West Virginia Surface Mining & Reclamation Association's

Green Lands

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WINTER 1976

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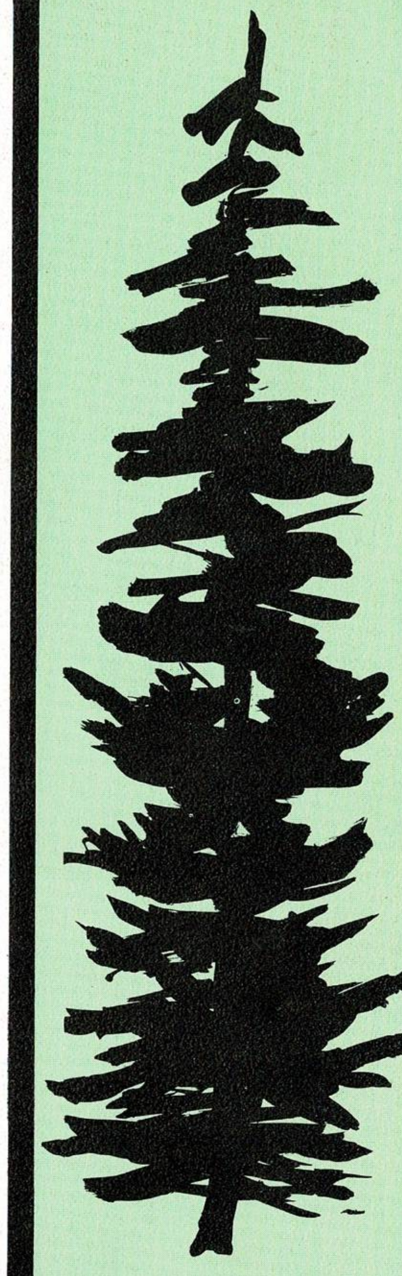
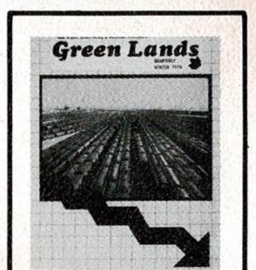
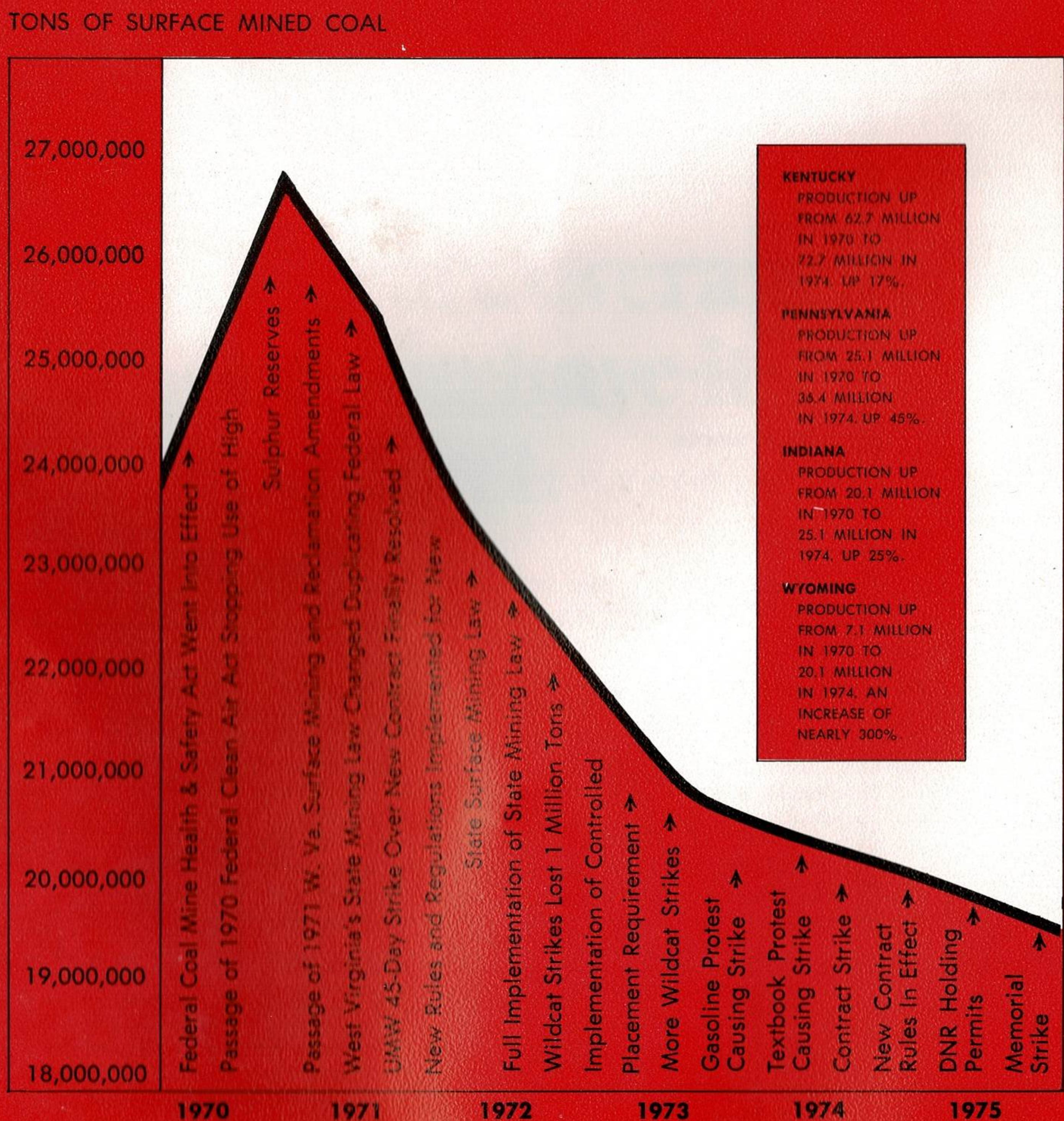




