Appalachia, including West Virginia. Our preliminary estimate is that it would eliminate a quarter of the nation's coal production.

I wish I could report victory on this fight, but the issue is still in doubt. I can only say that we need all the help we can get. Before the final decision, I hope that members of congress will learn the views not only of those to whom surface mining is important — and this includes thousands of West Virginians — but those who realize the importance of a secure and adequate energy supply. And that is everyone.

In short, the coal industry is beset on many sides — by strip mining legislation, by air pollution control, by critics of all sorts, and by ill-considered government actions. Those who are for whatever reasons chipping coal out of the National fuel base — and some would carve it out with one stroke if they could — must realize that there won't be much of a base left when they are finished. What they don't realize or won't heed is that wholesale restrictions on coal represent the rejection not only of an environmentally problem-ridden solid fuel but of the most promising future source of the prized and environmentally acceptable fluid and gaseous fuels.

The United States cannot declare — as the President did last June in his energy message to congress — that coal gasification is one of our priority needs without giving a corollary priority to healthy development of the coal source — its redemption as a fuel for today's markets in order to provide a basis for its conversion tomorrow.

There is no panacea for these problems. Perhaps the closest approach to one would be a national energy and environmental policy, which would give a proper priority to the need for adequate energy from domestic sources, compatible with our environmental goals.

But if there is no panacea, there is hope. Increasingly, the hard facts of our energy dilemma are beginning to become apparent to responsible officials in Washington and elsewhere. If they have not yet experienced a great dawn of understanding, they are glimpsing the truth with increasing frequency. And since coal is our only truly abundant energy source, the only means of assuring our energy independence in the future, we may hope that the dawn of understanding will not be long in coming.

The Experts Evaluate Mountain State Reclamation

The 1972 Interagency Evaluation of Surface Mine Reclamation in West Virginia was conducted this past July 17-21. The annual week-long tour covered Barbour County in the north to Raleigh County in the south and is designed to bring together representatives from the various state and federal agencies involved in reclamation and research to evaluate progress in the field.

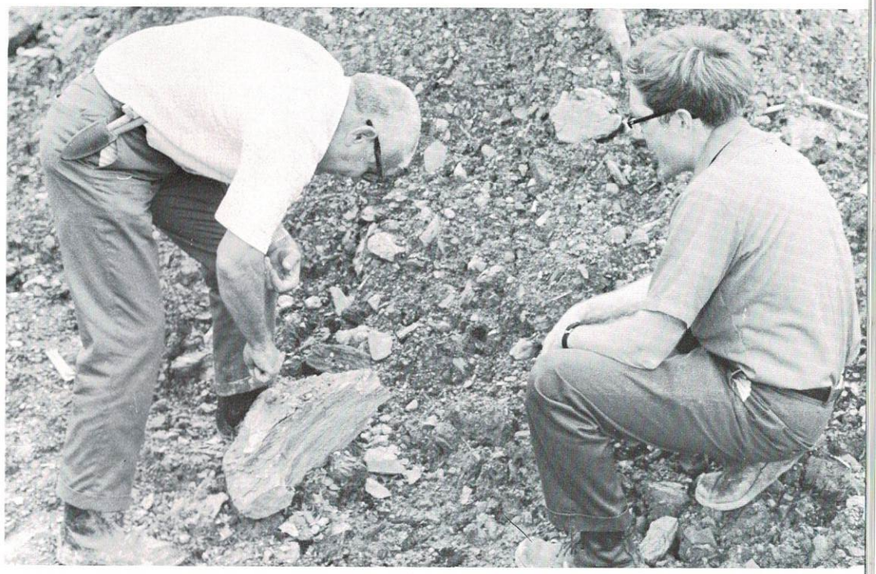
Groups participating in the evaluation were: Department of Natural Resources, Soil Conservation Service, Soil Conservation Districts, West Virginia University, U. S. Department of Agriculture, U. S. Forest Service, U. S. Bureau of Mines, Agricultural Research Service, West Virginia Surface Mining and Reclamation Association, various industry representatives and several members of the press.

First stop on Monday morning was this newly constructed silt pond in Barbour County. The group scrambles down over the hill to get a closer look at work done by Barbour Coal Company this spring.

Jim Compton, left, President of Grafton Coal Company and an interested operator talks shop with Chief of Reclamation, Ben Greene.

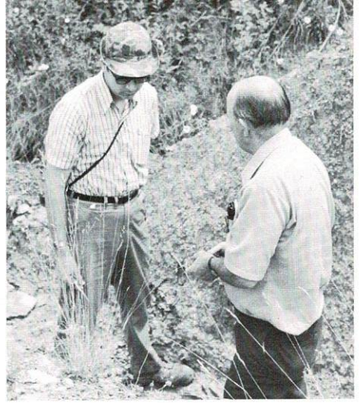
At every site participants took time to check over maps and pre-plans before beginning the inspection. From the left; Owen Carney, DNR, Joe Parker, DNR, Jim Clevenger, Bureau of Mines, Walter Grube, WVU School of Agronomy, and Frank Glover, SCS.

The man in charge of this operation is Barbour Coal Company President, Arch Sandy, (center). Here he gets some advice from Dr. Richard Smith of the WVU School of Agronomy. Dr. Smith has done extensive research in mined land reclamation.



Later in the day on property owned by Wesgin Mining Company, Dr. Smith checks the overburden and spoil material with Dave Atchinson, reclamation specialist for the WVSM&RA.

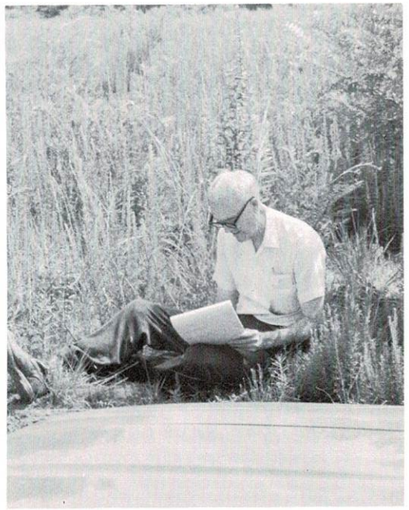
Summit conference. Reclamation Division personnel crowd around to get a closer look at the maps and pre-plans. From the left (sitting) Joe Parker, Pete Pittsenbarger, J. D. Brackenridge; (standing) Charlie Sheets, Owen Carney and Ben Greene.



