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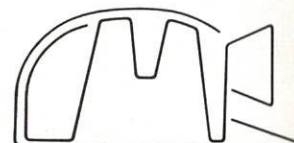
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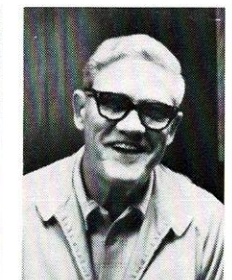


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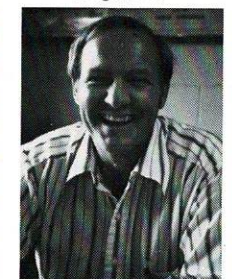
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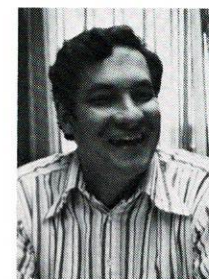
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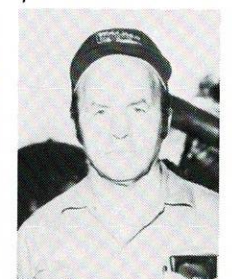
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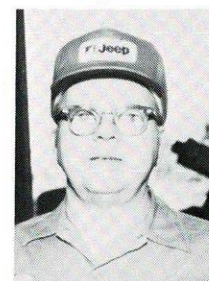
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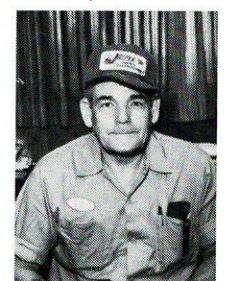
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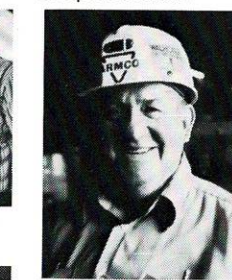
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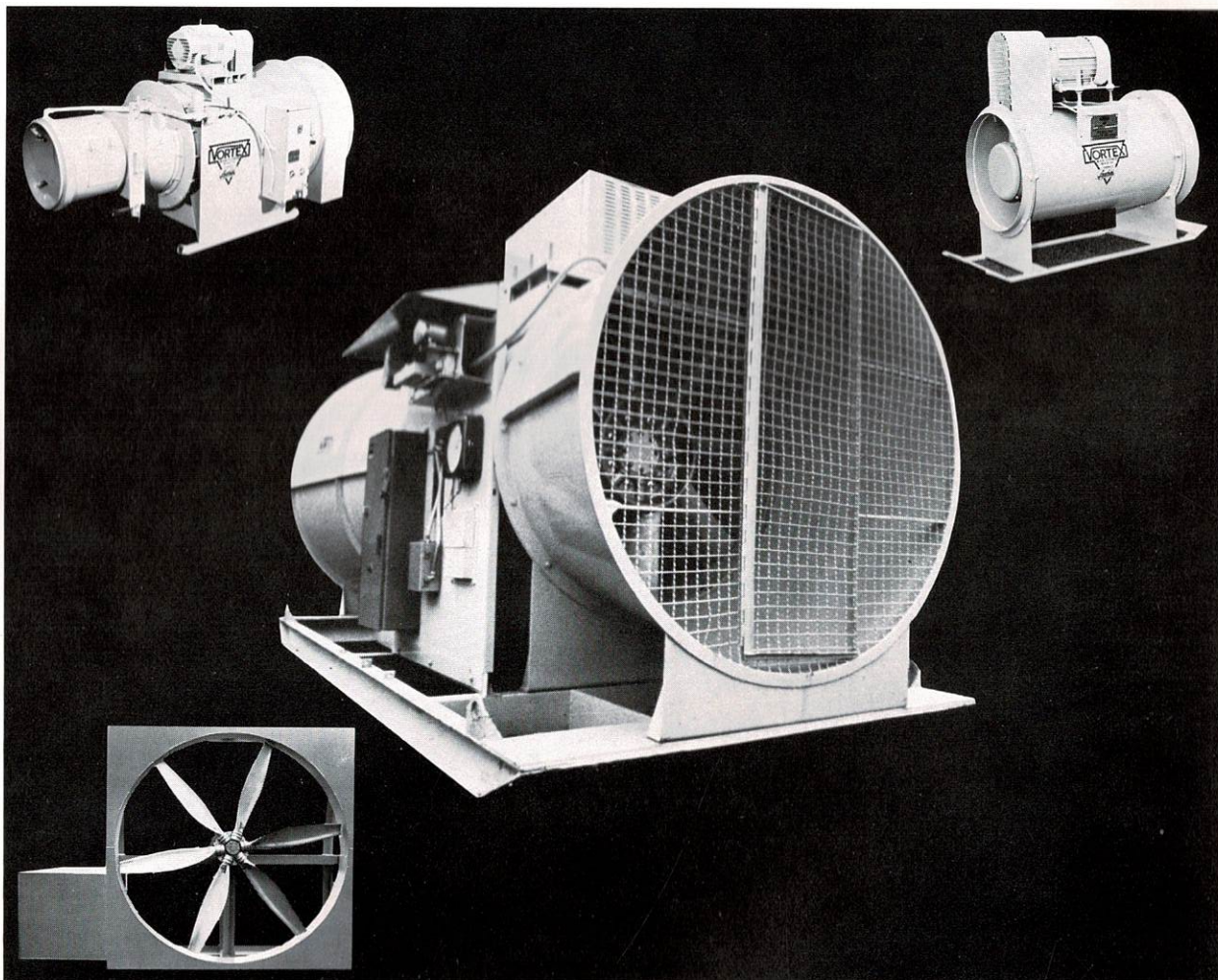
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There are other benefits, too. For example we might not have to rely on OPEC and we just might become energy independent. Another benefit: the jobs that would be created—from the mines to the processors to the sellers. And that's good for our economy.

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## Coal is still ready

The message from Washington in recent months is that everyone must suffer in order to turn the economy around. The coal industry, which has suffered from every conceivable misfortune affecting market conditions, can only benefit from a revitalized economic situation.

Still, it should be a source of pride among coal operators that very little outcry has been heard regarding those budget cut proposals which might adversely affect coal. One which comes immediately to mind is the possible cutback in funding of the SRC-II plant near Morgantown.

Having barely survived a time when social programs and industrial regulation dominated D.C. thinking, coal people seem to realize that a move toward a freer economy will tend to juxtapose the interests of the coal industry and the American community at large.

Although the full effects of Washington's changed attitude won't be known for months, maybe years, it seems apparent that the Reagan administration has "hit the ground running," as promised.

At last there is realistic hope that coal is being recast from the role of villain to that of hero. If so, then the resolve and ingenuity which carried the industry through the trying times of recent years can carry us back to the boom cycle again.

Let's do it.

## Looking back on Cool Ridge

Our story on page 10 is about a permit to surface mine that created a lot of controversy five years ago. Eventually the site was mined, reclaimed, and the bond was released. It's quiet now.

What ever became of the wild accusations about the devastation which would surely follow the mining process? Whatever became of the individuals who made the accusations?

Well, the scare stories turned out to be speculative, uninformed, erroneous, in short, dead wrong. The local people who opposed mining haven't been heard from since the bond was released in 1979, so presumably they're satisfied that good reclamation was carried out.

But the instigators, the legal white knights who wasted everybody's time and money with petitions, motions, and threats, they're still around. They've just moved on to what they perceive as "greener pastures." They like to be where the legal action is, and never mind past indiscretions. The accusations are the same, and the foundation of truth in them hasn't improved any. It's only the geographic scene that changes.

Nobody has written a story about Cool Ridge for a long time. Where are the investigative reporters when you need them?

## So near, so far

The country is in a mood for coal conversion. Washington is in a mood for more reasonable regulation. The world market situation is improving. Plans are on the board for improved transportation systems.

Now if we only had a contract to mine coal. Come on, fellas, can't we work something out?



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*On the cover and above is a recent picture of the first surface mining operation in West Virginia to use the revolutionary "haulback" method of contour mining. The work was done by Hobet Mining & Construction Co., Inc. in 1973. This technique was perfected and widespread by 1976, when L&F applied for its Cool Ridge permit. Despite the availability of this technology and the equally innovative "mountaintop removal" mining method, opponents of the proposed Cool Ridge operation still claimed that reclamation could not be effectively carried out. As the pictures on the opposite page suggest, they were wrong.*

## Old haulbacks lookin' good

It's a rare month in West Virginia when the news doesn't contain something about a controversy somewhere in the state over a proposed surface mining operation. The central figures are mostly the same from case to case, so called public service lawyers, other self appointed watchdogs who make a living from opposition to coal and other land use industries.

But nothing much is written or said about the eventual outcome of the controversies. The story usually leaves off with the judicial or administrative ruling. One such case is DNR surface mining permit 244-76, the L&F Mining Co. plan to mine and reclaim a 110 acre tract in the Cool Ridge area of rural Raleigh County.

As with so many other operations, the Cool Ridge permit was fought every step of the way by the "public

saviors". Even after the permit was issued, the battle continued. Tax funded lawyers for the petitioners betrayed their arrogance of their position in a letter to the West Virginia Reclamation Commission, in which they demanded 1) a suspension of the permit 2) a permit review hearing and 3) revocation of the permit (never mind the results of the hearing).

The petitioners grasped at every straw, citing possible acid mine drainage, blasting damage, and danger to passing motorists on the nearby West Virginia Turnpike, which was then undergoing construction and daily blasting.

Compare the following quotes, from the petition to revoke, with the pictures on the facing page.

"The strip mine will constitute a hazard to the West Virginia Turnpike and will cause temporary and

permanent damage of highly visible aesthetic values."

"It will be difficult or impossible to properly reclaim this land."

"The area in question is believed to have significant potential for expanded residential use. The existence of a strip mine on this site will eliminate this potential."

The permit application for the Cool Ridge site was filed on March 9, 1976. The permit was issued on November 5 of that year. The petition mentioned above was filed on December 6.

On February 19, and March 24, 1977, members of the Reclamation Commission made on site inspections. On March 29, the West Virginia Reclamation Commission ruled that the petition was groundless.

They were right.



*This peaceful looking scene in Raleigh County was the subject of much controversy five years ago. The dire predictions of doom and despair turned out, obviously to be groundless.*





# Dear West Virginia

*Editors Note: As part of an ongoing campaign to widen the domestic market for West Virginia coal, the West Virginia Coalition solicited letters from West Virginians last fall to speak directly to our "neighbors in New England" on the merits of the Mountain State product. The Coalition is a joint effort of the West Virginia Surface Mining and Reclamation Association and the West Virginia Coal Association.*

*The best letters were reprinted in a full page ad in the Boston Globe, the largest daily newspaper in New England. At the same time New Englanders were invited to write back. The response was gratifying, as illustrated in the following letters.*

Dear West Virginian:

As a former West Virginia resident from Weirton now residing in Tewksbury, MA, I found your letters regarding West Virginia Coal in the Boston Globe on February 19, 1981 interesting, amusing and sad.

**Interesting** because of its honesty and pointedness to a serious area of concern to all of the people of Massachusetts heating and electricity cost.

**Amusing** because I found your approach to the problem unique.

**Sad** because the Massachusetts political structure and our liberal environmentalists have far too much power to allow a wholesale change from oil to coal. However, industry, and some of our elected officials are and will continue to pursue the change and some token changes are and will continue to be approved, but it is too little.

Many of us appreciated your letters and advertisement. Thank you and as the saying goes "we've only just begun."

Cordially yours,  
Frank Ferrelli  
Tewksbury, MA

Dear West Virginian:

I saw your advertisement in the Boston Globe of February 19, 1981.

As a home owner in Massachusetts

who relies 100% on electricity to run my house, heat included, I am fully in favor of coal conversion of our power plants.

Our most recent electric bill had a fuel sur-charge of almost seven cents (.07) per KWH when the electricity cost itself was only about two and one half cents (.025) per KWH. **WE MUST ELIMINATE FOREIGN OIL.**

I am behind your efforts 100% to sell West Virginia coal.

Robert Gurwitch  
Plymouth, MA

Dear West Virginian:

Your page ad in the Boston Globe does strike a chord!

I spent \$1050.00 in the fall of 1979 for a coal stove and installation. Last winter three tons of coal saved me \$350.00 versus oil; using 800 gallons instead of 1400 gallons previous year.

This winter I waited until Dec. 1 to purchase coal and I couldn't get any. They say the demand is three times the supply.

What will the demand be next winter with these increases in the price of oil in the past two weeks!

I am alarmed about my ability to buy coal this summer—e.g. good anthracite coal.

I spent \$1050.00 to help myself and my country and neither the state or the

federal government is responding properly.

Special interests are working to keep the coal from being delivered and if they do deliver the price will not be fair. This combination of special interests wielding the monkey wrench and bureaucracy in govt. is putting the country in so much worse shape than is necessary.

I could go on for pages. Thank you for your program.

James A. Isbell  
Canton, MA

Dear West Virginian:

Thanks for a great spread. I think some of us have gotten the message already. Many, many people bought coal stoves in the last year to cut down the cost of heating their homes. While it works just as well if not better than oil the dealers **ran out of coal.**

With the supplies you have down there, hopefully we'll be able to keep our homes warm even if we can't get the utilities to move!

The big question is how to get your supplies up to the homeowners. Do you have **any ideas?** Last year the coal price jumped 20% during the shortage, we don't need that.

Sincerely,  
David A. Varley  
Norwell, MA

Dear West Virginian:

If there is an abundance of coal, and miners are out of work for lack of a market, then what are we waiting for? An okay from big oil no doubt! We pay 70% of our Edison bill for fuel adjustment charge. I went to Edison and asked them why; they said they were very sorry but that was the way things were because of OPEC and all. I'm beginning to wonder who OPEC represents.

Michael Carson  
Pembroke, MA

Dear West Virginian:

Your advertisement in today's Boston Globe is a joy.

Nice style. Nice sentiments. I'll burn your coal any day.

Regards,  
Paul W. Pitman  
Saugus, MA

Dear West Virginian:

I was very happy to see the spirit of West Virginians reaching out in the form of a full page ad in the Boston Globe.