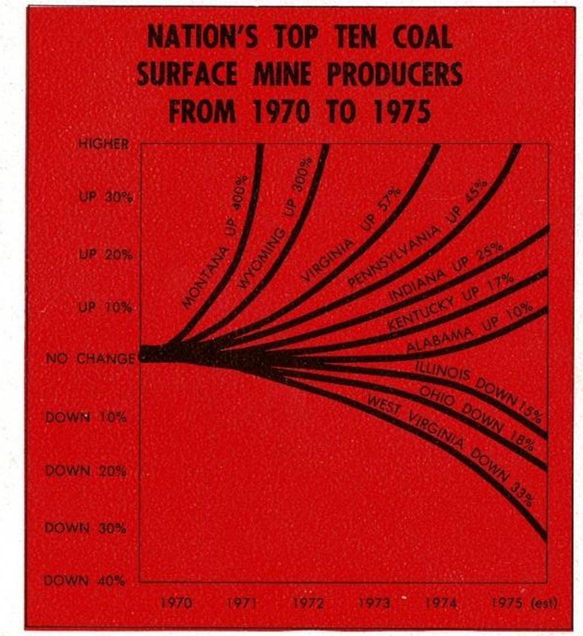
ABOUT THE COVER

Surface mine production has been declining for the past five years and is now off nearly 30% since 1970. The facts and figures behind this downward trend are brought out in this issue of Green Lands Quarterly in an attempt to emphasize the serious condition of West Virginia's coal industry.

WEST VIRGINIA SURFACE MINE PRODUCTION FROM 1970-1975



West Virginia Surface Mine Production Declines For 5th Straight Year



Coal production in West Virginia is declining rapidly and it will take a conserted effort of state government, industry and the general public if this situation is to be reversed, according to Ben E. Lusk, president of the West Virginia Surface Mining and Reclamation Association.

Speaking of the industry in general, but surface mining specifically, Lusk pointed to four major problem areas.

"Wildcat strikes, the Clean Air Act, federal and state safety standards and overzealous enforcement of the stringent surface mining law have combined to put West Virginia at a competitive disadvantage with surrounding states," he said.

"For 39 consecutive years, West Virginia led the nation in coal production until Kentucky took over in 1971. They now have a strong lead, producing 136.7 million tons to West Virginia's 101.7 million tons in 1974," Lusk noted. "If present trends continue, the Mountain State will soon ball to number three behind Pennsylvania."

Lusk explained that the precarious state of the coal industry is reflected by the production figures for the past five years.

"Since 1970, underground production has fallen from 115.9 million tons to 82.1 million tons in 1974. During the same five-year period, surface mine production is down from 27.1 million tons to 19.5 million tons. Total West Virginia coal production has fallen from 143.1 million tons to 101.7 million tons since 1970, a loss of 41.4 million tons of coal or 29.7 percent."

Lusk added, "To further complicate matters, productivity, or tons per man day produced, has decreased 38 percent since 1967, and dropped nearly 11 percent between 1973 and 1974 alone."

"The adverse effect of all of this on the state is significant. For example, ten years ago there would have been little doubt in anyone's mind that Coalcon belonged in the Mountain State. Recently, it was announced that it's going to be located in Illinois," he said. "In comparison, Montana has quadrupled its production in the last four years, and

. . . . "The Coal Industry Is Being Regulated Out Of Business."

TOP TEN SURFACE COAL MINE PRODUCING STATES			
STATE	1974	1973	1972
Kentucky	72,749,122 (53.2%)	63,600,000 (50.1%)	63,760,000 (53.0%)
Pennsylvania	36,426,098 (47.1%)	30,391,000 (39.7%)	26,400,000 (34.7%)
Ohio	30,936,138 (68.2%)	29,140,000 (64.3%)	34,360,000 (67.9%)
Illinois	26,968,528 (46.4%)	28,971,000 (47.1%)	33,940,000 (51.7%)
Indiana	25,121,000 (99.2%)	24,485,000 (96.9%)	24,430,000 (94.1%)
Wyoming	20,060,000 (99.8%)	12,920,000 (95.0%)	10,490,000 (96.1%)
West Virginia	19,527,391 (19.2%)	19,791,000 (17.2%)	21,814,683 (17.8%)
Montana	13,676,000 (99.9%)	9,930,000 (99.8%)	8,020,000 (99.8%)
Alabama	12,110,312 (61.4%)	11,901,000 (60.1%)	13,070,000 (62.2%)
Virginia	11,604,545 (33.9%)	10,530,000 (31.7%)	10,020,000 (29.5%)

WEST VIRGINIA COAL PRODUCTION BY METHOD					
Year	Underground	% of Total	Surface	% of Total	Total
1970	115,983,233	81.0	27,149,051	19.0	143,132,284
1971	92,403,043	78.1	25,914,742	21.9	118,317,785
1972	101,041,695	82.2	21,814,683	17.8	122,856,378
1973	95,447,890	82.8	19,791,256	17.2	115,239,146
1974	82,186,189	80.8	19,527,391	19.2	101,713,580

Source: West Virginia Department of Mines

Kentucky, the nation's largest coal producer, is exporting coal to Charleston because Kentucky can produce and ship coal to West Virginia cheaper than it can be mined in Kanawha County. As every other state is gearing up to meet the nation's increasing need for coal, West Virginia's productivity is continually going down."