At each stop, different members of the group studied revegetation, forestry, water quality, soil stabilization, engineering, wildlife and other areas of interest. Agronomist Walt Grube and John Gorman of the Soil Conservation Service check the pH of the soil.

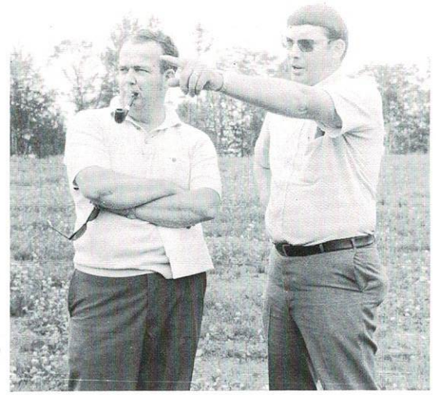
On a site recently completed near Summersville, A. S. Coppellari explains the methods used in back fill and regrading and preparing the land for seeding. Revegetation work was done by Willco, Inc. That's company president Ed Williams on the extreme left.

Excellent out slope stabilization is evident here, as the men split up into the various study groups.



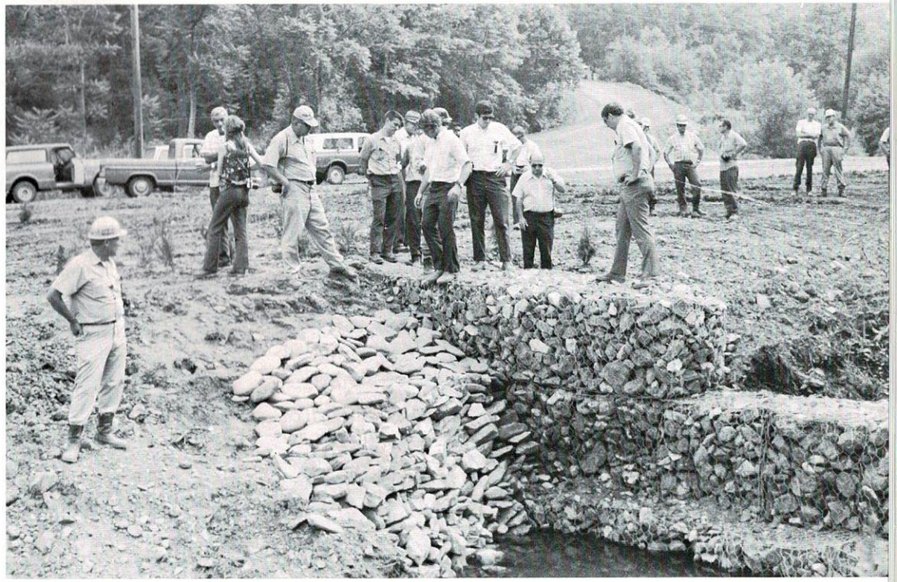
The press was invited along for the first time but only Jim Comstock of the W. Va. Hillbilly, Wendell Cochran of the Morgantown Post and Mary Walton of the Charleston Gazette were in attendance. Comstock, who traveled with the group for four days, sits in grass planted in 1967 to catch up on his notes.

Reclamation Division Chief Ben Greene and assistant Pete Pittsenbarger discuss the results of reclamation work recently completed in Greenbrier County. This stop was on the third day of the week long tour.



Joe Beymer, northern area assistant to Greene, looks over another area in Greenbrier County. This job was reclaimed in the spring of 1971 and the high wall was eliminated.

It's a gabion! These silt retarding structures were built by Ford Coal Company in Kanawha County and they're getting the once-over from the group. Mary Walton of the Charleston Gazette is just to the left of the dam.



SURFACE MINING:

FACT VS. EMOTION

Editors Note: The following is an editorial by Anthony Harrigan, Executive Vice-President of the Southern States Industrial Council. For additional copies write Mr. Harrigan at 918 Stahlman Building, Nashville, Tennessee, 37201.

When an oil spill or well fire occurs, no one suggests that drilling for oil be forbidden. It would be madness to do so, of course, as the country cannot operate without oil. Nevertheless, opponents of surface mined coal are determined that a ban be applied to that method of coal production. Sen. Gaylord Nelson (D.-Wis.) is the author of a bill that would outlaw strip mining within six months of enactment. Similar legislation is being advanced at the state level in West Virginia.

Protests against strip mining have fired the imagination of some sections of the public, in large part because the public has been exposed to emotional talk rather than the fact. A sample of the emotional extremism on the surface mining issue is to be found in a new book entitled "My Land Is Dying," written by Harry Caudill, a Kentucky lawyer and protest leader. Mr. Caudill is a specialist in a doomsday talk who is being built into a media hero.

A recent column in *The Washington Post*, reviewing Mr. Caudill's book, employs all the emotional trigger words to shoot down the surface mining industry. The tear-jerking article referred to "the defenseless and silent hills of Appalachia" and "ruthless coal companies." Nowhere in the article is there any reportage of the income surface mining produces for the people of the Appalachian states or any discussion of the remarkable land reclamation efforts conducted by the coal mining companies.

As for Mr. Caudill, his bias is showing. In his book, he writes: "Wherever the profit motive is still exalted as a virtue, the urge to acquire and to consume becomes a frenzy." The vast majority of the American people believe in capitalism and subscribe to the effectiveness and propriety of the profit motive. So Mr. Caudill is out of step in rejecting the foundation of free enterprise.

Mr. Caudill apparently is against more than surface mining in his native Kentucky. At one point in his book, he speaks of Congress' "bland unconcern that has caused millions of citizens to despise their own government." Those are very strong words, and they should be borne in mind the next time Mr. Caudill speaks out against surface mining. His real antagonism seems to be against our national system, not simply coal mining companies.

Mr. Caudill dismisses talk of an "energy crisis" as propaganda on the part of coal miners. He pays no attention to the fact that this developing crisis is cited by authorities in no way connected with coal mining, such as Nobel Prize-winning physicist Ralph E. Lapp. Recently, gas transmission companies have contracted for huge quantities of liquified natural gas from Algeria because of the energy shortage in the United States.

Under the circumstances, the United States *must* have surface-mined coal to meet its needs both in domestic use and trade. Coal has a tremendous potential for West Virginia and Kentucky.