I was born and raised in W. Va. (Parkersburg High '74). I have been living in Boston for the past year and a half. I really like Boston despite the high rents (partially due to high utility bills) and cold winters.

I just recently found out that the electricity in New England is generated by oil! When I saw the ad I was pleasantly surprised. It was nice to see an effort, by the citizens of the place I consider home, offer its resources to another part of the country for the benefit of each other. I

would like to see the fact proved that we don't need Middle East oil. I believe that this country could become self-sufficient in every area by turning to each other. We don't need foreign energy sources.

You have my support.

Sincerely,  
Ralph McClain

Dear Folks:

We are retired and trying to live on Social Security and pension. The price of fuel cost on the bill is terrible for everyone. Why not help each other. We have the goods, coal. Why not use it.

Yours truly,  
Edward L. Quinn  
Needham, MA

Ms. Virginian:

It was very interesting reading your ad in the Boston Globe, Feb. 19.

I have been a regular customer of Williams Coal Co. of Braintree, Mass. for several years. January of this year I ordered a ton of coal and was told I would have to wait three months for delivery. They informed me that there were 200 orders ahead of me.

Williams receives a shipment by rail sporadically and the contents are gobbled up by individuals with their own containers. The last time I checked with the company they had 500 back orders.

Every official, from the governor down, is supposed to be using their influence for more coal to our state. Spring is just around the corner! Not to be facetious, but maybe some of those people from West Virginia could bring a

couple hundred pounds when visiting our fair state. Thank you.

Sincerely,  
Louis E. Glazer  
Quincy, MA

Dear West Virginian:

I have a coal furnace which heats my whole house. Last summer I paid \$105 a ton for coal, picked up. The price rose steadily to \$120 in the late fall. After a shortage of five weeks during January and February when we could buy no coal at all, the price rose to \$145 and as high as \$180 in some places.

I keep hearing that we have so much coal. If so, why can't factories convert to it? Why must we be dependent on foreign sources for energy? Why can't families who want to get away from OPEC oil be spared a large price increase every time the price of oil increased? Why can't West Virginia coal mines go into production, giving work to our people there. Why can't carloads of coal be sent here? The news during the shortage showed hundreds of people scrambling and fighting each other for coal, and paying \$200 a ton for it.

I am ready to do anything I can to push for coal conversion legislation. I have already written to my congressmen, and I am going to become involved in future elections, toward this end.

Presently our coal is shipped by truck from Pennsylvania. Why not freight train loads from West Virginia? I am going to ask some people here.

Sincerely,  
Domenic V. Tonucci  
Dennis Port, MA



# Shavers' Fork Testimony

*Editor's note: Following is part of the testimony given at a recent hearing conducted by the federal Office of Surface Mining to evaluate the suitability of the Shavers' Fork area for mining.*

MR. RICHARD H. TALBOTT, JR.:

My name is Richard Talbott. I am an attorney with the firm of Bramm, Harner and Busch here in Elkins, and I am here this evening representing the Mower Lumber Company and Enviro Energy, Inc.

Mower is the owner of the coal and other minerals underlying approximately twenty-six thousand acres of the petition area. Enviro is Mower's lessee and is currently engaged in the development of the coal resources owned by Mower. For ease of reference, my statement refers to Mower and Enviro collectively as Mower.

Mower is in the process of reviewing and analyzing the OSM draft decision document and the underlying studies. As was reported at the February 25 meeting, twenty-one studies were undertaken in connection with the petition evaluation process.

Mower has requested copies of all these studies. To date Mower has received the draft decision document and six of the twenty-one studies. In addition, Mower has requested certain supplementary data from the West Virginia Department of Natural Resources.

Should we receive the requested studies and supplemental data in the immediate future, we anticipate being able to complete our review and analysis and provide written comments by the currently established March 18, 1981, deadline.

In the meantime, Mower would like to offer some comments on the results of its review and analysis to date.

First, review of the draft decision

document indicates that OSM has developed very little new data that was not available to the Forest Service when it prepared two Environmental Impact Statements on the Monongahela National Forest or to DNR when it entered into the agreement with Mower which is reprinted in the draft decision document or to DNR when it issued the necessary permits for the currently ongoing mining operation; or to EPA when it issued similar permits; or to the United States District Court for the Northern District of West Virginia when it rejected efforts to halt the ongoing mining activities.

If anything, OSM has apparently failed to consider much of the existing data. What little new data has been developed simply confirms the data and analyses already performed by the Forest Service and other government agencies.

Consequently, there is nothing in the draft decision document which supports any conclusion other than that already reached by the many other federal and state agencies which have considered this question; that is the underground mining activities, as proposed by Mower and as regulated in accordance with the many applicable federal and state laws and regulations, is fully compatible with the recreational and other important values of the Monongahela National Forest and will certainly not result in "significant damage to important natural systems" in the Forest.

Let me turn for a moment to the particulars of the draft decision document.

The draft decision document represents

an effort by OSM to identify all of the even remotely possible environmental effects of mining on a worst case basis. As already indicated, even this worst case analysis does not reveal that any significant environmental damage will occur as a result of the mining activities as planned by Mower.

Furthermore, there are many inaccuracies and erroneous assumptions in the draft decision document which have the effect of significantly overestimating the potential effects of mining in even the worst possible case.

Perhaps the most important of these errors is OSM's development of its own "hypothetical mining plan." As explained on Page II-2 of the draft decision document, OSM has "developed a hypothetical mine plan that would be sufficient to underground mine all the mineable coal in the petition area within a short period of time."

In fact, however, removing the coal in a short period of time is exactly the opposite of what Mower has proposed and intends to do. Under the OSM hypothetical mining scenario, dozens of mines and scores of roads would be in operation simultaneously.

This must be contrasted with the Mower mining plan which involves phased development with few mines and limited roads in operation at any one time. As detailed in the agreement between Mower and DNR reprinted in the draft decision document, Mower has formally agreed with DNR that no more than six mines and twenty-two miles of new roads will be in operation on the Forest at any given time.

The effects of this agreement can be seen in the currently ongoing mining

operations. The first three mines which Mower is in the process of opening will disturb a grand total of approximately fourteen acres, much of which consists of already existing roads.

The environmental impact of these mines has been described by U. S. District Judge Maxwell, after a full factual hearing, as, "Minimal." The first six mines to be opened will involve less than one hundred acres, again including many acres of already existing roads.

It is this phased development planned by Mower which OSM should be evaluating and not OSM's fictional scenario that grossly exaggerates even the potential impacts.

OSM's use of a fictional mining scenario also leads to great confusion in reading the draft decision document. The maps of supposed mine portals included in the draft decision document after page IV-2 are of such small size and poor quality that it is extremely difficult to identify the portals proposed by Mower and to distinguish them from the fictional portals of OSM.

Furthermore, among the Mower proposed portals that can be seen, many are misidentified and located in the wrong place. If OSM persists in its course of evaluating fictional mines, they should at least be clearly depicted both on the maps and in the written analyses so that the reader may better distinguish between the mining which Mower actually plans to do and the fictional scenarios of OSM — scenarios which will never occur.

Other errors in the draft decision document also tend to exaggerate even the potential impact of mining. Not only has OSM evaluated a fictional scenario,

they have also proposed a mining method which Mower does not intend to employ.

In Table 9 on Page III-16, OSM indicated that mining will be by the conventional method which requires repeated blasting as mining progresses.

Mower plans absolutely no conventional mining. Instead, the continuous mining method will be employed. This method, for which Mower had already purchased the necessary equipment, involves no blasting during mining operations.

By considering blasting as the mining method, OSM greatly exaggerates many potential impacts including particularly noise, dust and water quality impacts.

As part of the petition evaluation process, OSM contracted with SRW Associates to study the potential water quality impacts of mining. In its report SRW analyzes the potential for acid mine drainage by analyzing the acidity and alkalinity of the rock strata through which water entering the mine would pass.

As SRW found, some of these strata are naturally acidic and some are naturally alkaline; however, SRW also found that the vast majority of this overburden is alkaline in nature.

Despite this finding, SRW completely ignored the buffering capacity of the overburden and assumed that none of the alkaline materials would be picked up by the water passing through the strata but that all available acidic material would be carried along with the water.

This assumption defies the laws of both physics and chemistry and grossly

exaggerates the potential acidity of the mine drainage.

Despite this clearly erroneous assumption, the SRW report demonstrates that the potential for acid mine drainage is extremely low. If correct assumptions had been employed, even this negligible potential would have been eliminated — as demonstrated by existing data on mine drainage in the immediate area of Mower's planned activities, existing data which SRW apparently ignored in making its study.

Other examples of how inaccuracies and erroneous assumptions have caused OSM to greatly exaggerate even the potential for adverse environmental impact associated with mining will be detailed in Mower's written comments.

Not only has OSM exaggerated the potential for environmental impact, it has completely failed to recognize that potential impacts do not equal actual impacts and that, in the real world, the potential for impact can never be and will never be fully realized.

Perhaps the greatest failing of the draft decision document in this area is OSM's disregard of the effects of its own regulations and those of the many other involved state and federal regulatory agencies in preventing and mitigating potential environmental impacts.

OSM's failure to recognize or consider federal and state requirements in the draft decision document is in stark contrast to the only other OSM unsuitability petition decision document. In that document, such regulatory requirements are not only recognized but were also specified and evaluated.

OSM's failure to recognize regulatory requirements and to factor them



into its analysis of the petition leads to serious overestimation of the impacts which will actually occur, sometimes with almost comical results.

For example, Page VI-5 of the draft decision document discusses the impacts to be expected from the reconstruction of the access road to Mower's Glade Run Mine as follows:

"Brook trout in Glade Run could be affected by high short-term increases in sedimentation resulting from reconstruction of FR 27 serving VER Site 2."

This statement leaves a clear impression that high sedimentation will result from the reconstruction of the Glade Run Mine road and that this could have an adverse impact on the fish in Glade Run.

What the statement fails to reveal is that requirements imposed by the Forest Service and other federal and state agencies effectively prevent any significant sedimentation in connection with road building.

The statement also neglects to mention that the road in question has already been completed; that two full-time inspectors, one from the Forest Service and one from DNR, monitored compliance with applicable requirements, and that no sedimentation problems were encountered.

In no case can a mine portal road or other facility be constructed by Mower without the approval of the Forest Service as the surface owner. The approval process, which OSM nowhere mentions, involves the presentation to the Forest Service of preferred and alternative mine portal and road locations.

The Forest Service then conducts an environmental assessment to identify the alternative with the least potential environmental impact. Once that alternative has been selected, applicable federal and state regulatory requirements are imposed to eliminate or mitigate any remaining potential environmental impact.

This process and, indeed, the very

existence of the Forest Service and other federal and state regulatory agencies have been completely ignored in the draft decision document.

Compliance with the legally mandated regulatory requirements is not the only mechanism which determines whether potential environmental impact will actually occur. Voluntary action by the coal operator is also significant in this regard.

Throughout the period that the issue of mining in the Upper Shaver's Fork Subunit has been under discussion, Mower has consistently been prepared to voluntarily adopt reasonable environmental protection measures even when not required to do so by law.

For example, Mower has agreed to maintain the pH of any discharge from the first three mines at not less than seven, as requested by the Conservancy, rather than the lower limit of six required by federal and state law. Such voluntary actions by the coal operator must also be considered in OSM's analysis.

Beside the two major problems of overestimation of both the potential and actual impact of mining, the draft decision document suffers from several other deficiencies. Examples of the deficiencies so far identified by Mower include:

First, OSM's analysis of the socio-economic impacts virtually ignores the extensive economic impact data submitted by Mower at many stages of the regulatory process.

OSM's estimates of the percentage of the West Virginia and United States coal reserves which would be lost as a result of an unsuitability designation are based on the erroneous premise that coal is fungible and that therefore all coal reserves are equally accessible and of equal quality.

In fact, many of the proven reserves in both West Virginia and the rest of the United States are not economically recoverable. In addition, the majority of

the recoverable reserves are not of the same high quality and low sulfur content as the coal proposed to be mined by Mower. Both the accessibility and quality of coal reserves must be considered in OSM's socio-economic impact analysis.

The United States Geological Survey has seriously underestimated the extent of the coal reserves owned by Mower underlying the southern portion of the petition area. This underestimate is a result of the use by USGS of an inappropriate maximum parting-to-coal ratio of twenty percent.

A twenty percent ratio results in a reject level of twenty-five to thirty-five percent. In fact, coal reserves of a quality equal to or less than Mower's are currently being mined throughout the State of West Virginia at reject levels significantly above the thirty-five percent figure.

Use of a more realistic reject level would result in a more accurate estimate of the recoverable reserves. Specific examples of mines operating at higher reject rates will be provided in Mower's written comments.

We appreciate the opportunity to appear at this hearing and we intend to submit additional written comments in accordance with OSM's request.

MR. C. S. OGDEN:

Good evening. I'm C. S. Ogden. I'm a railroad engineer for the Chessie System. I've been hauling coal out of the Shaver's Fork area for almost thirty-four years. I represent the railroad employees, and there's over two hundred employees in this area on the railroad.

And it appears to me that the West Virginia Highlands Conservancy has a total disregard for our jobs. I'm also Chairman of the Dry Fork Landowners Association, and I represent landowners.

I've read the draft document prepared by the Office of Surface Mining. I cannot see where there would be any

great adverse effect from mining our coal in the Shaver's Fork area.

It is technologically and economically feasible to reclaim the land after the coal has been removed. The land may be planted back in useful vegetation.

In the Davis and Thomas area I can show you land up there that has been planted in pine trees, and black cherry grows abundantly, planted by nature there. So, I know vegetation will do well on reclaimed lands.

I feel also it will help the water situation as this reclaimed land will act like a sponge to hold water. It will also be less acid, as has been proved by tests. The people in this area are the ones that will be adversely affected if the coal is not mined. This is our livelihood.

As far as the wild animals are concerned, there are too many now. In the past three years, my vehicle has been extensively damaged five times by deer. In the past year about fifty chickens have been killed by wild animals for us, even coming in the middle of the day and carrying them off; deer so bad it's almost impossible to raise a garden in my area.