"West Virginia is now first in wildcat strikes, condemnation of high sulfur coal reserves because of the Clean Air Act, and enforcement of safety and reclamation laws," he said, "and the result is our production has fallen off 30 percent in five years and the coal industry is being regulated out of business."

Lusk noted that surface mining has virtually outgrown its earlier status as an emotional issue. This came about for four basic reasons:

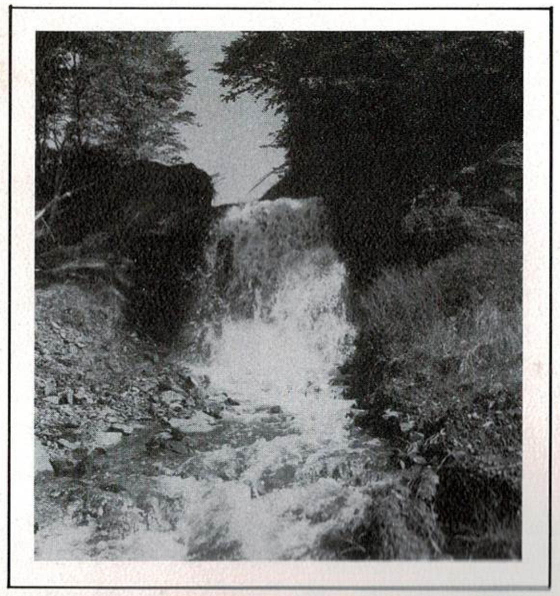
1. West Virginia passed the toughest state law in the nation for the regulation of surface mining;
2. It appropriated enough money to enforce the law;
3. It developed more advanced technology in mined land reclamation, and;
4. It had an industry that was willing to change.

"Today in West Virginia our streams are cleaner, our land is greener, our air is purer and our mines are safer than ever in the history of coal industry." he said.

"We in the industry are proud of our safety record and the fact that our reclamation successess on land disturbed by surface mining are second to none. But this can all be achieved through intelligent and rational enforcement of existing laws, not an overzealous interpretation of rules and regulations that do nothing more than stop production," Lusk said.

"I'm not saying we don't need cleaner air, or enforcement of safety laws or improved reclamation; what I am saying is when you see the drastic impact of too much regulation, too quickly, it is time for West Virginia to reevaluate its restrictive policies. If not, our state will lose another large percentage of its coal production during the next five years.

Dent's Run Clean-up Completed



Clean water tumbles from the spillway of Consolidation Coal Company's Sears Water Treatment Plant impoundment after it was cleaned up as part of the multi-million dollar Dent's Run Watershed environmental project near Morgantown, W. Va.

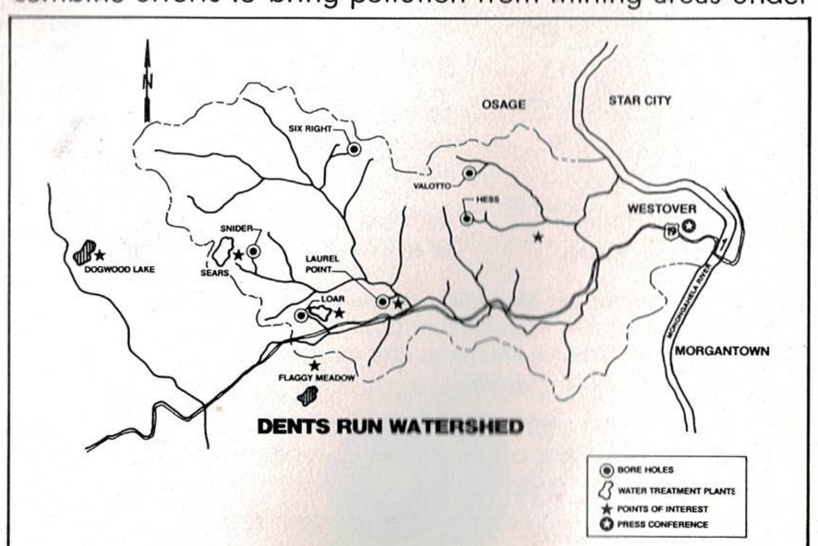
Dent's Run is back.

And no one could be happier than Consolidation Coal Company.

It took Consol, the West Virginia Department of Natural Resources, and the federal Environmental Protection Agency (EPA) almost five years, more than $2 million and the cooperation of Mother Nature to bring back the clean air, clean water and green foliage to the 14.6-square mile Dent's Run Watershed, located near Morgantown in the heart of the northern West Virginia coalfields.

To announce the conclusion of the five-year project, Consol hosted a press tour, inviting representatives from area newspapers, television and radio stations, as well as various local, state and federal officials to Morgantown to view the completed project first-hand. The tour began with a filmstrip presentation, illustrating the stages of the project, from beginning to completion. The group was then taken to the field, where they were shown the reclaimed area, water treatment plants and finally Dent's Run. The tour was concluded with a luncheon. Lennie Gross, manager of public relations for Consol, was very pleased with the success of the tour. "We had very complimentary remarks concerning it and the press people were quite enthusiastic and impressed with the environmental effects of the project."