Profs. H. C. Hottek and Jack Howard of the Massachusetts Institute of Technology recently reported that "the United States will need gas from coal at a time not yet established, but very probably soon, on a scale that will dwarf all other industry of comparable chemical content." The gasification process is still being developed, but pilot plants may be in operation before long.

Given this national need and the opportunity for new economic opportunities through coal for the people of Appalachia, it is terribly important that the Caudill-type attitude not prevail and become hardened into a reactionary anti-surface mining law.

As for the allegations of a blighted countryside, these have to be countered with the facts concerning reclamation. The West Virginia Surface Mining and Reclamation Association has set forth facts which needed to be presented nationwide. "In recent years," the association reported, "surface mining men have reclaimed more land than they mine. Now, because of ever-more sophisticated planting methods, mined land can green up within a year." Furthermore, the industry regularly pays money into a special state fund earmarked "Orphan Bank Reclamation, meaning areas strip mined in World War II and never reclaimed. In time, all so-called orphan banks will be gone.

There's no reason why Appalachia can't retain its beauty and its surface coal mining industry as well. *The anti-strip mining lobby, however, would turn Appalachia into a true wilderness, a region empty of energetic people and economic opportunity.* Coal is a great natural resource that must be used for the benefit of both the states concerned and the nation at large — and surface mining is the most efficient way to extract much of the country's coal resources.

PREPLANNING ON SURFACE MINE LAND

By Frank W. Glover, Jr.
Asst. State Resource Conservationist
U. S. Soil Conservation Service

Preplanning is the process of foreseeing reclamation problems and determining measures to minimize off-site damages during the mining operation and to provide for quick stabilization after mining.

Before mining begins is an excellent time to plan for removal in a way that will do the least damage to the site and to the surrounding area.

Before mining is also an excellent time to consider future use of the area. What needs to be done to an area if it is a potential housing development is considerably different from what should be done in an area where later use will be climax vegetation (Northern Hardwoods).

Potential of the area after mining for a variety of uses should be considered. For example, what is the possibility of using the area for pastureland, Christmas tree production, timber land, improved wildlife habitat or recreation areas of other kinds?

A very important consideration during preplanning is the maintenance of water quality during and after mining.

The need for preplanning prior to applying for a permit is to determine whether an area once disturbed can be stabilized. This is prerequisite to further development. If it is determined that satisfactory stabilization is possible (and a decision is made to go ahead with mining) the objectives or preplanning then are control of off-site erosion, effective silt control, proper spoil placement as determined by the physical and chemical characteristics of the site, and establishment of protective vegetation over the disturbed mine area.

Information obtained by test boring, actual prospecting with a bulldozer, and visual observations on the area are necessary to determine some of the problems associated with the disturbance. It is essential that we have accurate information about the character of overburden material. Old surface-mined areas in the vicinity offer an excellent opportunity to check the physical and chemical characteristics of proposed spoil material. An existing mine opening may provide an opportunity to investigate characteristics of the overburden material and the thickness of the coal seam as well.

It is generally true that material favorable to vegetative growth exists in most areas for a depth of 20 feet from the original soil surface.

Without previous mining and without an old mine opening, preplanning investigations may include core borings and/or prospecting cuts made with a bulldozer to examine the overburden material.

The characteristics of the overburden to be recorded include slope, pH, and stoniness. Each site will be unique with respect to pyritic materials, acid sandstone, strike and dip of coal, and slope stability.

The chemical nature of the spoil material may require more careful stacking during mining. Where this material is highly acid or has potential to produce acid, positive identification should be made, with some decision on what will be done with it. Burying the material may be the only way to provide surface material favorable to plant growth. Where acid material is only moderately acid-producing, perhaps soil amendments such as agricultural limestone may be used with satisfactory results.

Access roads shown on the proposal maps available for preinspection should be checked for grade and drainage requirement. Both of these are very important. How the road can be maintained during mining and abandoned (put to sleep) after mining are important aspects of access road location.

E. V. Wickline and Dave Dyer of the Soil Conservation Service discuss preplanning for a sediment control basin with Messrs. Riffle and Lambert of Appalantic Coal Company. The basin will trap sediment from about 60 acres of land which will be disturbed during the mining operation.

During preplanning, the natural drainage pattern is a vital consideration. Plans need to be made to drain the active area to a natural water course. The problems with this are: How much additional water will the waterway have to carry? Will the additional water cause erosion in the waterway? Can this erosion be controlled?

At the same time, provisions for control of sediment need to be considered. Possible impoundment sites need to be located, and decisions made about construction. After this, some design information about the impoundment site is a part of the preplan. This includes size of drainage area above the impoundment, with some calculations of storage capacity based on erosion rate.

During preplanning, the cropline and extent of disturbed area as estimated on the proposal map should be studied. If timber includes merchantable products decisions will be made so that this harvest can be made before the mining operation begins.

Finally, during preplanning, plans should include maximum use of vegetation to aid in control of off-site damages. This includes vegetative treatment for access roads very early during the mining operation. The present law requires seeding on cuts and fills on all haulageways during the first growing season after they are built. Seeding and mulching on any area where there will be no further disturbance and on areas that will not be used for 30 days or longer should be considered.

The species used depends on: future land use, the characteristics of the area (pH, slope, and stoniness), the time of year, and how long vegetation must be effective. Hence, fertilizer, seed, tillage, and mulching are all considered during the planning.

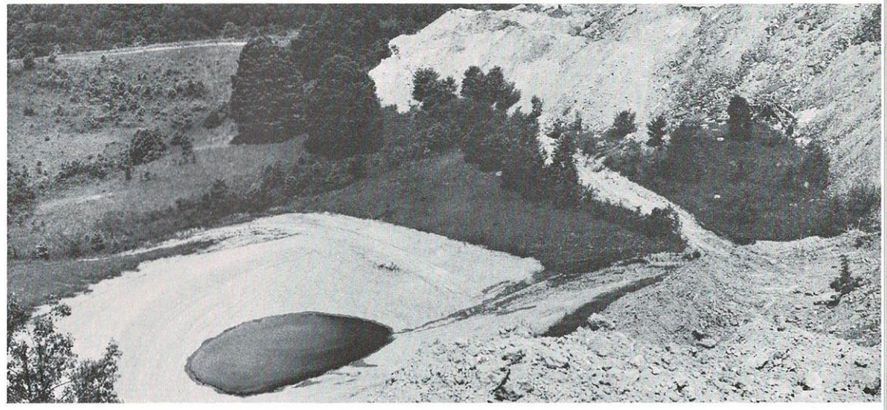
Mechanical measures to reduce effective length of slope and to supplement subsequent vegetative practices should be considered.