They claim one of the greatest detrimental effects on animals would be on the black bear. Is the sport of black bear hunting for a few hunters more important than the livelihood of several thousand people? Does the black bear have more right here than man that needs this area to work and furnish a living for his family?

There are other places the black bear can live and do live, although I don't think coal mining in this area will have any great adverse effect on the black bear. I've been around black bear all my life. They seem to adapt to living near mankind. I observed them many times around the railroad, watching the trains go by.

At Baird I've seen them in the middle of the railroad yard. At North Branch Mine I've seen them come in across a

spoil pile, across the railroad, eat apples out of the trees fifty yards from the tipple and water plant.

They come in near my home and eat apples out of my trees and are seen passing nearby. I was in Camp 535, Yellowstone Park, Wyoming, for several months. The black bear came in and around our camp, they ate out of our garbage can and moved around among us, apparently unafraid.

We used to raise sheep on our land, but the black bear put us out of business. Our neighbor raises sheep, but he and his family must guard over them day and night to keep the black bear out. Ask him what he thinks of the black bear, or ask any of the other sheep raisers in this area what they think of the black bear.

One of the first things a bear does when he attacks a sheep is eat the milk sack off of them, sometimes while they're still alive, leaving the little lambs to starve to death, if they escape.

Much is said about protecting the black bear, but what about our sheep? Don't they have a right to be protected, too? As far as I'm concerned, the bear is a varmint and serves no useful purpose.

Our power plants will not run on bears and fish. It seems the West Virginia Highland Conservancy will have mankind move out of this area and turn it over to the animals. What does the West Virginia Highlands Conservancy stand for that is beneficial to mankind?

Every time we try to mine some coal or build a dam, they're there to try to stop us. It seems as though they are against progress in the nation. What are the motives behind this? Is their alliance to some enemy of the United States? Who furnishes the money for their expenses?

It appears they want mankind to move off the face of the earth and leave it to the animals. If this is so, I suggest they be the first to go, then the rest of us won't have to go; our troubles will be over. We can live here in peace.

The West Virginia Highlands Conservancy should be brought to Court and held responsible for the financial burden it placed on the mineral owners and the taxpayers who have had to foot the bill for this draft document.

I request the petition of the West Virginia Highlands Conservancy to designate this area as unsuitable for surface mining be denied and we be allowed to mine our coal in this area in a business-like manner, unhampered by these people.

Thank you.

MR. MARSHALL LEE MILLER:

Hello. I'm Marshall Lee Miller for Elkins Kelly Lands, a group of small landowners here in the Elkins area.

As I listened to the speakers, it seems there is a remarkable in fact almost unique amount of agreement between the speakers. Now, it may seem there is disagreement because on the one hand people are pointing out some shortcomings, some inadequacies, some things that have been overlooked in the draft environmental impact statement.

Well, it is a rough document and we understand that. On the other hand, this is a subject which has been studied and studied and studied and studied. So, while there may be details we need to know and improvements that can be made in the report itself, such as the fact our land supposedly has no coal, overall I think there is remarkable agreement on quite a number of environmental conclusions.

If you recall under the statute there are two basic grounds under which land can be declared unsuitable for mining. One is if reclamation and recovery of the land is not feasible for some reason or another, and the other is if — and I'll discount the ones that are not relevant — but there is a significant threat to aesthetic or natural systems.

So, let me run over for a moment the various conclusions I see coming not



only out of this report but out of the reports that have gone on before in other studies.

Because generally when you think about mining problems you think of acid mine drainage, you think of strip-ping, you think of a number of problems which can cause serious environmental harm, yet we don't seem to find them in this case.

Let me go over them one by one, if I may. I think that we all agree that the Shaver's Fork area is a very beautiful area. We also have to agree it is not a pristine area. Pipelines, railroads, roads, hauling area, mines — abandoned and otherwise — are found throughout the area. That is no excuse for letting it go to ruin; on the other hand, it is an admonition for us to keep an idea of balance, that this is not the rim of the Grand Canyon we're talking about.

Now, in water, our previous speaker has pointed out what I think everyone agrees, that the water is acid in Shaver's Fork; not because of past mining practices which contributed, according to every study I've read, a negligible amount, but because of the natural soil, the vegetation, and acid rain from general precipitation — snow, rain, fog and so on. So, you have a naturally acidic strain. As a result the fish that live in there to the extent they live in there have to be placed in there on a put and take fishing operation. I requested under the Freedom of Information Act information from the hatchery nearby as to the expenses it took to put the fish in each year, and I also asked them to what extent the fish survived to the next year.

Their answers, as I'm certain you all know, were that very few fish do survive to the next year because of fishing and because it's really unsuitable for trout. And the cost per fish — the cost per pound of fish ran about a dollar eighty-five cents (\$1.85). Now, including heads or tails, you could probably do better at the supermarket.

The point here is not that there should not be fishing — not that that doesn't have some value for tourism and whatnot — but when we're looking at the cost and the benefits, let's acknowledge the fact that this is not one of those streams in which you place a few fingerlings and the fish grow up big and propagate and keep the generations going.

This is basically equivalent to having the people go to the hatcheries and throw their hook and lines in. All right, fair enough. But the point is that the mining operations in the past and any operations everyone sees as likely in the future if permission is granted will not endanger this fishing operation at all.

Now, there has been questions raised about our Cheat minnow which I understand is known to its friends as Rhinichthys bowseri minnow. There is still some debate about whether it is a hybrid or an endangered species or whether it's even a species at all, all of which is very well and good for the last ten years as the debates have raged and it still isn't on any endangered species list.

But I might point out, one of the leading experts with the Department of Natural Resources told me that ninety percent of those fish ever found were found upstream from Cheat Bridge. So, even if Shaver's Fork were dry, it should not have any particular effect on these fish.

The salamanders are another — what is it, Plethodon nettingi. The salamanders also exist in colonies throughout this area, but again according to studies I have seen they generally live in fairly defined habitats that can be avoided fairly easily, and that can be determined on a case-by-case basis.

It's certainly not a justification, of course, for the whole area being declared unsuitable for mining. Now, noise. Noise is a lot harder, and I'd like to reserve some of my comments on that until I've had a chance to study the matter further.

But I would notice this: According to the draft statement airplane noise, particularly jet noise, motorcycles, trucks, et cetera, create a higher than expected noise level in this area. Their calculation was the background noise, if I recall, was something about during a rain storm something about fifty-eight decibels, which is quite low, by the way.

That happens coincidentally to be the estimated road haul noise if mining were to take place there. The mining operations noise is estimated at seventy-six decibels. That is just about maybe a little bit more than what the noise was in this room right before the meeting started, my best estimate would be, and this is fifty times lower than the OSHA noise standard for occupations.

If you know anything about noise, you realize noise is subject to the inverse square rule, which means if you go twice as far away we have one-fourth as much noise; three times away, one-ninth as much noise. The noise drops off very sharply.

It also is greatly affected, as the document recognized, by trees, escarpments and other barriers around; and of course we're talking about an area very heavily wooded.

The document also points out there is things that could be done to reduce mine level noise even further. So, at this time as best I can tell from the limited available information here, there should not be any significant noise problems because of mining here.

Now, bears are a tougher case. I've asked Don Riesenberger from the Department of Natural Resources and also former president of the Conservancy for help in gathering information here; I also tried to gather it from the president of the Black Bear Association and other groups. I'll have to reserve my comments until I can get a little bit better information, but here are my tentative conclusions if I may share them with you.

The concerns about bears basically fall into two groups: One, do they have some hesitancy about crossing roads, something less than strip highways of course; second, is the concern by opening up areas with more and more roads that were previously inaccessible to people that people can go in there and illegally or legally kill bears.

From what I can tell, the latter is the real concern. The data I have seen on bear ranges indicates a very surprising median range of two hundred square kilometers — that's a lot of land — for an average male bear.

Now, that means he can't be that reluctant to cross roads or he would never get that far in this area. No, I think the real concern is about opening up roads in inaccessible areas, and we all realize there is no desire to cut back on the habitat of the black bear while it is found I think in about — will range over about a third of the United States from Maine to Georgia and of course out in the west.

And as I recall just in the last few years two large tracts of land — one a hundred and thirteen thousand square acres, another I believe like thirty-six or thirty-seven thousand square acres — have been set aside for bears. Bears seem to be doing rather good in getting land set aside for them.

But I just happen to notice on our property itself that while you can make assumptions about this being land or an area without a great number of roads, in fact we found roads all over our land that you can go all the way from the main jeep trail which is passable by passenger car, I believe, if you want to take some risk, all the way over to Shaver's Fork on every tract.

So, anyone who wanted to poach bear could easily do so without the need for waiting for more improved roads put in.

We again do want to say we don't want to take any action which would harm the bear — the bear and its habi-

tat, but we just don't see anything happening that would be appreciably different from the present situation.

I notice Professor Charles Jonkel out in Montana is one of the leading figures on bears, and he has pointed out in an article that the American Black Bear is one of the most adaptive of mammals. It can seem to get along through any changes of environment, even in contacts with humans.

Now, I don't want to push that too far, but let's say our concerns for the bear might be at least a little over stretched.

So, in summarizing the environmental data, you can see that there doesn't seem to be a great deal of harm — there doesn't seem to be any significant harm, much less the significant harm referred to in the statute.

Let me say a little bit of something about our land, because from what I can tell we are — Elkins Kelly Lands are one of those to be most impacted. On just one tract of land on the southern edge of what was originally proposed of the Rare II Study Area, our core drillings over the past couple of months have disclosed the existence of almost three million tons of high grade coal; that's from Peerless and Sewell B Seams that is met grade coal.

And what is the going rate now, forty dollars a ton? You can start working out what that would mean to the economy of this area. I might add, since the question has been raised about access, that there are existing roads in there that the improvement in roads that would have to be added are somewhere between one-half — less than one mile, a couple of thousand yards at most it seems, from what we can determine.

And the portal question we've looked at also would show that perhaps with one portal at a time — at most, two — operating sometimes on the land, this coal could be extracted with no great environmental problem.

Now, I notice Governor Rockefeller

this past Sunday had an article in one of the papers in which he lamented the fact that people seemed to be moving to the Sun Belt and said that's because they are moving to where the jobs are. There's no point in them staying in Appalachia if there aren't jobs.

I think this is a concern that has to be considered in any calculation by the Office of Surface Mining. I also suggest they take a look at statements and Court actions by the present Secretary Watt, who has taken a very strong view over the past few years in favor of multiple land use where land can be used for different purposes without undue harm, and it should be used in that way.

Now, I realize that the time that OSM has to put together its document is relatively short; very little time remains. I would suggest at least consider one option, and that is to treat the petition submission not as one document — because you remember there was a petition, there was a supplemental petition greatly enlarging the previous one, and there was an amended version of that.

And if they feel the time is really required to do an adequate job in summarizing these conclusions, they take advantage of the last valid petition date which would give them until June to make some sort of decision.

And finally, in conclusion, I would suggest this: As you can see, the statutory requirements for land to be declared unsuitable for mining just do not seem to be met. There does not seem to be any significant environmental damage.

The only objection you can see to mining would be a general attitude of, "We don't want mining." I can't argue with that. The only thing I can see is the factual basis on which OSM must decide seem to be lacking in this case.

And if I may respectfully suggest to that office, I think the legal grounds therefore for a declaration of unsuitability for mining does not exist anywhere in the petition area. Thank you.



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## Runoff and Sediment Yield Following Mulch and Soil Stabilizer Treatments

by William T. Plass

U. S. Forest Service (retired)

### ABSTRACT

Selected mulches and soil stabilizers will provide short term site protection while a vegetative cover becomes established. Long and short fibered mulches and chemical soil stabilizers were evaluated in this study to determine their effectiveness in reducing runoff and sediment yield.

The long fibered mulches, straw, shredded hardwood bark, composted municipal waste, and Verdyol were more effective than short fibered mulches or soil stabilizers. However, treatment costs may be higher for these products.

The short fibered mulches, wood fiber, wood cellulose, paper, and agro-mulch were partially effective at application rates of 1000 pounds per acre. There is evidence that these would be more effective at application rates of 1500 pounds per acre.

The short fibered mulches may be combined with soil stabilizers. These treatments are more effective in reducing runoff and equal in effectiveness in reducing sediment yield when compared with the short fibered mulches used alone.

Chemical soil stabilizers are effective at 50 to 100 gallons per acre application rates. All products tested were more effective at 100 gallon per acre application rate and a dilution ratio of 1 to 9.

Some degree of erosion control may be achieved on land disturbance

resulting from mining or construction activities by using one of several mulches or soil stabilizers. The effectiveness of an erosion control treatment often is judged by vegetation response and a reduction in sediment yield. There is evidence that the volume of surface runoff may also be controlled with mulches or soil stabilizers. A reduction in surface runoff directly affects the erosion process and may increase the moisture available for plant growth. Thus it is reasonable to assume that selected mulches or soil stabilizer treatments may be used to achieve more of the following reclamation objectives: more rapid establishment of vegetation, less erosion, and a reduction in the volume of surface runoff.

The Forest Service has been evaluating products and methods for controlling erosion for several years. Many tests have been made on large field plots. These provided information on the compatibility between the wide range of mulches and soil stabilizers and vegetation establishment and growth. Beginning in 1977, an experimental procedure was developed that used milacre plots to compare sediment yield and surface runoff following selected erosion control treatments. Twenty-six erosion control treatments using 17 mulches and soil stabilizers were evaluated by this system during a 3 year period.

Two types of erosion control materials are recognized. Mulches include a wide range of materials that have either long or short fibers. They are applied to the surface to modify rainfall impact and intercept sediment particles carried by surface runoff. Soil stabilizers are liquid chemicals applied to the surface in aqueous solutions. They are intended to bind the soil particles together to resist detachment by rainfall impact and movement by surface runoff.

The primary function of a mulch or soil stabilizer treatment is to provide short term protection of a site until an effective vegetative cover can be established. Although many factors affect the establishment and growth of grasses and legumes, an acceptable vegetative cover can be established on most sites within a 6 to 10 week period.