The Dent's Run clean-up will serve the nation as an example of how the coal industry and government can combine efforts to bring pollution from mining areas under control, according to Consol Chief Executive Official Ralph E. Bailey. Consol corrected water pollution problems from its active mines in the area and government eliminated pollution problems from abandoned derelict land created at a time when cheap energy overrode environmental considerations.



It was in 1971 that Consol teamed with the state and federal governments to initiate the massive environmental reclamation project, Bailey noted.

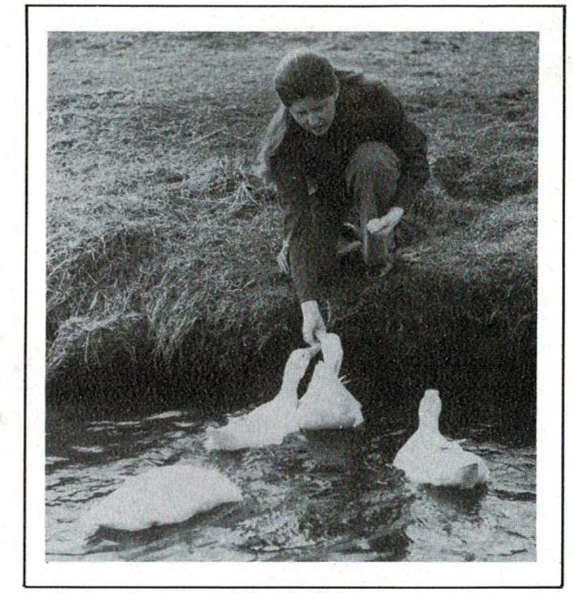
The results of that project are now evident.

According to Bailey, smoldering gob piles of coal refuse have been leveled, covered with earth and are now gently rolling hills supporting plant life. The air pollution from the burning gob piles is gone.

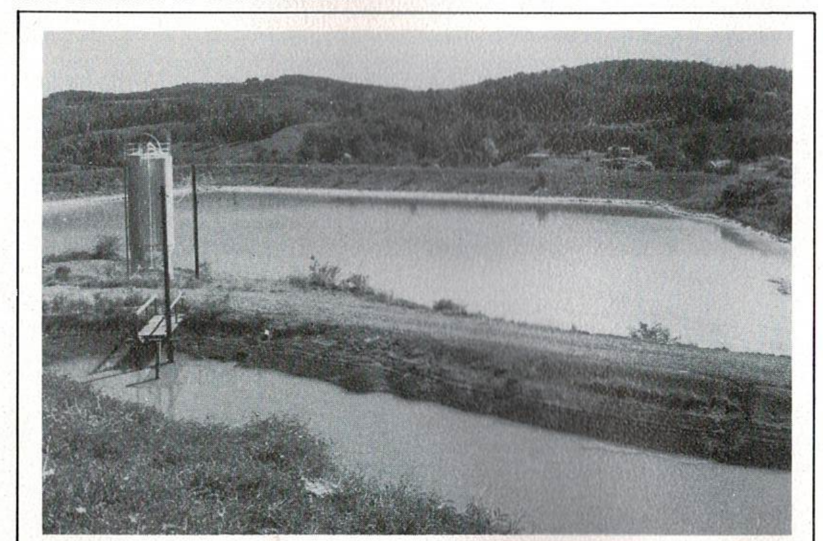
Surface-mined lands have been reshaped, covered with fertile soil and seeded to eliminate unsightly surface scars.

And the waterways, once contaminated and discolored by bright orange acid mine drainage, are flowing clear again.

It is believed to be the most comprehensive environmental clean-up effort of its type ever undertaken. The problems for Consol and the two governmental agencies were countless and there are still some to be resolved. For instance, residents of some communities within the Dent's Run Watershed have yet to obtain sewage treatment facilities. Raw sewage from these communities is still entering the streams in some areas.



The Dent's Run Watershed clean-up is a blessing to Mrs. Chauncey Layman, whose ducks swim contentedly in the clean stream. Before the cleanup, Mrs. Layman complained that her ducks would leave the stream covered with a thick coating of orange mine waste.



The Loar Water Treatment Plant is one of two such facilities constructed by Consolidation Coal Company to clean up water flowing through the 14.6 square-mile Dent's Run Watershed near Morgantown, W. Va., as part of the massive multi-million dollar environmental project. Hydrated lime is used in the two Consol plants to chemically treat the mine drainage.

. . . . *Dent's Run Clean-up*

A dramatic comeback is evident in these "before" and "after" photos. The wounds left by numerous surface mines have been healed as part of the unique Dent's Run Environmental Cleanup Project by Consolidation Coal Company, the West Virginia Department of Natural Resources and the federal Environmental Protection Agency (EPA). The exposed coal seam in the "before" photo has been covered over and the area has been graded and seeded. It now supports lush vegetation.

Members of the press and industry alike were impressed with Consol's clean-up of the Dent's Run watershed. Here, Bill Light of Consol's Christopher Division explains the water treatment process to tour participants.

Consol feels it has fulfilled its commitment to the Dent's Run Watershed in which the company's Christopher Division operates underground mines. Consol was responsible for keeping acid mine waste water discharges from entering the streams of the Dent's Run Watershed and thence into the Monongahela River at Granville, W. Va.

To accomplish this task, Consol engineers devised a unique plant to transport mine discharge underground through a worked-out coal seam to two new water treatment plants and accompanying holding ponds.

The plants utilize hydrated-lime treatment methods to remove the acid from the drainage water, which is then directed through settling holding ponds, and clean water flows into the Dent's Run and Little Indian Creek watersheds.

Since Consol has diverted its mine waste water to the treatment plants, Dent's Run and its tributaries have cleared remarkably and are now free of orange-colored mine waste water.