In summary, preplanning involves locating access roads, deciding on major watercourses, choose the measures required to control sediment, and determining proper spoil placement. The preplan would include plans for establishing vegetation on all disturbed areas as soon as possible.

The operator making a request is responsible for developing a preplan.

Technical assistance is available to surface mine operators from the Soil Conservation Service through West Virginia's 14 local soil conservation districts. Tentative working arrangements to utilize SCS technical assistance are as follows;

Watershed Structure 6, Polk Creek Watershed, protected from sedimentation by two dams built expressly for that purpose. Structures were constructed in spring 1971 by company doing the surface mining. SCS designed, laid out and supervised construction of the dams. All work was done at the insistence of landowner and paid for by surface mine operator.



New sediment pond constructed by King Knob Coal Company to stop and contain eroded soil from strip mining above the pond.

1. The operator will be given an opportunity to become a cooperator with the Soil Conservation District during the pre inspection visit.
2. The SCS district conservationist, the DNR reclamation inspector, and the surface mine operator may discuss various aspects of the reclamation plan, grading, drainage, sediment control, location of access roads, and establishment of vegetation.
3. The surface-mine operator will make a decision on what he plans to do to facilitate surface mining and reclamation. These decisions are recorded as part of the official request for a surface mining permit. The district conservationist may help the mine operator record the various parts of the plan.

About the Association

GREENBRIER

If you attended the annual meeting at the Greenbrier you probably agree with that old saying, "When it rains it pours," because we certainly had our share during our stay in White Sulphur Springs. But even if the outdoor activities were dampened, no one's spirits seemed to be, as the fun moved inside.

From everyone's comments (and the bar bill) the first annual Kate's Mountain Lodge Clam Bake was a smashing success for which much of the credit must go to Lawson Hamilton for providing us with the great talent of Ronnie Prophet.

Equally successful was the banquet on Saturday night, which was highlighted again by our master of ceremonies, Lawson Hamilton, and the presentation of awards.

We'd like to extend our thanks to Fil Frasher, Paul Hamilton, Tom Horn and Mrs. Cappellari for their help in setting up the various tournaments and events and wish everyone better weather in '73.

We'd also like to send a special thanks out to everyone who attended because it's the people that make the convention. We hope to see all of you again next year.

The main order of business was the election of new officers and Board of Directors for 1972-73, which took place Friday morning. Those either newly elected or continuing to serve were:

President	– James L. Wilkinson
First Vice President	– C. E. Compton
Second Vice-President	– James C. Justice
Secretary	– F. B. Nutter, Sr.
Treasurer	– Lawson W. Hamilton, Jr.

New Board Members

John C. Anderson	John Kebblish
Jack R. Fairchild	Arch F. Sandy, Jr.
Alan A. Fischer	Earl Scholl
Bernard J. Folio	Lawrence Streets
Tom L. Horn, Jr.	John K. Turner
Frank D. Jennings	Frank Vigneault
C. I. Johnston	P. H. Weber

WE'RE NO. I

As you all know, West Virginia has led the nation in land reclamation during the past four years and reclaimed a record 20,369 acres last year alone. Everyone in the various state and federal agencies involved and the industry, has worked hard to reach this goal and should be proud of their achievements. But, we should take even more pride in the fact that we are not letting up. From all indications and early reports from the Department of Natural Resources, reclaimed acreage will increase again this year, possibly to nearly 25,000 acres. This should be more than enough to make the Mountain State the nation's leader for the fifth straight year.

WORKSHOPS

The West Virginia Surface Mining and Reclamation Association has initiated a program of technical workshops in an attempt to relay all the latest information on mining and reclamation advancements to its members.

The sessions are being held weekly, alternating between the northern and southern portions of the state, and company officials are encouraged to get their personnel out to these meetings. They should be of benefit to everyone.

The Technical Committee has worked out the schedule as follows:

AGENDA
September 25 – Kingwood – Preston Country Club
7:00 P.M. – 10:00 P.M.
Presiding – Lawrence Streets
"Preplanning and Permit Processing"

1. Long Range Planning & Property Development – Dick Vande Linde
2. Individual Permit Planning and Legal Aspects – Joe Beymer
3. Technical Assistance Available – Frank Glover
4. Summary – Question and Answer Period – Floyd Stiles
5. Industry Executive Session – Dick Vande Linde

October 2 – Beckley – Ramada Inn
7:00 P.M. – 10:00 P.M.
Presiding – Dave Ozmina
"Preplanning and Permit Processing"

1. Long Range Planning & Property Development – Dick Vande Linde
2. Individual Permit Planning and Legal Aspects – Joe Parker
3. Technical Assistance Available – Frank Glover
4. Summary – Question and Answer Period – Penny Thomas
5. Industry Executive Session – Dick Vande Linde

October 9 – Bridgeport – Holiday Inn
7:00 P.M. – 10:00 P.M.
Presiding – Mitch Sorbello
"Water Quality Control"

1. Drainage System and Design Criteria – J. D. Brackenrich
2. Mine Drainage Application (Regulation 7C-01) – Water Resources Representative
3. Cleaning and Abandonment – Dave Atchinson
4. Summary – Question and Answer Period
5. Industry Executive Session – Dick Vande Linde

October 16 – Charleston – Daniel Boone Hotel
7:00 P.M. – 10:00 P.M.
Presiding – Frank Jennings
"Water Quality Control"

1. Drainage System and Design Criteria – J. D. Brackenrich
2. Mine Drainage Application (Regulation 7C-01) – Water Resources Representative.
3. Cleaning and Abandonment
4. Summary – Question and Answer Period – Frank Gaddy
5. Industry Executive Session – Dick Vande Linde

Note: Dinner will not be served at any of the above meetings.

LADIES AUXILIARY

The Surface Miners Auxiliary has been involved in a number of events during the summer months.

The ladies have assisted in a few community projects such as volunteer work at hospitals and donations to civic projects.

The ladies in the South assisted with the press tour and open house sponsored by Tracy Hylton. The "open house" was a big success and the ladies successfully handled the food and beverage for some 12,000 people.