This experiment was located in a field on a gentle slope with a western exposure. The randomized block design had three replications with six treatments per replication. The mulch and soil stabilizer treatments were randomly assigned to plots within each replication. Each plot was a plywood box having a surface area of 1 milacre. The boxes were constructed to provide uniform slopes of 10 degrees and slope lengths of 6.6 feet. Soil from the experimental area was used to fill the boxes. The soil in the boxes was allowed to settle before the treatments were ap-



plied. No mechanical compaction was used. Soil depth in the boxes ranged from 30 to 12 inches. Moisture could drain through the soil in the box into the undisturbed soil below. Average particle size distribution of the soil was determined by screening samples from five boxes:

Particle size	Percent of total
< ¼ inch	3.3
> ¼ inch - 2 mm	8.1
> 2 mm - 1 mm	8.0
> 1 mm - ½ mm	13.3
½ mm or less	67.3
Total	100.0

A covered gutter on each plot collected sediment and runoff. Runoff was collected in a 5 gallon container. Sediment yield represents the oven dry weight of sediment deposited in the gutter plus sediment carried into the 5 gallon container by surface runoff. A 1 pint sample of well mixed runoff solution from each container was oven dried. The weight of the sediment in this sample was used to compute the sediment in the total runoff volume. The container had adequate capacity for runoff from most precipitation events, but overflowed during a few high intensity or large volume storms. Runoff estimates for these storms were not included in treatment comparisons but sediment determinations were made for the collected runoff. Sediment lost in the overflow of the 5 gallon containers was considered minimal since the percentage of the total sediment yield carried by the runoff was small.

Test materials were applied by appropriate methods. Mulches were distributed by hand or sprayed on with a 5 gallon hydromulcher. Soil stabilizers were sprayed on with a 1 gallon garden sprayer or a 5 gallon hydromulcher. The soil was scarified with a garden rake immediately prior to treatment application.

All plots were kept free of vegetation during the observation period.

All volunteer vegetation was removed while it was very small so that removal caused minimal disturbance to the treated surface.

During a 3 year period these boxes were used for five separate comparisons of selected mulches and chemical soil stabilizers. In 1977, six mulching treatments were compared. In 1978 and 1979 two evaluations were made, six mulches were tested in one experiment then six stabilizers were evaluated. After each test all evidence of the treatment was removed. Additional soil was applied if needed and the surface was thoroughly scarified with a garden rake. Observation periods for each evaluation ranged from 6 to 8 weeks. This approximates the time required to establish an effective vegetative cover. Precipitation events during each observation period were documented by a recording rain gage.

**RESULTS FOR MULCHES**  
The treatments selected for comparison in each of the three comparisons of mulching treatments is shown in Table 1. Rates of application conform to the manufacturers recommendations, are consistent with current practices, or were selected on the basis of past experience. The straw-Verdyol treatment in 1977 was an error. Straw was the intended material but Verdyol was applied. It was decided to place straw on top of the Verdyol to assess the results for a very intensive treatment. This is not considered a practical treatment for large acreages.

Table 1.—Mulching treatments	
Year	Material and rate of application
1977	Straw (1½ ton/acre) plus Verdyol <sup>1</sup> (1 ton/acre)
	Shredded hardwood bark (40 cu yd/acre)
	Composted municipal waste <sup>2</sup> (10 ton/acre)
	Verdyol (1 ton/acre) plus Complex 50 stabilizer (130 lb/acre)

	Wood fiber (1000 lb/acre)
	Wood Fiber (500 lb/acre) plus Curasol AK stabilizer (50 gal/acre)
1978	Wood fiber (1500 lb/acre)
	Wood fiber (1000 lb/acre)
	Wood cellulose (1000 lb/acre)
	Wood fiber (500 lb/acre) plus Aerospray 70 stabilizer (25 gal/acre)
	Shredded paper (1000 lb/acre)
	Pelleted cleanings <sup>3</sup> (1000 lb/acre)
1979	Straw (1½ ton/acre)
	Verdyol (1000 lb/acre)
	Wood fiber (1000 lb/acre)
	Shredded Paper (1000 lb/acre)
	Agro-mulch <sup>4</sup> (1000 lb/acre)
	Wood fiber (500 lb/acre) plus Genaqua 743 stabilizer (25 gal/acre)

NOTE:  
<sup>1</sup> Verdyol—chopped straw, paper, and cotton.  
<sup>2</sup> Composted municipal waste—all components of municipal garbage including glass and plastics  
<sup>3</sup> Pelleted screenings—vegetative waste material from a seed cleaning operation compressed into pellets.  
<sup>4</sup> Agro-mulch—a blend of wood chips, paper, and other fibers.

**Precipitation**  
Total daily precipitation for each of the three observation periods is as follows: 1977, 3.85 inches; 1978, 3.70 inches; and 1979, 5.85 inches. A description of the events immediately proceeding measurements of runoff and sediment are shown in Table 2. Runoff exceeded the capacity of the collection containers for all treatments during events 1 and 4 in 1978 and events 1, 4, and 5 in 1979.

**Runoff**  
Variations in runoff volume between treatments for each of the 3

Table 2.—Description of rainfall events during mulch evaluations

Year	Event	Measurements	Description of event
1977	1	RS	0.25" in 1 hr—8 hrs no rain—0.25" in 3 hrs
	2	R	0.20" in 1 hr—8 hrs no rain—0.15" in 1 hr—10 hrs no rain—0.10" in 2 hrs.
	3	R	0.25" in ½ hr—6 hrs no rain—0.15" in 2 hrs
	4	RS	0.50" in 1 hr
	5	RS	0.50" in 2 hrs—3 hrs no rain—0.10" in ½ hr
1978	1	RS	0.45" in 8 hrs—14 hrs no rain—0.80" in ½ hr
	2	R	0.15" in 2 hrs—15 hrs no rain—0.10" in ½ hr—14 hrs no rain—0.25" in 4 hrs
	3	R	0.15" in ½ hr—19 hrs no rain—0.05" in ½ hr
	4	RS	0.10" in ½ hr—2 hrs no rain—0.45" in ½ hr
	5	R	0.30" in 2 hrs
	6	RS	0.35" in 4 hrs
	7	R	0.15" in ½ hr
1979	1	RS	0.25" in 10 hrs—7 hrs no rain—1.25" in 4 hrs
	2	RS	0.55" in 18 hrs
	3	R	0.55" in 10 hrs
	4	R	0.90" in 16 hrs
	5	RS	0.65" in 20 hrs
	6	R	0.25" in 2 hrs
	7	RS	1.20" in 10 hrs

NOTE: R—Runoff was measured after this event  
S—Sediment was measured after this event

Table 3.—Average gallons of runoff by treatment and precipitation event—mulching evaluations

Year	Treatment	Precipitation event				Total runoff
		(1)	(4)	(5)		
		(gallons per milacre)				
1977	Straw + Verdyol.....	.31	.07	.03		.41
	Bark.....	.31	1.37	.64		2.32
	Compost MW.....	.51	2.47	2.35		5.33
	Wood fiber — 1000.....	.86	3.24	4.65		8.75
	Verdoyl + Complex 50.....	.87	2.29	1.28		4.44
	Wood fiber—Curasol AK.....	1.55	2.16	5.21		8.92
		(2)	(3)	(5)	(6)	
1978	Wood fiber — 1500.....	.89	.26	4.70	4.96	10.81
	Wood fiber — 1000.....	.60	.29	4.96	4.28	10.13
	Wood cellulose.....	.29	.12	4.43	4.06	8.90
	Wood fiber + Aerospray 70.....	.40	.17	4.34	3.02	7.93
	Paper.....	1.09	.51	4.94	4.97	11.51
	Pellets.....	.87	.46	4.71	4.52	10.56
		(2)	(3)	(6)	(7)	
1979	Wood fiber + Genaqua 743.....	1.77	1.09	.005	5.02	7.85
	Verdyol.....	2.75	1.57	.016	5.37	9.726
	Wood fiber — 1000.....	4.76	2.32	.590	6.11	13.780
	Paper.....	2.92	1.92	.005	5.20	10.045
	Agro-mulch.....	3.12	2.47	.161	5.80	11.551
	Straw.....	2.24	.84	.006	5.72	8.806



years were evaluated by analysis of variance. Significant differences occurred between treatments in 1977 when mulches with a wide range of physical characteristics were evaluated (Table 3). The straw-Verdyol treatments had significantly lower runoff than all other treatments. There was no significant difference between runoff for shredded hardwood bark or Verdyol-Complex 50 treatments. The runoff from the shredded bark treatment was significantly lower than runoff for the other three treatments. There were no significant differences in runoff for the following treatments: composted municipal waste, Verdyol-Complex 50, wood fiber-Curasol AK, or wood fiber.

In 1978 there was no significant difference between treatments in the volume of runoff. Similarities in the physical characteristics of the

mulches used in these evaluations may have reduced the variation. It is interesting to note that wood cellulose and wood fiber with the stabilizer, Aerospray 70, had consistently lower runoff than the other treatments.

Although the mulches compared in 1979 had a wider range in physical properties, there was no significant difference between treatments in the volume of runoff. Straw and Verdyol, both long fibered mulches, and wood fiber with the stabilizer Genaqua 743, had lower volumes of runoff than the other three treatments.

It is not known if the reduction in runoff volume results from an increase in infiltration or if the mulch absorbs moisture that would otherwise run off. Shredded hardwood bark, Verdyol, and composted municipal waste would absorb more moisture than the short fibered

mulches. The reduction in runoff after the wood fiber with stabilizer treatments may be due to the maintenance of surface porosity during rainfall events. Chemical soil stabilizers bind the soil particles together and may improve surface porosity.

**Sediment Yield**

Sediment yield represents the pounds of sediment collected in the gutters plus estimates of the total sediment in the runoff water. It is believed the methods used provide good estimates of total sediment yield from each milacre plot.

An analysis of variance and Duncan's multiple range test were used to compare differences in sediment yield for the three test periods. Sediment yields for each collection date were used for these analyses.

In 1977, wood fiber and wood fiber

Table 4.—Average pounds of sediment per milacre by treatment and sampling date—mulching evaluations

Year	Treatment	Sample number			Total	
		1	2	3		
(Pounds per milacre)						
1977	Straw + Verdyol .....	.10	.08	.01	.19	
	Bark .....	.16	.10	.02	.28	
	Compost MW .....	.45	.51	.24	1.20	
	Wood fiber — 1000 .....	.93	5.25	2.58	8.76	
	Verdyol + Complex 50 .....	.54	.60	.06	1.20	
	Wood fiber + Curasol AK .....	1.26	4.92	1.44	7.62	
		(1)	(2)	(3)		
1978	Wood fiber — 1500 .....	8.54	3.86	2.94	15.34	
	Wood fiber — 1000 .....	18.13	5.97	5.16	29.26	
	Wood cellulose .....	18.58	7.18	4.68	30.44	
	Wood fiber + Aerospray 70 .....	12.77	5.69	4.62	23.08	
	Paper .....	20.38	7.58	6.16	34.12	
	Pellets .....	38.56	16.60	12.09	51.25	
		(1)	(2)	(3)	(4)	
1979	Wood fiber + Genaqua 743 .....	.61	.10	.31	.18	1.20
	Verdyol .....	1.42	.10	.31	.17	2.00
	Wood fiber — 1000 .....	1.64	.20	.46	.29	2.59
	Paper .....	1.29	.14	.37	.18	1.98
	Agro-mulch .....	1.58	.13	.50	.24	2.45
	Straw .....	.86	.04	.33	.15	1.38

Table 5.—Description of rainfall events during stabilizer evaluations

Year	Event	Measurements	Description of event
1978	1	R	0.95" in 8 hrs
	2	R	0.60" in 2 hrs
	3	RS	0.10" in 2 hrs—7 hrs no rain—0.50" in 10 hrs
	4	R	0.10" in 1 hr—3 hrs no rain—0.50" in 4 hrs
	5	RS	0.33" in 22 hrs
	6	R	1.05" in 1 hr—21 hrs no rain—0.20" in 1 hr
	7	RS	1.35" in 3 hrs
1979	1	RS	0.45" in 1 hr
	2	RS	0.25" in 1 hr
	3	RS	0.85" in 8 hrs
	4	R	0.15" in ½ hr.
	5	RS	0.90" in 14 hrs
	6	R	0.25" in 8 hrs—17 hrs no rain—0.35" in 1 hr

NOTE: R—Runoff was measured after this event  
S—Sediment was measured after this event

with Curasol AH had significantly higher sediment yields (Table 4). There were no significant differences between the other treatments. Lowest sediment yields occurred when shredded hardwood bark and straw-Verdyol were used.

Sediment yield for plots mulched with the seed cleaning pellets was significantly higher than all other treatments in 1978. Wood fiber, 1500 pounds per acre, was the most effective treatment but it was not significantly different from wood fiber-stabilizer treatment. There was no significant difference between paper, wood cellulose, or wood fiber when applied at a rate of 1000 pounds per acre.

There were no significant differences between treatment in 1979. Straw and wood fiber-stabilizer had the lowest sediment yields.

**RESULTS FOR SOIL STABILIZERS**

Evaluations of selected soil stabilizers were conducted during the

summers of 1978 and 1979. Previous field and laboratory tests were used to select the stabilizers used in this study. All materials except DLR-E and Nerosin are commercially available products. DLR-E is an experimental acrylic resin and Nerosin is a petroleum derivative from the Soviet Union. All materials except Nerosin were diluted with water and applied as aqueous solutions. In 1978, the stabilizers were applied at a rate of 50 gallons per acre. The dilution rate was not controlled but is believed to be equivalent: 1 part stabilizer to 19 or more parts water. The application rate in 1979 was 107 gallons of stabilizer per acre. A dilution rate of 1 part stabilizer to 9 parts water was used. Nerosin was applied undiluted at a rate of 1.3 tons per acre in 1978 and 1979. This material must be heated to permit spraying through conventional equipment.

**Precipitation**

Total daily precipitation for each of the observation periods is shown

in Figure 2. Yearly totals were 6.45 inches in 1978 and 3.65 inches in 1979. A description of the precipitation pattern immediately preceding the measurements of runoff and sediment are shown in Table 5. Runoff exceeded the capacity of the collection containers for all treatments during events 6 and 7 in 1978 and event 4 in 1979.