The figures alone provide a good example of the problems associated with the clean-up. The watershed was heavily disturbed by at least 28 abandoned surface mines with a total affected area of 400 acres.

Thirteen abandoned mines had to be sealed to prevent normal surface water runoff from seeping through mine openings and becoming polluted before filtering through to streams in the watershed.

Three million gallons of acid mine drainage daily are now being diverted from Consol's active operations to its treatment facilities in the watershed.

The clean-up program covered 14.6 square miles, approximately twice the size of the nearby city of Morgantown, W. Va.

The Dent's Run project is a flowing example of Consol's commitment to restoring the environment.

DENT'S RUN WATERSHED CLEAN-UP FACTS-AT-A-GLANCE

PARTICIPANTS:

Consolidation Coal Company, West Virginia Department of Natural Resources, U. S. Environmental Protection Agency.

OBJECTIVES:

Rid streams of the 14.6 square mile Dent's Run Watershed of orange-colored drainage from active and abandoned mines.

Reclaim 400 acres of land disturbed by more than 28 abandoned surface mining operations.

Eliminate air pollution caused by smoldering mine refuse piles.

Build and operate plants for chemical treatment of mine waste water from the active underground mines in the project area.

COST:

More than $2 million.

TIMETABLE:

Consol initiated the project with a pre-feasibility study in early 1971.

The project was announced at a press conference in Charleston, W. Va., December, 1971.

The Department of Natural Resources approved the project application in March, 1971.

Environmental Protection Agency announced in June, 1971, approval of the first grant in the nation awarded under the Water Pollution Control Act for financing part of the Dent's Run Watershed Clean-up project.

Consol constructed and put into operation Loar Treatment Plant in 1972.

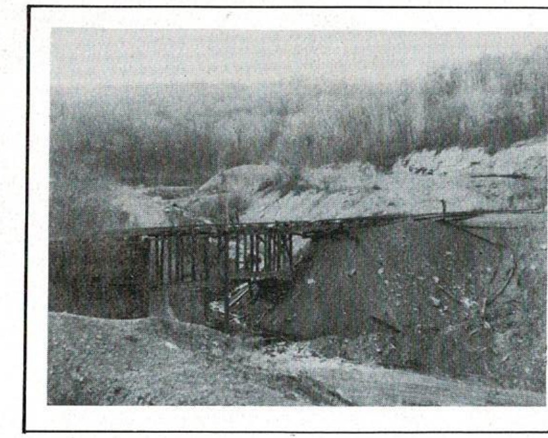
Reshaping of surface-mined lands continued throughout 1972 and 1973.

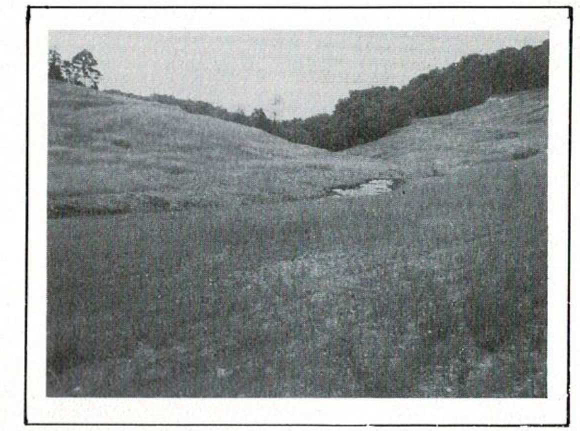
The second and largest water treatment plant, Sears, was put into operation by Consol in 1974.

Monitoring of stream continued during 1974.

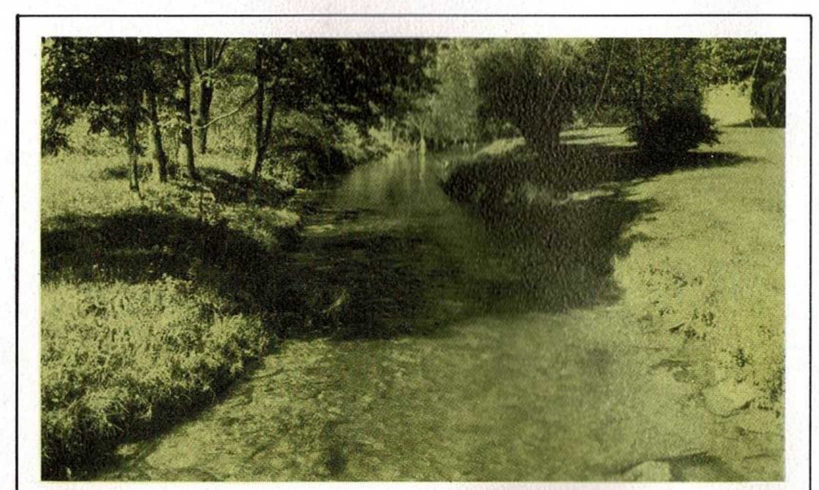
Four mine waste water discharges were diverted to the Sears Treatment Plant in January, 1975, concluding Consol's task of eliminating discharges from entering Dents Run waterways.

Additional work followed to clean up discharge from refuse piles.





The land in upper photo was left in a state of ecological ruin following pre-law surface mining operations in the Dent's Run area near Morgantown, W. Va. The West Virginia Department of Natural Resources assumed responsibility under the Dent's Run Watershed environmental cleanup project for restoring 400 acres of land scarred by 28 surface mines abandoned long ago. Lower photo shows how the state transformed an eyesore into a gently rolling valley.