The Auxiliary aided with several tours – the most recent being three busloads of Young Democrats. Also on this tour were Si Galperin, Bob Handley (President of Citizens to Abolish Strip Mining), representatives of the press, and Jay Rockefeller's younger sister.

They also helped in several letter writing campaigns designed at stimulating the membership into correspondence with their Representatives and Senators. The most recent "letter campaign" urged the membership to express their views concerning the proposed 20 degree slope requirement.

The most important accomplishment of the summer was the completion of the surface mine display. The display (4' x 4' x 12') was designed by an engineer at Vecellio and Grogan. The artistic touches such as painting and "sticking" of some 1,000 trees were done by Auxiliary members. The trucks accompanying the display were donated by various companies who would also be effected by the abolishment of surface mining. The display is representative of a lot of time and effort and the Auxiliary would like to thank all who helped in some way.

The display was on exhibit the entire week (August 18-26) of the State Fair in Lewisburg, West Virginia. It is estimated that approximately 7,000 people observed the display, were given literature, and a step-by-step explanation of surface mining. The display was again on exhibit September 11-14 at the Industrial and Mining Show in Charleston, West Virginia. On September 16, the display was on exhibit at the Potato Festival at Summersville. On all occasions the display has been well received, and a special thank you should be given to all the men and women who have spent endless hours travelling with the display and explaining surface mining to an interested public.

The display will be on exhibit at the Grafton Coal Company. September 27-October 1, in Kingwood for the Buckwheat Festival, and October 4-7 the display will be in Elkins for the Forest Festival.

ACID TREATMENT DEMONSTRATION

A demonstration of mine drainage treatment equipment was held near Mt. Storm in Grant County on August 2 and 3, in conjunction with a meeting of the Steering Committee for Surface Mine Research.

The demonstrations were set up through the joint effort of the Department of Natural Resources and the West Virginia Surface Mining and Reclamation Association and were designed to bring together the various industry, government and research groups to see a practical application of the latest mine drainage equipment.

The treatment technology and equipment on display were made available by Reclamation and Air Survey, Inc. and the Shirley Machine Company, with costs running from a few hundred to several thousand dollars. The methods of pH adjustment varied from dry lime and lime slurry treatment to liquid caustic soda, and limestone chips.

Attendance at the two day affair was less than expected, but the operators who were on hand found that acid drainage problems can easily be solved with the methodology and equipment that is available today.

INDUSTRY IN THE NEWS

YOUNG SEES DECLINE IN WEST VIRGINIA

Stephen G. Young, President of the West Virginia Coal Association, said recently the state's coal industry "is in a period of steady decline, largely because of a host of economic problems."

He said mine closings and layoffs in West Virginia this year have cost the jobs of more than 1,000 mine workers. Included in this number, he said, are 396 men affected by the closing of three Clinchfield Coal Company mines in Harrison County last month. The decline in coal hurts other areas of the economy, he added: railroads have laid off hundreds of workers, and businesses which provide supplies and services to the coal industry have cut back their work forces.

Mr. Young blamed the decline chiefly on higher operating costs and an unfavorable market for West Virginia coal. In many mines, operating costs have more than doubled since 1967, he said; he blamed part of this on "the contradiction and unreasonableness" in interpretation and enforcement of state and federal health and safety laws.

"Coal companies are continually faced with situations in which an inspector one day approves a condition, then a couple of days later a different inspector cites as a violation the very condition which was changed to comply with the first inspection," Mr. Young said.

"Let me clearly emphasize that we are not opposing laws and regulations aimed at the ultimate of safety in coal mining. We support and endorse them. But there must be a cooperative and consistent enforcement which would eliminate unnecessary and unreasonable operating costs or duplications of costs," he said.

Mr. Young added that worker productivity has declined steadily in underground mining, from 16.22 tons per man-day in 1967 to 11.51 tons in 1971. Wildcat strikes continue to be a problem, he said, costing more than 218,000 man-days last year apart from the 45-day contract strike. Environmental costs of preventing air and stream pollution have risen, he continued.

Markets for metallurgical coal from southern West Virginia have fallen off both here and abroad, Mr. Young said, and "the bottom has literally dropped out of the market" for utility coal from northern West Virginia, which has a high sulfur content.

"The coal industry has been faced with every conceivable problem and challenge," Mr. Young said. "How the industry, its employees, government and West Virginians in general face these problems and challenges will determine the course of the industry and West Virginia's economy."

STUDY FINDS UTILITIES TAKING BAD RAP ON SO_2

Power plant stacks have taken the brunt of criticism for sulfur dioxide emissions because they are more visible than other community offenders, an environmental consulting firm said in a recent interview with ELECTRICAL WORLD.

Environmental Analysts Inc. made an air quality study for Long Island Lighting Company and reported that if the utility's power plants emitted no sulfur dioxide at all, the drop in annual average levels of the gas on New York's Long Island "would be almost imperceptible."

EAI Chairman Merril Eisenbud, former New York City environmental protection administrator, said that requiring utilities to use low-sulfur fuels instead of putting the first demand on other sources was a "backwards" approach. He said there is growing appreciation of the fact that "low-sulfur coals are going to the wrong people, and that the electric utilities should be allowed to burn higher sulfur fuels under certain circumstances." In many urban and suburban areas, he said, industrial plants and apartment houses should be required to burn lower sulfur fuels.

James V. Fitzpatrick, EAI President and former Air Pollution Chief in Chicago, said that use of 1 percent sulfur fuel for home heating "has a greater impact on ground-level air quality than the same amount of 1 percent sulfur fuel used by a power station."

Mr. Eisenbud said that up to a short time ago the amount of utility research on sulfur dioxide control was "relatively minuscule, and the amount of present research has been mandated by laws which . . . have in some cases been badly conceived."

MOST 1971 COAL EXPORTS WERE COKING QUALITY

The Bureau of Mines estimates that of the 56.6 million tons of bituminous coal exported last year, 40.9 million tons – 72.2 percent – were used for metallurgical purposes. Japan imported 19.7 million tons of bituminous coal from this country, all of which was of coking quality.

Canada took 17.6 million tons of U. S. coal, of which 6.9 million tons were for metallurgical purposes. The Community nations of Western Europe took 11.1 million tons from the United States, of which 7.4 million tons were for metallurgical use. Elsewhere in Europe, about 75 percent of the 5.3 million tons imported from the United States was for metallurgical purposes.