**Runoff**

Variations in runoff volume between stabilizer treatments were significant in 1978 when stabilizers were applied at a rate of 50 gallons per acre and a high dilution rate. Runoff following the Nerosin treatment was significantly higher than all other treatments (Table 6). Aerospray-70 was significantly higher than DLR-E and Soil Seal.

In 1979, when the stabilizers were applied at 107 gallons per acre and a 1-10 dilution rate, there were no significant differences in runoff between treatments. The variations show that DLR-E and Genaqua 743 had the



Table 6.—Average gallons of runoff by treatment and precipitation event—soil stabilizers

Year	Product	Precipitation event					Total runoff
		1	2	3	4	5	
		(gallons per milacre)					
1978	Aerospray 70 .....	1.78	.36	.68	2.86	.68	6.36
	Genaqua 743 .....	.69	.46	.49	2.22	.43	4.29
	Soil Seal .....	.62	.22	.23	1.80	.31	3.19
	DLR .....	.78	.28	.37	2.37	.60	4.40
	DLR-E .....	.39	.23	.13	1.44	.22	2.41
	Nerosin .....	2.95	.66	.94	5.37	1.57	11.49
1979	Aerospray 70 .....	.59	1.76	4.24	3.58	—	10.17
	Genaqua 743 .....	.51	2.02	3.87	3.31	—	9.71
	Curasol AH .....	.91	2.02	3.75	3.95	—	10.63
	DLR .....	1.14	2.15	5.07	5.11	—	13.47
	DLR-E .....	.99	1.67	3.52	3.55	—	9.73
	Nerosin .....	.61	2.24	5.72	5.53	—	14.10

lowest runoff volume and Nerosin the highest.

Runoff will occur when rainfall volume exceeds the infiltration capacity of the soil or if puddling on the soil surface reduces surface porosity. Characteristics of the crust formed by the stabilizers and the soil

particles can affect infiltration rates and the degree of puddling that occurs during a rainfall event. Differences exist in the percentage of solids in a stabilizer. Therefore, when stabilizers are applied at a uniform rate, the product with the highest percentage of solids could result in a crust

with lower porosity than a stabilizer with a lower percentage of solids. It is also possible that porosity of the crust may relate to physical characteristics of the plastic film after the stabilizer cures. These variables were not considered in this study.

Table 7.—Average pounds of sediment per milacre by treatment and sampling date — soil stabilizer

Year	Product	Collections					Total sediment
		1	2	3	4	5	
		(pounds per milacre)					
1978	Aerospray 70 .....	.60	.21	30.35	—	—	31.16
	Genaqua 743 .....	.27	.11	19.63	—	—	20.01
	Soil Seal.....	.19	.07	11.40	—	—	11.66
	DLR .....	.22	.14	11.08	—	—	11.44
	DLR-E.....	.26	.06	8.61	—	—	8.93
	Nerosin.....	.80	.24	16.81	—	—	17.85
1979	Aerospray 70 .....	.71	.07	.59	.10	.05	1.52
	Genaqua 743 .....	.82	.15	.44	.11	.06	1.58
	Curasol AH.....	.55	.18	.42	.11	.07	1.33
	DLR .....	.81	.07	.71	.13	.10	1.82
	DLR-E.....	.55	.28	.42	.10	.05	1.40
	Nerosin.....	3.93	.29	3.52	.32	.11	8.17

Sediment yield

There were no significant differences in total sediment yield between treatments in 1978 (Table 7). The acrylic resins, Soil Seal, DLR and DLR-E had lower sediment yields than the polyvinyl acetates Aerospray 70 and Genaqua 743.

In 1979, the sediment yield for Nerosin was significantly higher than all other stabilizer treatments. There were no significant differences between the acrylic resins and the polyvinyl acetates. Curasol AH and DLR-E had the lowest sediment yields.

During the 1978 and 1979 observation periods there was no apparent breakdown in the crusts by weathering processes. These stabilizer treatments apparently will remain effective for at least 6 to 8 weeks. This time interval is adequate for the establishment of an herbaceous ground cover.

SUMMARY

Selected mulches and soil stabilizers will provide short term site protection while a vegetative cover becomes established. This study identified several effective erosion control treatments utilizing long and short fibered mulches and chemical soil stabilizers.

The long fibered mulches are grouped together as they effectively dissipate rainfall impact when used at recommended application rates. Reclamation costs may be higher for these materials because seed and fertilizer cannot be applied at the same time or with the same equipment used to apply most long fibered mulches.

Straw (1½ tons/acre) with Verdyol (1 ton/acre) was the most effective

tive treatment in these evaluations. Shredded hardwood bark (40 cubic yards/acre) while less effective than the straw-Verdyol treatment, was more effective than the other long fibered mulches. Straw (1½ tons/acre), composted municipal waste (10 tons/acre), Verdyol (1 ton/acre) with Complex 50 (130 lbs/acre), and Verdyol (1000 lbs/acre) were comparable treatments. Verdyol is the only long fibered mulch that can be applied with a hydroseeder.

The short fibered mulches such as wood fiber, wood cellulose, paper and agro-mulch are grouped together as they have similar physical characteristics. These materials have a low resistance to rainfall impact and are less effective than the long fibered mulches in reducing runoff and sediment yield. An effective minimum rate of application for these products is 1000 pounds per acre. Wood fiber applied at 1500 pounds per acre was more effective than wood fiber, wood cellulose, or paper at 1000 pounds per acre. Therefore, higher rates of application may result in less runoff and sediment yield.

Wood fiber (500 lbs/acre) with 25 gallons of a chemical soil stabilizer was more effective than wood fiber applied at 1500 or 1000 pounds per acre in reducing runoff and at least equal to wood fiber (1000 lbs/acre) in reducing sediment yield. All chemical soil stabilizers used in these evaluations could be used with the other short fibered mulches with comparable results.

Chemical soil stabilizers provide additional treatment options. Not only can they be used as chemical tacks for the long and short fibered mulches, they are effective when used alone. There are many products on

the market but the stabilizers used in these evaluations have proven to be the most effective in extensive testing. The product, rate of application, and dilution rate determine the effectiveness of stabilizer treatments for controlling sediment yield. Runoff appears to relate more to product than rate of application or dilution ratio.

Consistently lower runoff was recorded when the acrylic resin DLR-E was used. The acrylic resins, DLR, Soil Seal, and DLR-E were more effective in reducing sediment yield than the polyvinyl acetates at application rates of 50 gallons per acre and high dilution ratios. There was no difference in sediment yield when the stabilizers were applied at 100 gallons per acre in a 1 to 9 dilution ratio.

Although no direct comparisons were made between short fibered mulches and soil stabilizers, the combined results for tests conducted during the calendar years 1978 and 1979 provide a basis for some general conclusions. Total rainfall was 9.95 inches during the two mulch tests and 10.10 inches during the two stabilizer trials. Combining total runoff and sediment yield for the mulches and the soil stabilizers showed a reduction in both variables of approximately one-third when stabilizers were used. It can be assumed that the stabilizers are at least as effective and probably more effective than the mulch treatments in reducing runoff and sediment yield. This assumption is supported by evidence from direct comparisons of mulches and wood fiber-stabilizer treatments. The wood fiber-stabilizer treatments were consistently more effective than the other short fibered mulches.



# Organic and Inorganic Amendments Affect Vegetation Growth on an Acidic Minesoil

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## ABSTRACT

Organic amendments may be included in minesoil revegetation treatments to produce high density ground covers or increase the yield of pasture and forage crops. They may also provide an alternative to the "topsoiling" requirements under current surface mining laws and regulations. In this study, shredded hardwood bark, composted municipal waste, and a tannery waste were applied to an acidic minesoil. Supplemental inorganic amendments including fertilizer, agricultural lime, and an alkaline waste from an SO<sub>2</sub> scrubber system were applied alone and in combination with the organic amendments. Treatment comparisons were based on vegetation response and chemical and physical characteristics of the minesoil after treatment. The data indicate organic amendments are not required for vegetation establishment but some reduced the time required to achieve an acceptable vegetative cover. Site characteristics, land use objectives, and the availability of organic materials, will determine which amendment is appropriate for a specific site.

Nutrient availability, microbiological activity, and moisture efficiency are directly and indirectly affected by the organic matter in a soil. Organic matter is an important component of productive forest soils. Many of the less productive forest soils occurring in the coal producing regions of the Appalachians have relatively low

percentages of organic matter. Fresh minesoils are generally deficient or lacking in this valuable component.

Previous research has been concerned with the use of organic materials as amendments for toxic spoils where other treatments have failed. Sutton (1973), Sopper (1972, 1974), Lejcher (1974), and Scanlon (1973) demonstrated that sewage sludge, manure, and composted municipal waste can be used to achieve some degree of vegetative success on toxic spoils.

The successful revegetation of thousands of acres of non-toxic minesoil using inorganic fertilizer with or without lime, demonstrate that organic amendments are not essential for vegetation establishment. However, it is believed that a high density herbaceous cover can be achieved in less time and that yields of pasture and forage crops will be higher when organic amendments are used. It has also been suggested that organic amendments provide an alternative to the "topsoiling" requirements under current surface mining laws and regulations.

In this study shredded hardwood bark, composted municipal waste, and tannery waste were applied and disced into an acidic minesoil. We compared vegetation response and chemical and physical characteristics of the minesoil after these organic amendments had been applied. Fertilizer, agricultural lime, and an alkaline waste from an SO<sub>2</sub> scrubber

system were evaluated as supplemental amendments.

## METHODS AND MATERIALS

The three organic amendments, shredded hardwood bark, composted municipal waste, and tannery waste, represent materials having a wide range in physical properties and chemical composition. Shredded hardwood bark is a waste product from sawmills using debarkers. The bark is processed by passing it through a shredding machine that reduces the bark fragments to a more uniform size. Bark from many species of Appalachian hardwoods may be included but the oaks probably represent the greatest volume.

Composted municipal waste contains all materials commonly found in municipal garbage, including glass and plastics. A process that includes shredding, grinding, and composting, produces a granular product. The composting process minimizes or eliminates pathogenic hazards. Potential plant and animal toxicities are controlled by excluding industrial wastes.

Tannery waste contains the organic residues and the chemical effluents from a tannery. This effluent is discharged into settling ponds to allow the solids to settle. It is an alkaline material with a high moisture content and the consistency of fresh manure.

Shredded hardwood bark was applied at a rate equivalent to 30 to

40 cubic yards per acre, composted municipal waste at 7 to 10 tons per acre, and tannery waste at 7 to 10 tons per acre, air dried weight. The bark and the municipal waste were applied with an Estes aerospreader. The tannery waste was spread by hand; however, a conventional farm manure spreader would provide a more efficient system for spreading tannery waste on large acreages.

A split-plot experimental design was selected for this study. Each of the organic amendments and an untreated control were randomly assigned to one plot in each of three blocks (Figure 1). Each block had one common side with another block. The plots were subdivided into four subplots. Three inorganic amendment treatments were randomly assigned to three subplots. The fourth subplot was not treated with inorganic amendments. Diammonium phosphate fertilizer (18-46-0) was applied at a rate of 300 pounds per acre alone, and in combination with lime and scrubber waste. Agricultural limestone, the second inorganic amendment, represents a treatment often recommended for acidic minesoils. The third inorganic amendment, scrubber waste, was a waste product from an SO<sub>2</sub> scrubbing system, for a coal burning electric generating plant. In this system, limestone is used to remove SO<sub>2</sub> and other pollutants. The limestone must be replenished periodically and the residual material represents a large volume industrial waste. It was included in the study to determine its potential for mined land reclamation. The limestone and scrubber waste had similar calcium carbonate equivalents and both were applied at a rate of 3 tons per acre.

The study area is located on a relatively flat bench on a surface mine in Randolph County, West Virginia. A coarse textured shale and sandstone overburden was top-dressed with 4 to 6 inches of soil. The top dressing was a mixture of the B and C horizons from a forest soil. Little or no A horizon was found at this site. This procedure is typical of many mining

operations in West Virginia. Laboratory analyses of this top-dressing showed pH ranged from 3.7 to 4.4 and there was a deficiency of phosphorus. The soil texture was sandy loam to sandy clay loam.

The organic and inorganic amendments were applied, the plots were disced, and the following seed mixture was sown:

Species	Pounds per acre
"K-31" tall fescue .....	10
Orchardgrass .....	5
Red clover .....	3
Alsike clover .....	2
Kobe lespedeza .....	5
Birdsfoot trefoil .....	5
Crownvetch .....	3

The study was established in May 1977. During the first three growing seasons, vegetative yield was determined by clipping a 4-square foot quadrat within each subplot. The green weight of all living plants was used to compare vegetation response to treatments.

Prior to the third clipping, the percent ground cover within each quadrat was estimated. The percentage of the total ground cover contributed by legumes was then estimated. These two estimates were used to obtain the percentage of each quadrat covered by legumes.

At the end of the first growing season the bulk density of the surface 6 inches was determined by the rubber-balloon method. Water holding capacity and total pore space were determined by conventional laboratory methods for soil particles 2 mm or less in size.

After three growing seasons, a sample was collected of the surface 6 inches of minesoil in each subplot to compare selected chemical characteristics. Specific conductance and pH were determined by conventional methods using a spoil and distilled water mixture. Available phosphorus was determined by the Bray No. 1 extractant solution. The titration method developed by Yuan was used to determine exchangeable acidity and aluminum. Available calcium, magnesium, and potassium were

determined by atomic absorption methods.

## VEGETATION RESPONSE

The green weights of all plant materials removed from each quadrat at each clipping date were used to compare vegetative response to the organic and inorganic treatments. An analysis of variance and Duncan's multiple range test were used as statistical analyses.

During the first growing season there was no significant difference in yield between plots treated with the organic amendments or in interactions between the organic and inorganic amendments. The inorganic amendments significantly influenced vegetation growth. Plots treated with lime and fertilizer and scrubber waste and fertilizer produced the highest yield (Table 1). There was no significant difference between these treatments. The plots treated with lime and fertilizer had significantly higher yields than plots treated with fertilizer alone.