Crystal clear water now flows past the community of Laurel Point, near Morgantown, W. Va., as a result of the massive multi-million dollar Dent's Run Watershed clean-up.

Minesoil Properties And Classification Studied

by Dr. Richard M. Smith

On October 15 and 16 a group of Soil Scientists from Maryland, Pennsylvania, Ohio, Indiana, Kentucky, Tennessee, Virginia and West Virginia spent two days studying minesoils in Monongalia and Preston Counties as part of a Soil Conservation Service cooperative effort to correlate results of plant material tests with minesoil properties identified in classification categories throughout eastern and midwestern states.

This study is part of continuing efforts toward improved understanding of variable uses of highly disturbed soils in accordance with their special properties and suitabilities. In this photograph the group was assembled on a four year old minesoil near Brandonville, from which corn silage was recently harvested.

The Soil Scientists agreed that minesoils can be classified consistently throughout states represented in order to improve needed research and assure valuable lands for the future.

Minesoils studies ranged from acid mine waste, reclaimed by heavy liming and fertilization, to neutral, fertile, fine textured minesoils near Lennox where vigorous legume and grass growth required little treatment.

We have reached the point where soils on mined lands are recognized as important resources, often comparable or superior in particular properties compared to old soils present before mining. They should be used in accordance with their capabilities and treated according to their needs for protection and improvement, the same as other soils.

First row, left to right—Peter Hartman, Maryland; Walter Ellyson, West Virginia; Leon Davis, Indiana; John Van Dine, Virginia; Ivan Radcliff, Pennsylvania.

Second row, left to right—Richard Andersen, West Virginia; Charles Powers, Tennessee; Keith Schmude, West Virginia; Richard M. Smith, West Virginia; Neil Rubel, Ohio; John Haagan, Maryland.

Third row, left to right—Walter Grube, West Virginia; Raymond Hayes, Kentucky; Charles Delp, West Virginia; John Sencindiver, Kentucky; Edward Wright, West Virginia; Carlos Cole, West Virginia.

Mining Show Draws 7,000

The largest collection of mining and industrial equipment ever assembled in this area was exhibited at the 1975 West Virginia Industrial and Mining Show, held October 21-23 at the Charleston Ordnance Center. The event, sponsored by the Charleston Regional Chamber of Commerce and Development, featured 172 exhibitors and over 7,000 in attendance.

The West Virginia Surface Mining and Reclamation Association exhibited its new display booth at the show and numerous visitors were attracted to the display's slide presentation and narration depicting the background and struggles of the surface mining industry in this state. Recent issues of **Green Lands Quarterly** were distributed and the Association was quite pleased with the large number of members who stopped by the booth to visit. Approximately 20 Associate members also sponsored exhibits at the show.

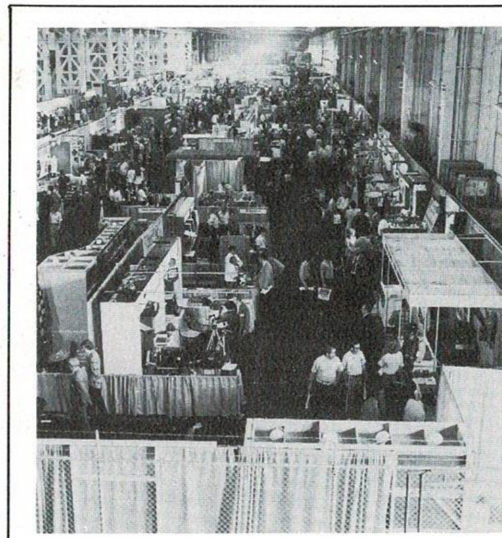
This year's exhibit — the sixth held since its origin in 1959 — was unique in that the displays were mostly mining or mine supply oriented, rather than being more equally distributed between mining and other industries, as it had been previously. According to the show's manager, Glen A. Knapp, "This time about 80 percent of the exhibits were on mining because of all the recent emphasis on coal."

Knapp added that he was very pleased with the support he received from area coal operators. "The coal operators were particularly eager for the employees to be able to view the latest products and services that are now available to the industry," he said.

A kickoff luncheon sponsored by the West Virginia Coal Association October 21, opened the event and the president of the American Mining Congress, J. Allen Overton, Jr. was featured as speaker.

In opening remarks, Overton noted that as our country prepares to celebrate its bicentennial, our freedom today is again being threatened from abroad — by our dependence on foreign countries to supply our mineral resources. To defend ourselves, he warned, we must uphold the military arsenal of the nation, by seeing that we become self-sufficient in the minerals industry. Adding that the economic warfare also endangers our freedom, he acknowledged," I doubt if we need any reminders of this after the

(Continued on Page 17)



Over 7,000 people visited the show, viewing the 172 exhibits, which represented 21 states. Seventy-nine displays were from West Virginia, 25 from Ohio and 17 from Pennsylvania.

.... *WVSMRA Shows New Display*

vivid lessons of the oil cartel, and we're not out of the energy woods yet by any means. Better conservation, improved efficiency and greater exploitation of domestic resources all remain imperative, if we're not going to be held hostage to foreign producers. In the words of Federal Energy Administrator, Frank G. Zarb, if there is another oil embargo, it will make the last one look like a picnic!"

"Fortunately, the United States has abundant reserves of coal and, like the cavalry in a western movie, the cars are riding to our rescue. Moreover, we have people with the requisite industriousness, ingenuity and dedication — many of them right here in West Virginia — who can show us how to develop our bountiful coal reserves without any permanent offense to the environment."