Of the 2.7 million tons shipped to South America, almost 99 percent was used in metallurgy.

SULFUR LIMITS BOOST OIL IMPORTS, BOM REPORTS

The Bureau of Mines has released a staff report that says, "Energy problems have arisen owing to inadequate supply, and expected new restrictions on sulfur content of fossil fuels will cause even greater shortages."

The report, which was prepared for the Environmental Protection Agency, said that legislative actions regulating sulfur content of imported heavy fuel oils have been responsible for "dramatic increases" in imports of residual oil with less than 1 percent sulfur.

Price was originally the main factor in increasing fuel oil imports, the report said, but now pollution regulations on sulfur content loom as the prime reason for them. And with demand increasing, it added, availability of low-sulfur oil is the most important problem, even above price.

Imports of heavy fuel oils, primarily to the East Coast, have increased dramatically since restrictions were lifted in 1966, the report said. These imports have caused a shift of energy requirements – including plant conversions from coal to oil – and a further dependence on foreign sources, the Bureau staff said.

FULL-SCALE CLEAN AIR COLLOQUIUM POSTPONED

The Senate Public Works Committee headed by Sen. Jennings Randolph (D-W. Va.) announced that the colloquium on the workings of the Clean Air Act of 1970, scheduled for September 20, has been postponed until later in the year.

However, spokesmen for the coal and electric utility industries will meet with Sen. Randolph and representatives of the Department of the Interior and the Environmental Protection Agency for a preliminary conference anyway to define the issues to be explored later.

"The issues to be examined are urgent and we must be certain that there is time to prepare adequately for a thorough examination of the questions," Sen. Randolph said. He said the Committee asked the Interior Department and EPA to participate in the preliminary discussions because of the close relationship of their responsibilities to the subject of the colloquium.

SCHLICK ENDORSES STRIPPING FOR SAFETY

Donald P. Schlick, the Bureau of Mines' Deputy Director for Health and Safety, said recently, "I personally feel that it would be very unwise to ban strip mining of coal. I base my opinion solely on the health and safety advantages for coal miners."

Mr. Schlick, in a letter to the Washington Star and News, said the fatality rate for the past five years in surface mining has averaged 0.57 per million man hours vs. 1.13 for underground coal mines.

"The necessary technology is clearly available, in most situations, to permit the stripping of coal and the subsequent reclamation of the overburden," he said.

"Rather than the immediate banning of strip mining, with all the health and safety as well as economic ramifications that would result from such an action, what is needed is rapid congressional action on the administration's proposed Mined Area Protection Act," Mr. Schlick wrote.

FROM THE BECKLEY POST HERALD

The energy crisis is growing worse, according to government and industry experts, who expect a fuel shortage in the Northeast this coming winter and more brownouts in big cities next summer.

Yet no one is doing anything to head off the fuel shortage except to talk and bicker about it. In fact, what little action has taken place has been in the direction of worsening the situation!

Here in West Virginia, for instance, we have a Democratic gubernatorial candidate, John D. Rockefeller IV, who is demanding the cessation of coal stripmining. So is Ken Hechler, the congressional candidate.

A stripping ban not only would cause capital losses to operators, put strip-mine employes out of work, and generally upset the state's economy, it also would cut the national fuel supply and keep more householders from being warm this winter or having light in cities next summer.

Stripmining certainly needs to be strictly controlled, as Gov. Arch A. Moore Jr. advocates, but to eliminate stripping now, during an energy crisis, would actually be heartless and unmoral as well as uneconomic! Families should not have to suffer without adequate heat this coming winter just to accommodate the political aspirations of Rockefeller and Hechler!

In a long, prime-time television commercial, Rockefeller is shown with his family. He concludes by saying that he wants his children to be proud of what their father does. He adds that he wants them to know their father as a man who keeps his word, so he intends to keep his word on campaign promises.

Perhaps he will. In the past, Rockefeller has talked a lot but done very little, but perhaps he really would keep his word this time and do some of the things he says he would do if he were governor. What if he became governor and stopped stripmining? It probably wouldn't hurt Rockefeller's family but it certainly would hurt a lot of other families in and even beyond West Virginia!

PROGRESS REPORT

Experimentation With Mulches and Soil Stabilizers

William T. Plass
Principal Plant Ecologist
Northeast Forest Experiment Station

The West Virginia Legislature, in January 1971, amended and re-enacted legislation regulating surface mining and reclamation. Section 20-6-10 of this act states mulch shall be applied to all disturbed areas where the remaining slope exceeds 20 degrees from the horizontal. The Division of Reclamation was then obligated to interpret this paragraph, and write appropriate regulations specifying the kinds and amounts of mulch they would accept.

It was apparent that many different materials could be used. The problem was further complicated by the lack of well-documented information on the effectiveness of many commercial products. There were also conflicting recommendations on the rates of mulch to apply. Therefore, the Department of Natural Resources and the West Virginia Surface Mining and Reclamation Association requested the U. S. Forest Service to initiate a testing program under the existing tripartite cooperative agreement.

The purpose of the testing program would be to apply products using the manufacturer's recommendations, then rank each product in terms of each objective. Another criterion for judging a product would be the ease of application and the cost.

The first demonstration was initiated in June 1971. The objective was to determine the effect of several products on vegetation establishment and growth. Rowland Division of Consolidation Coal Company agreed to cooperate in the project.

Results at the end of the first growing season showed that mulching treatments could affect the rate of germination and growth. The long-and short-fibered mulches improved vegetative growth more than the liquid preparations. This test failed to show the necessity of using any of the products for vegetation establishment.

Many of the products could be applied through a hydroseeder as a component of the seed, fertilizer, and wood fiber slurry. Costs for materials ranged from 15 to 300 dollars per acre.

A second demonstration was established in the spring of 1972. The design was changed to include methods to measure sediment yield following the application of several products. A few new products were included, and changes were made in treatments using products applied in 1971.

Ranger Fuel Company, a division of Pittson Coal Company, provided the site, a hydroseeder, and crew, and all the seed and fertilizer. The Finn Equipment Company donated a straw mulcher, a hydroseeder, and an operator. D and D Reclamation Company supplied a hydroseeder. Fifteen companies provided mulches and soil stabilizers, and sent representatives to supervise the application of their products.