After two growing seasons, there was a significant difference in yield between plots treated with organic amendments. Neither the inorganic amendments nor the interaction between organic and inorganic amendments significantly affected yield. The yields were highest on plots treated with municipal and tannery waste.

Both treatments had significantly higher yields than the shredded bark treatment or the control, but they were not significantly different from each other. The shredded bark plots had significantly higher yields than the control plots.

During the third growing season both organic and inorganic amendments significantly affected yields and there was a significant difference in yield between replications. The interaction between organic and inorganic amendments was not significant. The municipal waste treatment had significantly higher yields than all other organic amendments and the control plots. Yields following the tannery waste treatment were



higher than the shredded bark treatment or the control. There was no significant difference between yields for the shredded bark treatment or the control.

Plots treated with lime and fertilizer and scrubber waste and fertilizer had significantly higher yields than fertilizer alone or the control. Although there was no significant difference in yield between the lime and fertilizer and scrubber waste and fertilizer plots the lime and fertilizer treatment had consistently higher yields than the scrubber waste fertilizer treatment.

Significant differences in yield between replications developed during the third growing season. Chemical characteristics of the minesoil showed the replication with the lowest yield had significantly lower exchangeable aluminum and available phosphorus. Although not statistically significant the replication with the lowest yield also had the highest median pH and mean specific conductance. Exchangeable acidity and available potassium were low and there was no consistent trend for calcium or magnesium.

Species composition is an important consideration in treatment comparisons. The species of grasses and legumes in the mixture have a range of tolerances to toxic ions, nutrient requirements, and compatibility with associated plants. These treatments may affect each of these tolerance factors directly or indirectly. The legumes are more responsive to toxicities, nutrient availability and competition than many grass species. Therefore, the percentage of the ground cover contributed by legumes was related to the treatments. Each of the organic amendments when used alone increased the percentage of legumes on the plots (Table 2). The use of fertilizer with the organic amendments caused a slight increase in the percentage of legumes. The addition of lime or scrubber waste and fertilizer created conditions that allowed the legumes to dominate the cover. This occurred for all organic amendments as well as the control.

Birdsfoot trefoil dominated the legume cover but red clover and crownvetch contribute on many plots. Alsike clover and Kobe lespedeza were not present after three growing seasons although they were included in the seed mixture. Crownvetch was found on all plots treated with lime or scrubber waste. It was also found on plots treated with tannery waste and fertilizer.

PHYSICAL PROPERTIES

One year after treatment bulk density, total pore space, and moisture holding capacity were determined for selected treatment combinations. No samples were collected on plots treated with fertilizer alone, or in combination with the organic amendments.

There was no significant difference between treatments for bulk density or total pore space (Table 3). Analyses of the moisture holding capacity show that subplots treated with scrubber waste had significantly lower moisture holding capacity than the untreated control or the plots treated with lime. There was no significant differences in water holding capacity between the organic amendments.

CHEMICAL PROPERTIES

At the end of the third growing season, samples were collected from each subplot to assess the chemical characteristics of the minesoils. Parameters included were pH, specific conductance, exchangeable acidity, exchangeable aluminum, and available phosphorus, potassium, calcium, and magnesium. All data was analyzed statistically using an analysis of variance and Duncan's multiple range test.

Minesoil pH and specific conductance were significantly influenced by the organic amendments but not the inorganic amendments (Table 4). The tannery waste treatment resulted in significantly higher values for both variables than all other treatments. Minesoils on the control plots had the lowest pH values. There was no significant difference in specific con-

ductance for the control or the shredded bark and municipal waste treatments.

Both organic and inorganic amendments reduced exchangeable acidity and exchangeable aluminum. Tannery waste treatments had significantly lower levels than all other treatments. All organic amendment treatments were lower than the control. Lime and scrubber waste significantly reduced exchangeable acidity and exchangeable aluminum, but there was no significant difference between these treatments.

The analyses show the tannery waste treatment and the untreated control had significantly higher levels of phosphorus than the bark or composted municipal waste treatments. The low levels of phosphorus on the bark and municipal waste plots may reflect an interaction between the organic amendment and the available phosphorus. The inorganic amendments did not affect phosphorus levels. There were highly significant differences in available phosphorus between replications with replication means ranging from 38.4 to 9.7 ppm.

There were no significant differences in potassium between plots treated with organic or inorganic amendments.

The tannery waste treatment greatly increased calcium and magnesium levels, but there was no significant difference between the other two organic amendment treatments or the untreated control. The lime and scrubber waste treatments significantly increased calcium but not magnesium.

RESULTS

The results of this study indicate several organic and inorganic amendment options may be useful for establishing an herbaceous cover on acidic minesoil. Justification for use of these amendments include more rapid establishment of an effective cover and higher yields of pasture and forage crops.

The time required to establish an effective cover is an important con-

sideration on many mine sites. Therefore, the time required to produce an effective ground cover, 1000 pounds of green forage per acre, provides a basis for reviewing the treatment options.

An effective ground cover cannot be established on this minesoil without organic or inorganic amendments. Acidity and exchangeable aluminum are believed to be contributing factors. The addition of 300 pounds of diammonium phosphate fertilizer alone did not increase yields. However, when fertilizer and lime or scrubber waste are used an effective cover was achieved during the second growing season. These treatments are also favorable for legume growth.

When composted municipal waste or tannery waste were used, an effective cover developed the second growing season without the benefit of fertilizer, lime, or scrubber waste. Shredded hardwood bark was less effective and required 3 years. These organic amendments reduced active acidity, exchangeable acidity, and exchangeable aluminum.

The use of fertilizer with the three organic amendments did not appreciably reduce the length of time required to achieve an effective cover. It did increase yields when used with shredded bark and composted municipal waste.

Where lime and fertilizer were used with the organic amendments, an effective cover with a high percentage of legumes developed the first growing season. Scrubber waste with fertilizer and the organic amendments were less effective than lime but an effective cover was achieved in the first or second growing season.

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Table 1.—Average green weight yield for three growing seasons

Inorganic amendments	Organic amendments											
	Control			Shredded bark			Composted municipal waste			Tannery waste		
	No amendments			Growing season			Growing season			Growing season		
	1	2	3	1	2	3	1	2	3	1	2	3
Thousand pounds per acre												
Control—												
No amendments	*	*	.4	*	.1	1.3	.4	1.1	5.5	.4	2.3	4.4
Fertilizer	*	*	.5	.3	.9	1.8	.9	1.5	7.2	.8	2.1	4.7
Lime +												
Fertilizer	.2	1.5	7.2	1.0	1.8	7.4	1.2	2.0	9.0	1.3	1.8	9.1
Scrubber waste												
+ fertilizer	.3	1.2	7.1	1.1	1.9	6.0	.9	2.2	7.7	.9	2.0	5.3

\* = Average less than 100 pound per acre.



Table 2.—Percentage of ground cover provided by legumes at the end of the third growing season

Inorganic amendments	Organic amendments			
	Control	Shredded bark	Composted waste	Tannery waste
		percent		
Control	26	34	47	40
Fertilizer	21	36	53	52*
Lime + fertilizer	80*	68*	80*	62*
Scrubber waste + fertilizer	63*	68*	67*	58*

Note: An asterisk (\*) indicates the occurrence of crown vetch on one or more subplots.

Table 3.—Physical properties of mine soils one year after treatment

Treatment	Bulk density	Pore space	Moisture holding capacity
	(g/cc)	(percent)	(percent)
<b>Control</b>			
Control .....	1.45	54.7	8.7
Lime + fertilizer .....	1.38	59.2	9.7
Scrubber waste + fertilizer .....	1.34	60.5	8.5
Mean .....	1.39	58.1	8.9
<b>Shredded bark</b>			
Control .....	1.30	62.6	10.6
Lime + fertilizer .....	1.14	69.5	10.7
Scrubber waste + fertilizer .....	1.27	62.5	8.2
Mean .....	1.24	64.9	9.8
<b>Municipal waste</b>			
Control .....	1.22	69.7	10.1
Lime + fertilizer .....	1.07	67.5	10.0
Scrubber waste + fertilizer .....	1.22	65.2	9.4
Mean .....	1.17	67.5	9.8
<b>Tannery waste</b>			
Control .....	1.22	65.8	11.5
Lime + fertilizer .....	1.27	61.5	10.4
Scrubber waste + fertilizer .....	1.18	64.9	9.9
Mean .....	1.22	64.1	10.6

Table 4.—Minesoil chemical characteristics 3 years after treatment

Treatment	Median pH	Specific conductance (mmhos/cm)	Exchangeable		P	Available		
			acidity	aluminum		K	Ca	Mg
			(me/100g)			(ppm)		
<b>Control</b>								
Control .....	3.9	.060	3.8	3.0	31	43	84	26
Fertilizer .....		.088	2.5	2.2	31	43	68	50
Lime + fertilizer .....		.031	2.4	2.1	52	41	338	47
Scrubber waste + fertilizer .....		.058	2.5	2.1	36	44	338	35
Mean .....		.059	2.8	2.4	37	43	207	33
<b>Shredded bark</b>								
Control .....	3.9	.036	2.4	2.2	9	37	556	48
Fertilizer .....		.028	2.3	2.1	41	19	61	8
Lime + fertilizer .....		.092	.7	.6	15	35	465	65
Scrubber waste + fertilizer .....		.062	.6	.4	14	99	666	66
Mean .....		.055	1.5	1.3	20	47	437	47
<b>Municipal waste</b>								
Control .....	4.2	.079	3.2	2.4	12	40	159	20
Fertilizer .....		.034	1.8	1.6	7	30	185	15
Lime + fertilizer .....		.079	.5	.4	17	35	753	27
Scrubber waste + fertilizer .....		.046	1.3	1.0	16	28	419	15
Mean .....		.060	1.5	1.4	13	33	379	19
<b>Tannery waste</b>								
Control .....	4.8	.281	.2	.1	32	52	2290	136
Fertilizer .....		.162	.8	.8	17	29	1364	227
Lime + fertilizer .....		.208	.7	.7	39	65	831	103
Scrubber waste + fertilizer .....		.158	.2	*	65	40	1447	56
Mean .....		.202	.5	.4	38	46	1483	130

Note: An asterisk (\*) indicates a trace.



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The Symposium was concluded with the Reclamation Awards Luncheon. Left to right are WWSMRA President Ben Greene, DNR Director David Callaghan, OSM Region I Director Patrick Boggs, WWSMRA Vice-President William Raney, and DNR Reclamation Chief Pete Pitsenbarger.



Association Chairman of the Board Lawrence Streets welcomes members and guests to the Eighth Annual West Virginia Surface Mining and Reclamation Symposium.

## 400 attend annual symposium

The Annual West Virginia Surface Mining and Reclamation Symposium has been different each year. Really, it has. It's just the headlines that seem the same. "Regulations dominate symposium," "Government topic of meetings," etc.

Since the Surface Mining Control and Reclamation Act was signed into law in 1977, the industry has been forced to turn its greatest attention from reclamation research to legal compliance. At technical gatherings, program time that might otherwise have been spent teaching successful new techniques, instead has been used to coach coal operators on how to survive the regulatory onslaught.

So it was that the Eighth Annual West Virginia Surface Mining and Reclamation Symposium featured various aspects of the permanent program, as agreed to by the federal Office of Surface Mining, and the West Virginia Department of Natural Resources.

Dealing at last with the permanent program represents a great deal of progress. The 1978 Symposium, held just five months after the legislation was enacted, presented an overview of the new law. By 1979, the interim program was ready for analysis. In 1980, the proposed State program was on the floor, and finally this year, the approved permanent program.

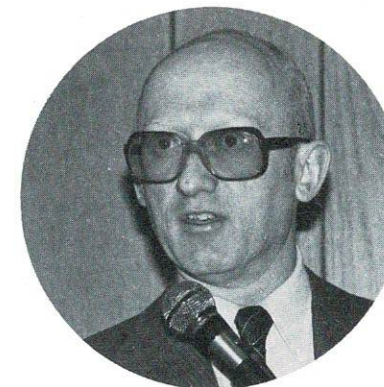
Even this milestone doesn't represent the end of the line. As everyone knows, the times are-a-changin' in Washington, and 1982 will almost certainly bring about a new and improved version of the permanent program.

Another effect of the federal legislation has been to broaden the scope of the Symposium program. Each year the program topics have more application to the underground industry.

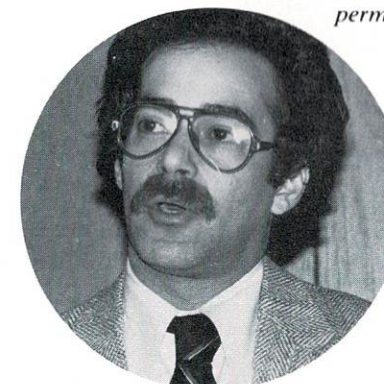
The 1981 agenda, for instance, featured presentations on bonding, unemployment compensation, blasting, groundwater monitoring, and the NPDES program, as well as proposed changes in the Clean Air Act.



Joe Morgan of EPA, NPDES permits.



H. Herchiel Sims, Jr. of Employers Service Corp., Unemployment Compensation.



Dennis Abrams, DNR Panel.



Andy Teeter of McDonough Caperton Shepherd Group, Inc., Bonding.



David Flannery of Love, Wise, Robinson & Woodroe, Clean Air Act.



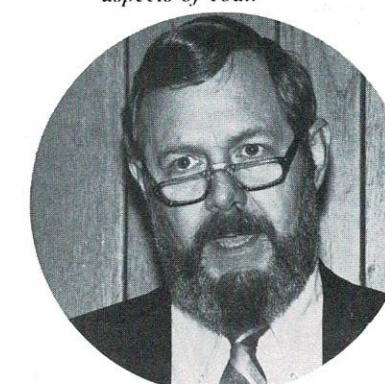
Ricklin Brown of Bowles, McDavid, Graff & Love, Legal aspects of coal.



Edwin K. Wiles of the West Virginia Coal Association, Legislative issues.



Alfred M. Hirsch of Woodward-Clyde Consultants, Groundwater monitoring.



Ted Hillman of Princess Susan Coal Co., Inc., Blasting panel moderator.