Warning that we must act now to become self-sufficient in all minerals, he stated, "If the industrial machinery of this nation is crippled by a metals deficiency, our fossil fuels might as well be left in the ground for all the good they'll do."

Overton noted that "in the national interest" the federal government should encourage private enterprise to promote a secure and dependable mining industry. He pointed out, however that, "a recent study by two career professionals in the Department of the Interior came to the alarming conclusion that today almost 73 percent of all federal lands are entirely or partially closed to exploration and development for leasable minerals and almost 70 percent for locatable minerals." Adding that this trend has been increasing rapidly in recent years, Overton warned that unless the trend was reversed, by 1980, one-third of the nation's total land area will be closed to mining.

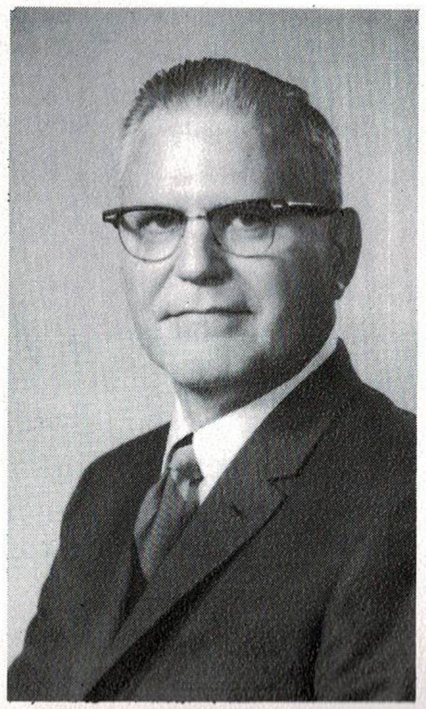
Another road-block facing the mining industry is the various federal agencies who post "off limit" signs to mining, looking at their own personal interests, rather than the impact this will have on the nation. "It's being done in the name of scenery, wilderness, water, birds, seed orchards, pup fish, desert turtles and a host of other causes. But in the octopus of the federal bureacracy, one hand doesn't know what the other 99 are doing," he said.

"I don't argue for a minute that mining is suitable everywhere. It isn't. Yet, in point of fact, over the entire history of this country, mining has disturbed only three-tenths of one percent of the land area."

(Continued on Page 18)

The WVSMRA staff members alternated manning the new display booth at various times during the three-day show. From left to right are Cindy Jennings, Ben Lusk, John Sturm and Dan Gerkin.

.... Overton Is Kick-off Speaker



J. Allen Overton Jr., President
American Mining Congress

Noting that "the mining industry and American business in general are being absolutely hobbled by government edicts," Overton offered a four-point plan of defense the industry may adopt. The defense includes:

—Accepting the idea that today, change is inevitable, and rather than try to resist it, the industry representatives can help guide the transition by "altering the difficulty or altering himself to meet the difficulty."

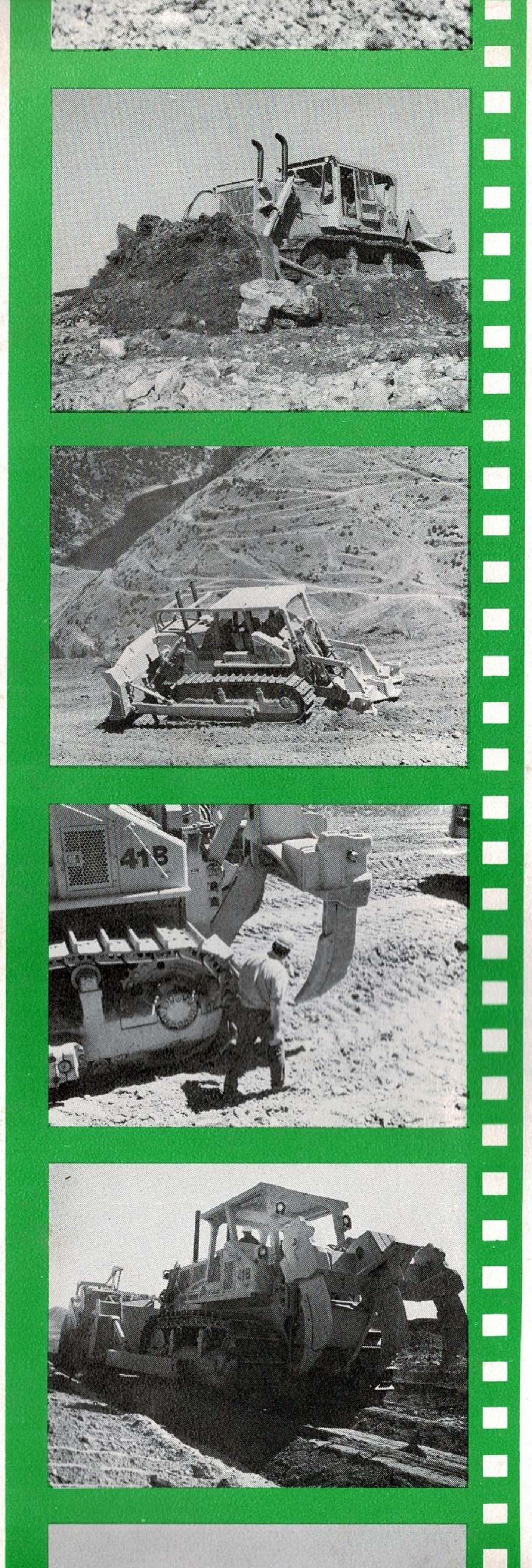
—Admit that many of the charges against the industry do exist. "Public opinion will be poisoned against us all, unless we're the first to call for the bad apples to be tossed from the barrel."