Wooden catchment boxes were installed on 20 of the 44 plots to measure sediment yield. Each catchment box collected sediment from a slope area of 1,000 square feet. The depth of sediment in each box will be measured after each major rainfall event until an acceptable vegetative cover has been established. From these measurements, it will be possible to compute total sediment yield in cubic feet per acre.

Eight weeks after treatment, observations and measurements were made on plots 1 through 20 to document sediment yield and vegetation growth. At the same time, observations on vegetation growth were made on plots 21 through 31 and all replications of treatments for plots 1 through 20. Also, measurements of rainfall were made weekly in a standard raingauge located on the site.

On plots one through 20 vegetation germination and growth were more rapid after treatments using a mulch or combinations including a soil stabilizer and wood fiber. Straw tacked with Curasol "AH", hardwood bark, Aerospray 70 with wood fiber, and Aquatain resulted in an acceptable, uniform cover 8 weeks after treatment.

The Japanese millet on the plots treated with Aerospray 70 had a healthy green color. Some yellowing of the foliage occurred on the following treatments: straw tacked with Curasol "AH", Curasol "AH" with wood fiber, and Aquatain. Hardwood bark caused extreme yellowing of the Japanese millet foliage.

Soil stabilizer treatments without wood fiber did not have as dense a cover as the treatments with mulch or a soil stabilizer with wood fiber. Height growth for the Japanese millet seemed to be related to the specific treatment rather than the broad classification mulches and soil stabilizers.

The treatments were intended to have their greatest effect on sediment yield from the time of establishment until a protective vegetative cover was established. On this demonstration, an acceptable ground cover was established on many plots in 8 weeks.

The lowest sediment yield occurred on the plot treated with straw and Curasol "AH". Sediment yield for the hardwood bark and Curasol "AH" with wood fiber were comparable to the straw, but somewhat higher. Next in terms of increasing sediment yield were the treatments: experimental wood fiber #1, Genequa 743, and Aquatain. Thus at the end of 8 weeks, two mulches, two soil stabilizers, and one soil stabilizer with wood fiber had the lowest sediment yield.

The low overall sediment yield on these plots is interesting. Although precipitation was above average, sediment yield was much lower than expected. Some rills developed while the vegetation was developing. These should not enlarge as rapidly now that a vegetative cover has been established.

The loss of seed by surface runoff has been reported but not documented. Trapping all runoff water and sediment provided an opportunity to observe factors affecting the occurrence of seed loss by surface runoff. There was no attempt to quantify the amount of seed lost. The degree of slope appeared to be an important variable. More plots on the upper row (plots 14 through 20), where the degree of slope ranged from 21 to 24 degrees, had observable seed loss. Treatment also affected seed loss. No seed loss was observed following 7 of the 13 treatments on the lower row of plots, where the degree of slope ranged from 16 to 20 degrees. These included hardwood bark, straw tacked with Curasol "AH", wood fiber #1, Curasol "AH" with wood fiber, Genequa 169 with wood fiber, M-145 (high rate), and Aquatain.

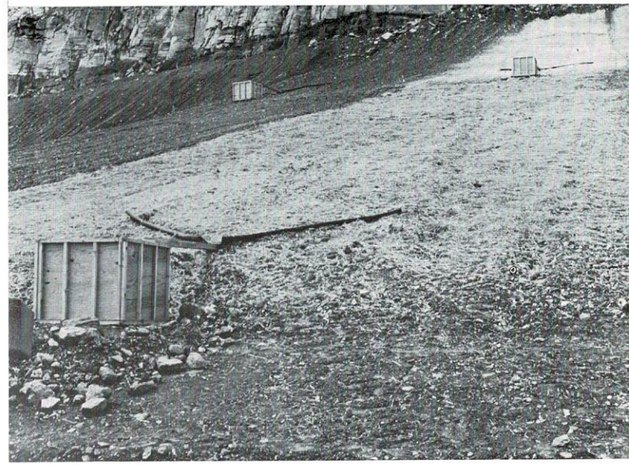
On plots 21 through 31 no measurements were made. The comments are based on observations. Each plot is discussed spearately.

Plot 21 — Straw tacked with Terra Tack. — Vegetation development was similar to the straw tacked with Curasol "AH" treatment. Surface runoff from the untreated area above the plot washed through the straw causing some rilling. The tack appeared to be effective on areas not affected by the surface runoff from above.

Plot 22 — Wood fiber, 1,000#/acre. — The contrast in vegetation development between the adjacent plot with 500#/acre wood fiber was obvious after 8 weeks. The higher rate of wood fiber resulted in more rapid vegetation establishment, and the Japanese millet appeared to be taller.

Plot 23 — Bagasse. — Much of this material was very fine, and it either washed away or was incorporated with the surface soil. There was no apparent benefit from the treatment.

Plot 24 — Urea formaldehyde foam. — The vegetation on the area receiving a surface treatment of foam appeared to germinate beneath the layer of foam. Growth and development were similar to the other treatments. After 8 weeks the Japanese millet is taller and greener where the foam was applied. No erosion rills were noted on the plot. The concern that surface runoff could cause rilling under the foam was not substantiated.



All but one of the European alders planted in trenches filled with foam died, and all of the trees planted on the untreated area died. However, the trenches are clearly outlined by the improved growth and foliage color of the Japanese millet.

Plot 25 — Brush chips. — The vegetation growth and erosion on this plot is similar to the hardwood bark plot. There does not appear to be as much yellowing of the Japanese millet following the brush chip treatment.

Plot 26 — Curasol "AE" with wood fiber. — Vegetation germination and growth appear to be comparable to the plots on either side of plot 26. No observations have been made on surface erosion.

Plot 27 — Shredded paper, 1,500#/acre. — This material appeared to slow the germination and early growth of the Japanese millet. However, once the plants emerged, growth improved; and at the end of 8 weeks there was little difference between this plot and plot 28.

The material appeared to be a very effective erosion control material. It formed a paper maché layer on the surface that was very resistant to raindrop impact and surface runoff. At the end of 8 weeks, the material was visible on the surface and apparently still effective.

Plot 28. Wood fiber, 1,500#/acre. — Vegetation germination and growth were similar to the plots treated with 1,000#/acre of wood fiber. Erosion control was difficult to evaluate. However, there was almost no trace of the material on the surface 8 weeks after treatment.

Plot 29 — Shredded Urea Formaldehyde foam. — Chunks of the foam were added to the slurry in the hydroseeder. When this slurry was applied, there was no visible trace of the foam. Germination and growth of the vegetation was comparable to the adjacent plot treated with 1,500#/acre of wood fiber. No observations were made on erosion control.