# Reclamation Awards



**Brent Wahlquist,  
Bill Brackenridge**

**Carbon Fuel Company** — For superior reclamation accomplishment in the conduct of permitted operation No. 3-79 in the steep slopes of Kanawha County. The installation of permanent drainage control has complimented the long-range environmental integrity of the entire area.

**Eastern Associated Coal Corporation/Bluestone Coal Corporation (Contractor)** — For the effective use of innovative drainage control measures and exceptional reclamation on mountain top operations in McDowell County. The cooperative use and maintenance of haulroads have benefitted the entire area and successful revegetation has provided a dependable source of hay mulch for continuing efforts.



DNR Director David Callaghan (center) presents Reclamation Awards to Don Shupe (left) of Eastern Associated Coal Corp., and George Garland of Bluestone Coal Corp.

**Terry McGaffee  
Odell Rogers**

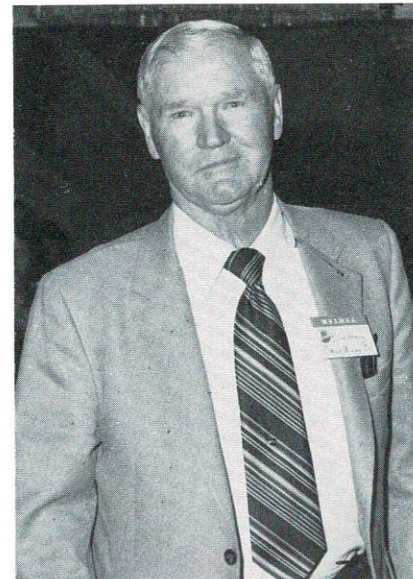
**Rebel Coal Company, Inc.** — Special recognition for excellence in construction control and reclamation of a "chimney-core" valley fill. Completion of this project will result in land with tremendous future use potential, a rare and much needed commodity in Logan County.





**Marrowbone Development Company** — For outstanding environmental awareness in the overall development of a diverse mining complex in Mingo County. The diligent employment of an accurate and practical preplan is exemplified by effective drainage control, dependable haulroad construction and aesthetic preservation.

**Bill Schmid, Ralph Hall, Randall Sartin**



**Ben Henry**

**Omar Mining Company** — For excellence in the conduct of underground and surface operations in Boone County, typified by the installation of a well-designed and functional preplan with outstanding reclamation efforts.

**Mountain Top Fuel Company** — For overall excellence on Randolph County operations characterized by a notable awareness of state requirements with particular emphasis on water quality control and concurrent reclamation in the environmentally sensitive area of Shaver's Fork.

**Ford Riffle**



**Bill Kerns**

**Inter-State Lumber Company, Inc.** — For exceptional cooperation, performance and consistent demonstration of pride in the conduct of mining and reclamation in Preston County. Attention to detail is evident in every aspect of operation on these permit areas.



**Leman Kendrick**

**Wolf Creek Coal Company, Inc.** — Special recognition for overall environmental attention in the development of their mining complex in Braxton County. This special awareness is consistently demonstrated by practical and cooperative preplanning, concurrent reclamation and noted excellence in water management practices.

**Lewis Ellison**

**Campbell Mining Company** — For outstanding performance on operations in the sensitive area of New River Gorge, Fayette County. Emphasis on effective drainage control and concurrent revegetation have provided superior and durable products of acceptable reclamation.

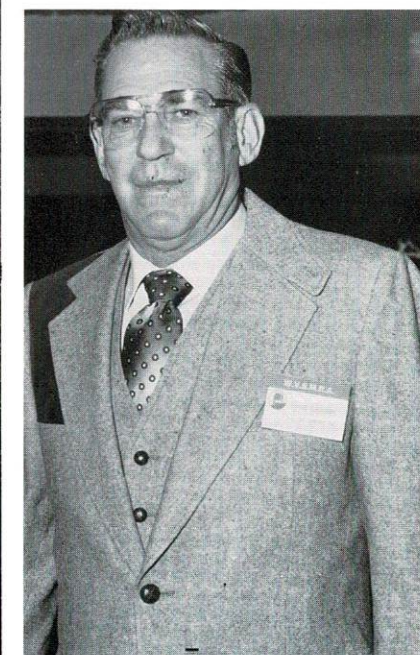
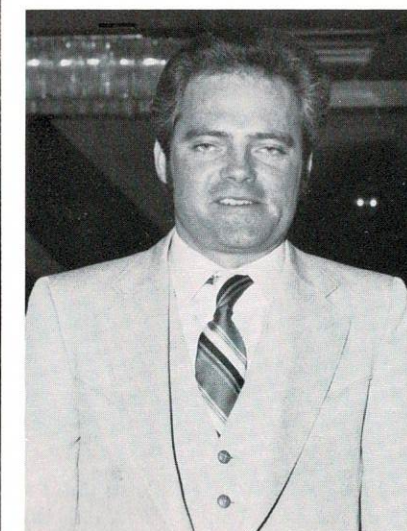


**Albert Barnosky**

**B & B Coal Company, Inc.** — For outstanding reclamation performance during all phases of operation on permit areas in Upshur County with particularly conscientious efforts in pre-planning and maintaining good relationships with surrounding landowners.

**Bell Mining Company** — For superior regrading and reclamation performance under adverse conditions on operations within close proximity to populated areas of Harrison County.

**Frank Miller**



**Richard Schwinabart**

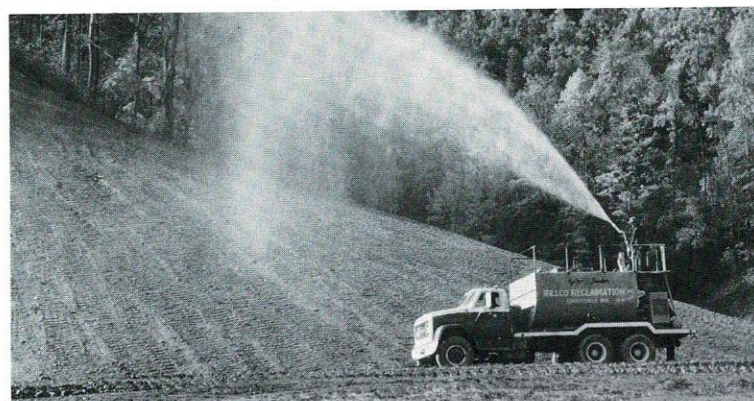
**D & L Coal Company, Inc.** — For outstanding reclamation efforts in transforming abandoned mined land to environmentally sound, aesthetically pleasing and useful Mineral County farmland through effective drainage control and revegetation.



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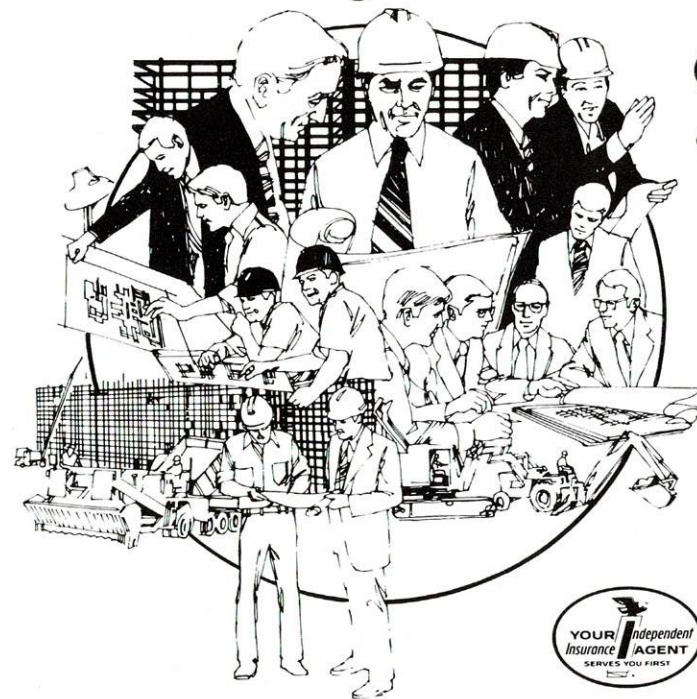
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*Association Board Chairman Lawrence Streets.*

## Semi-Annual Meeting features transportation, markets

Over the last four or five years, Association meetings have tended to be seminars in how to get along with government.

But the coal industry has other problems as well, and some of these were the focus of attention at the Association's 1981 Semi-Annual Meeting in January at Marco Beach, Fla.

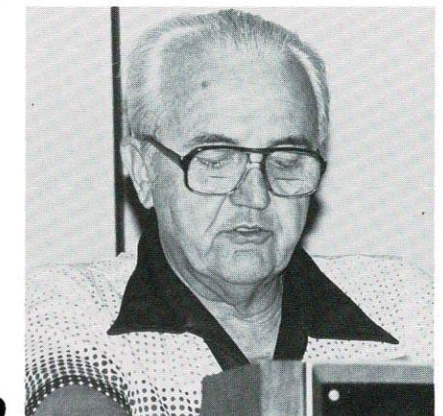
Transportation, for instance, is a source of continual concern to coal operators, large and small. Rate stability, coal car shortages, and port facility backlogs all pose serious questions for the West Virginia industry. These and other subjects were addressed by Bill Bales, vice president for coal and ore traffic of the Norfolk and Western Railway Co.

Market potential is another obvious area of critical interest to operators. The market outlook was covered in a panel format by three potential coal buyers, including

Leroy Gleason of Cincinnati Gas & Electric Co., J. E. Carson of Florida Power & Light Co., and George Ketterer of Jacksonville (Fla.) Electric Authority.

The three day meeting, attended by 300 Association members and guests, culminated in the traditional Saturday night banquet, which featured after dinner speaker Bobby Bowden, head football coach at Florida State University, and former head coach at West Virginia University.

The program also allowed time to indulge in Florida version of winter sports, namely golf, tennis, and fishing. Fil and Ginny Frasher did their usual professional job in running the golf tournaments. Golf competition was also enhanced by the generosity of Ray C. Call, Inc. and Mountaineer Euclid, Inc., which put up \$50 gift certificates for the best tee shots on designated holes.



*Leroy Gleason, Cincinnati Gas & Electric Co.*



*Bill Bales, Norfolk & Western Railway Co.*

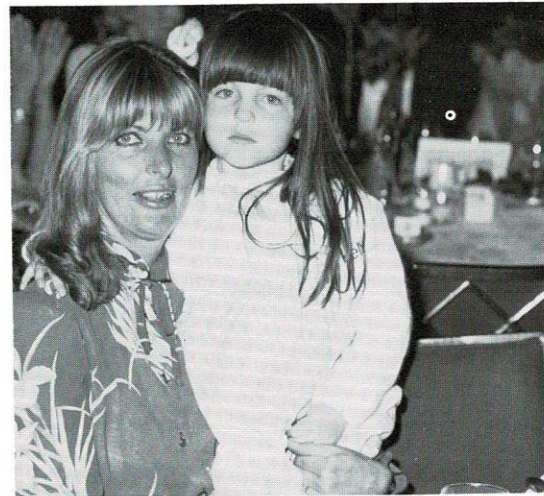


*WVSMRA President Ben Greene.*





Bobby Bowden displayed a speaker's touch to match his football coaching record.

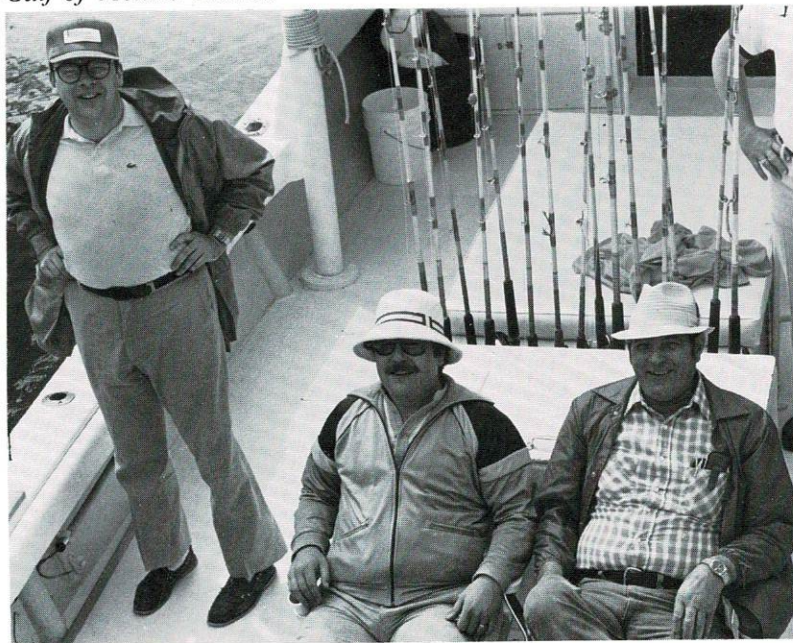


Kelly Faltis, shown here with her mother Carol, celebrated a birthday at the Saturday night banquet.

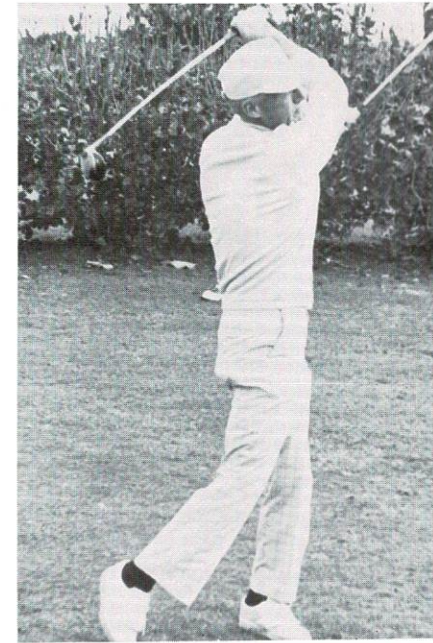


Jeanne and Lawson Hamilton.

This able crew set out for a stormy day of fishing. Mike Metheny, left, won a prize for "most bait released." Metheny's effort is believed to be a Gulf of Mexico record.



The last order of business was the Saturday night dance.



Jim White warms up for golf.