Plot 30 — Shredded paper, 500#/acre, with Curasol "AE" and chicken litter substituted for ammonium nitrate.

– Germination was slow and growth less than on plot 29. The foliage had a distinct yellowish color which may indicate a nitrogen deficiency. The shredded paper with the additive formed a paper maché like mat on the spoil surface. This covering resisted raindrop impact and surface runoff very well. Eight weeks after treatment, the mulch was visible on the surface, and probably continued to provide good protection against erosion.

Plot 31 – Chicken litter, 1,000#/acre. – Germination was comparable to the other plots, but growth was quite slow. The foliage had a distinct yellow color indicating a possible nitrogen deficiency. The material quickly dispersed, and could not be found on the surface after the first few rains. It is assumed this material will not be effective for erosion control.

Measurements and observations on vegetation growth will be made 12 and 16 weeks after treatment. Foliage samples will be collected from the Japanese millet 12 weeks after treatment on selected plots for foliage analysis. These will be used to compare the mineral content of leaf tissue by treatments. Particular emphases will be placed on the nutrients: nitrogen, phosphorus, potassium, calcium, and magnesium.

Sediment measurements will be repeated 10, 12, 14, and 16 weeks after treatment. After 16 weeks, the boxes will be cleaned to allow collection of sediment during the winter months. Samples of spoil from each box will be used to determine particle size distribution by sieving, pH, available phosphate, and total acidity. A second progress report will be prepared after the 16-week measurements. This will summarize all measurements during the 1972 growing season.

The following is a list of the various mulches and soil stabilizers used in the experiments.

MULCHES

1. Hay or straw with a tacking material. – Hay and straw are usually applied at a rate of 1-2 tons per acre. Both materials must be tacked to prevent movement by wind and water. Tacks used in these demonstrations included asphalt, Curasol AH, Aerospray 70, and Terra-Tack.

The seed and fertilizer are applied with a hydroseeder. The hay or straw are then applied and tacked with a straw mulcher.

2. Hardwood bark and brush chips. – Bark is a waste product from sawmills which use a debarker to remove the bark before the logs are sawn. The bark may be used as it comes from the debarker, or it may be hogged to reduce the pieces of bark to a more uniform size. Brush chips are waste material resulting from chipping trees and brush for right-of-way clearing or maintenance.

Both materials may be spread with a modified straw mulcher after the seed and fertilizer have been applied. Thirty cubic yards per acre are recommended for most sites.

3. Wood fiber. – Several wood fiber mulches are commercially available. This short-fibered product is applied with a hydroseeder. Recommended rates vary from 700 to 1,000 pounds per acre.

Two products widely used in West Virginia are Conwed and PFM_4 a Weyerhaeuser Company product.

4. Erocom. – A product combining gypsum and a short-fibered material. A catalyst is added at the hydroseeder nozzle. This causes the material to harden after application.

Rates used on the demonstration were 1,000 and 2,000 pounds per acre. (National Gypsum Company)

5. Shredded paper. – The product used was shredded and reprocessed to remove ink, staples, etc. It had a high moisture content, and without proper packaging it was difficult to handle.

The material can be applied through a hydroseeder with the seed and fertilizer. An estimated dry weight, 1,500 pound per acre rate was used on the 1972 demonstration. This high rate probably can be reduced after further experimentation and use (Tynex Company)

6. Urea-formaldehyde foam. – Urea-formaldehyde resin and a foaming agent are mixed and foamed with compressed air. This light weight, white material is applied directly to the spoil surface. A special wetting agent is then applied to the foam. Seed and fertilizer are applied to the foam with a hydroseeder.

In this demonstration, 5 gallons of urea-formaldehyde resin and 5 gallons of the foaming agent were used to treat 2,000 square feet. (U.F. Chemical Company)

7. Bagasse. – This is a waste product from the sugar cane industry. The unprocessed cane fibers have a high moisture content, and are irregular in size.

The material is applied with a straw mulcher at a rate of 1-2 tons per acre after the seed and fertilizer are applied with a hydroseeder.

SOIL STABILIZERS

1. Genequa 743. – A modified liquid vinyl acetate resin that is diluted in water and applied with a hydroseeder. Seed and fertilizer were applied with this material. (The Delta Company)

2. Genequa 169. – A modified liquid acrylic resin that is diluted in water and applied with a hydroseeder. Seed, fertilizer, and wood fiber were applied with this material. (The Delta Company)

3. Terra-Tack. – A powdered vegetable gum that is dissolved in water and applied with a hydroseeder. Seed, fertilizer, and wood fiber were applied with the product. It was also used as a tack for straw. (Grass Growers, Inc.)

4. Aerospray 70. – A liquid polyvinyl acetate emulsion resin that is dissolved in water and applied with a hydroseeder. Seed, fertilizer, and wood fiber were applied with the product. This material may also be used as a tack for hay or straw. (American Cynaimid Company)

5. Aerospray 72. – A liquid alkyd emulsion resin that is mixed with water and applied through a hydroseeder. Seed, fertilizer, and wood fiber may be applied with the product. (American Cyanimid Company)

6. Aerospray 52. – A liquid alkyd resin which is dissolved in water and applied with a hydroseeder. Seed and fertilizer may be applied with the product. (American Cyanimid)

7. M-145. – A liquid resin polymer dissolved in water and applied with a hydroseeder. Seed and fertilizer may be applied with this product. No wood fiber was added to the solution in this demonstration (Dowell)

8. Aquatain. – A powder with a pectin base dissolved in water and applied with a hydroseeder. Seed and fertilizer may be applied with this product. No wood fiber was included in the mixture. (Soil Conditioners, Inc.)

9. Curasol AH. – A liquid synthetic resin diluted in water and applied with a hydroseeder. Seed, fertilizer, and wood fiber were applied with this material. This product may also be used as a tack for straw and hay. (American Hoechst Corporation)

10. Curasol AE. – A liquid high polymer synthetic resin dispersion diluted in water and applied with a hydroseeder. Seed, fertilizer, and wood fiber were applied with this material. (American Hoechst Corporation)

11. XB-2386. – An experimental liquid reactive polymer injected into the slurry at the nozzle of the hydroseeder. Seed, fertilizer, and wood fiber were applied with this material. (3M Company)