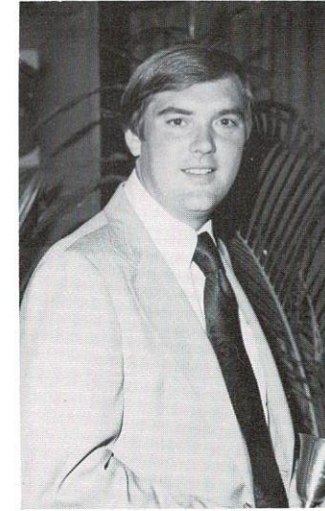
Golf Chairman Fil Frasher kept things moving with his famous "shotgun start."



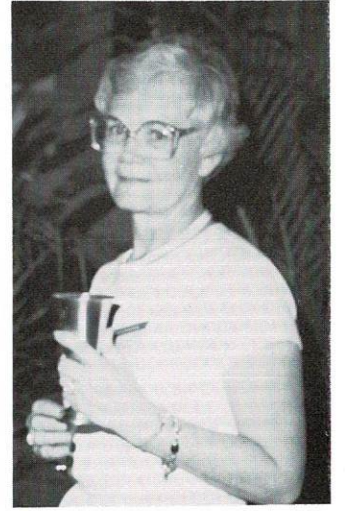
Bob Bliss, men's golf low gross.



Kim Wilburn, women's golf low net.



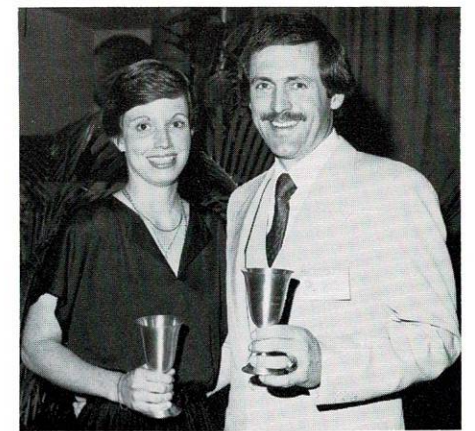
Danny Coppinger, men's golf low net.



Pauline Harvey, women's golf low gross.

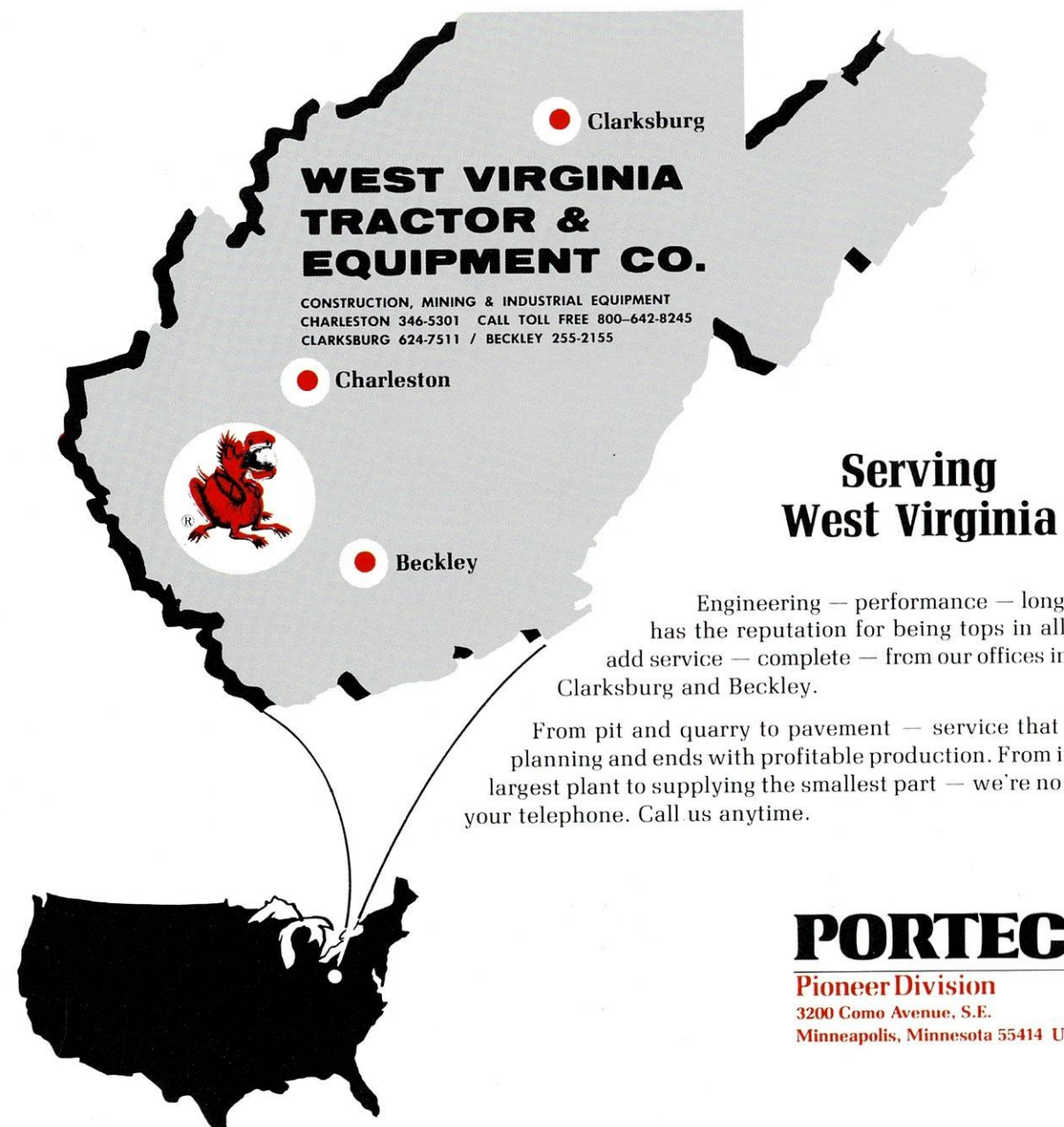


The tennis finalists were, l-r, Bert Wolfe, Margo Teeter, Susan Bliss, and Dave Porreca; and the winners, Susan and Dave.





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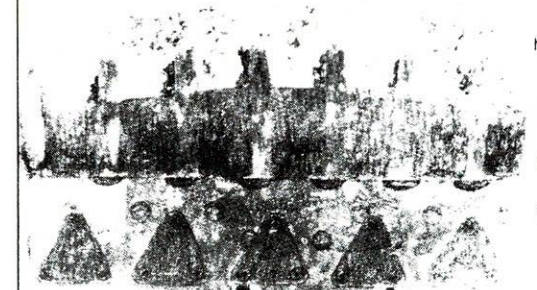
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# ASSOCIATION

## New members

The Association welcomed 19 new members into its ranks last month at the Semi-Annual Meeting at Marco Island, Fla.

Among the companies approved for membership were two general division companies and 17 in the associate division.

New members are as follows: General Division—Elk Run Coal Co., Inc.; Sierra Coal Co.; Associate Division—Appalachian Surveying, Inc.; B.R.J., Inc.; John E. Caffrey; Chemply—Division of United Chemicals, Inc.; Cobre Tire Co.;

Commercial Union Assurance Co.; Commonwealth Laboratory, Inc.; E. D'Appolonia Consulting Engineers, Inc.; Employers Service Corp.; Engineering Services, Inc.; Ergon, Inc.; Evergreen Helicopters, Inc.; FIL-RECO; GEO Consultants, Inc.; Holley, Kenney, Schott; Jasper Engines & Transmissions, Inc.; Patton, Harris, Rust & Guy.

One change was made in the Board of Directors, with Dave Morrison stepping in for the retiring Fred Toothman as the representative from Western Pocahontas.



Association Board Chairman Lawrence A. Streets (right) presents a check for \$1000 to West Virginia DECA Advisory Council Chairperson Katy Kesler, and DECA Student President Mark Bates. The money will fund a scholarship awarded to the winner of a coal education competition run by the student organization.



# NOTEBOOK

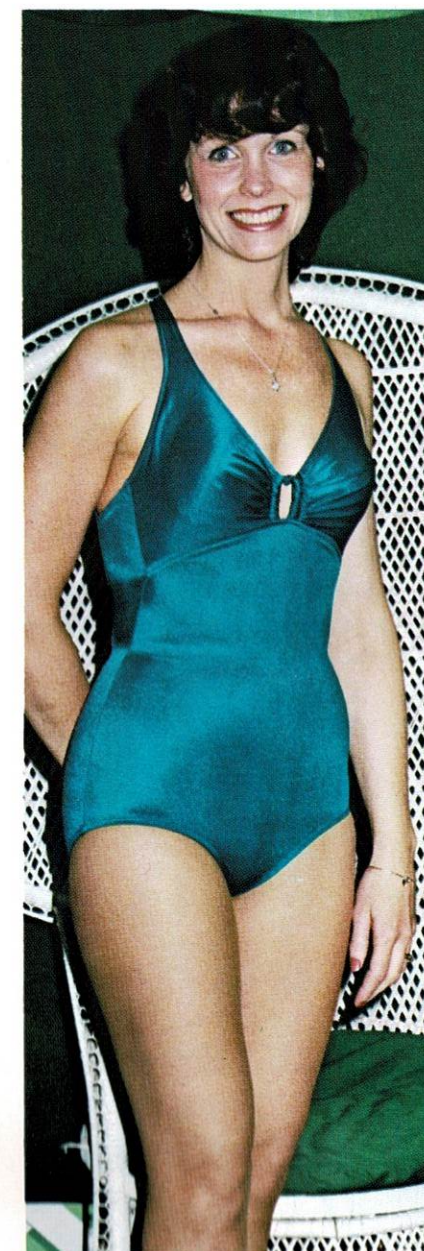
## Coal miner's party

This year's Annual Meeting will include a coal miners' theme party, and your help is urgently needed with decorations. We need signs, posters, small replicas of equipment, and any other props easily transferred from a coal mine to a ballroom. If anyone can help, please contact Patty Bruce at the Association office as soon as possible.

## "Coal Men" postponed

Due to the unexpectedly prolonged strike, the annual "Coal Men of the Year" Dinner has been postponed. Originally set for June 5, the Dinner has been rescheduled for August 27, at the Lakeview Inn and Country Club, near Morgantown. The membership will be advised of program and ticket information at the appropriate time.

The Association sponsored a contestant in the recent "Mrs. West Virginia" competition, and came out a winner. Actually, it's Mrs. Shirley Weaver of Fairmont who deserves the credit. She's the one who captured 2nd runner up in the annual pageant.







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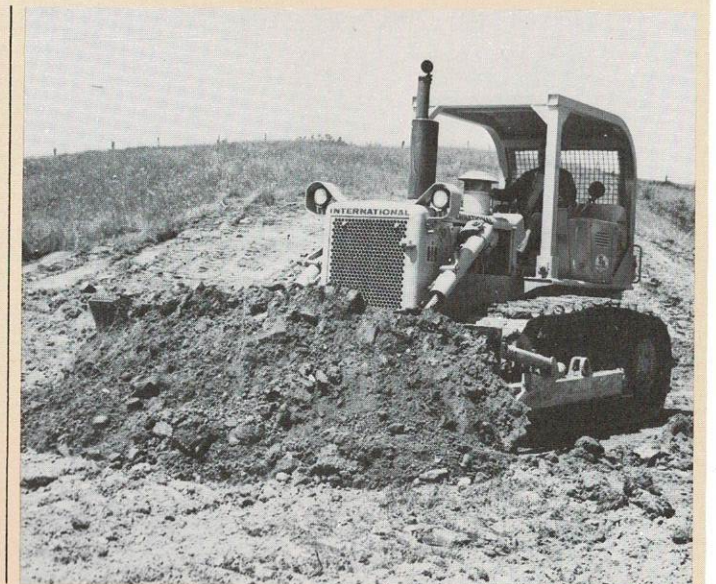
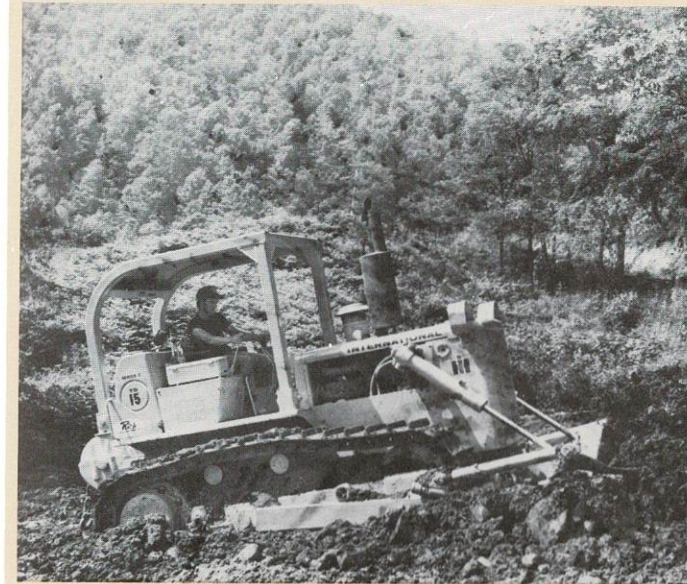
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## SITE PREPARATION



### Stowers Excavating, Inc. Relies On TD-15C Fleet

Facing the demands of rugged, mountainous terrain in Central West Virginia, Stowers Excavating, Inc. of Hamlin, W. Va., turned to International's TD-15C dozers to meet the requirements of site preparation and reclamation work on gas and oil drilling projects in Putnam County, W. Va.

When Appalachian Exploration Development (AED) a division of Cabot Gas, contracted with Stowers to meet the preparation requirements for their 40-plus gas well drilling project, Wylie Stowers and his sons, Lyle and Greg, immediately acquired the six dozers from Rish.

Factors influencing the decision were several including a favorable experience with another International crawler, a TD-20E; a preference for the undercarriage and roller frame of the TD-15C compared to competitive makes; and product support services by the Rish branch in St. Albans.

### Important Factors In Equipment Purchases



**EQUIPMENT COMPANY**

• Bluefield, WV • Beckley, WV • St. Albans, WV • Clarksburg, WV • Parkersburg, WV  
• Frostburg, MD



CONSTRUCTION  
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