—Increase efforts toward educating the public, especially the youth, by informing them of the urgent need for our country to be self-sufficient in the minerals industry. "Even the most ardent anti-pollution crusader and nature lover can be made to understand that water treatment plants, electrostatic precipitators and catalitic converters are not manufactured out of fig leaves."

—Finally, we must admit that there are many people who will not listen to any rational explanations. "Unfortunately, many of them are sitting in Congress and other legislative bodies. They have an intense dislike for business in general. Along with heavier regulation for all of it," he said "they'd like to nationalize some of it. I'm not succumbing to hysteria when I say these people constitute a genuine danger to our economic system. We cannot lobby them in the corridors of power, so the only thing to do is fight them in the precincts. This is the American way."

West Virginia, Overton concluded, was born in a period of uncertainty and trial. "In that theme of crisis, the people of West Virginia did not hesitate: "Yes" to the Union . . . "no" to slavery . . . Mountaineers Are Always Free. My earnest hope is that this same spirit will animate the great people of this state again. Your leadership, inspiration and willingness to fight for what you believe is right are needed now as they were then.

"If enough of us stand together, we can match any mountain of troubles. And once more we shall gain the inevitable victory."



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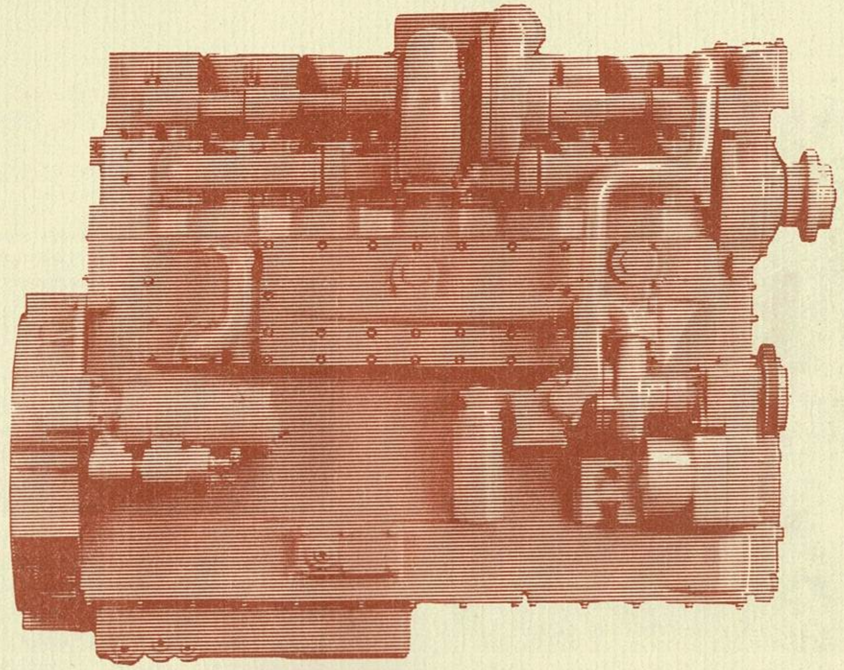

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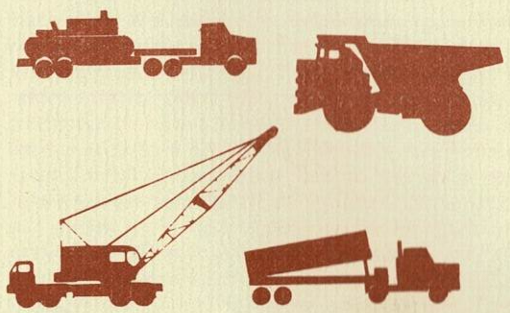

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SPECIAL REPORT

Study Reveals Impact Of Mining On State Watersheds

Changes In Water Chemistry Resulting From Surface-Mining of Coal on Four West Virginia Watersheds

William T. Plass
Principal Plant Ecologist
USDA Forest Service
Northeastern Forest Experiment Station
Princeton, W. Va.

DESCRIPTION OF AREA

This is a case study of the changes in water chemistry on four experimental watersheds in southern West Virginia (fig. 1). The four contiguous watersheds have similar soils, topographic features, surface geology, and vegetation. Stover A watershed covers 354 acres, Stover B watershed 446 acres, Wingrove A watershed 240 acres, and Dillon watershed 164 acres. Maximum elevation is about 3,000 feet (table 1).

Table 1.—Watershed Descriptions

Watershed	Total acreage	Weir elevation	Maximum elevation
	Acres	Feet	Feet
Stover A	354	1,900	3,080
Stover B	446	1,750	2,880
Wingrove A	240	1,950	3,100
Dillon	164	2,000	3,020

Surface-mining shatters the rock strata above a coal seam. When exposed to natural weathering processes, the heterogeneous mass of fragmented rock releases chemical constituents. Surface and sub-surface drainage carries these chemicals into streams and rivers. One impact of surface-mining is the resulting change in water chemistry.

The extent of change in water chemistry resulting from present mining and reclamation methods is poorly documented. A lack of information prevents a realistic evaluation of the impact of surface mining for coal on the water resources of Appalachia.

This case study of four West Virginia watersheds provides additional data on changes in water chemistry resulting from surface mining. The mining and reclamation were conducted in accordance with current laws and regulations.

A second- or third-growth mixed-hardwood forest dominates the vegetation. Small areas of cleared land are located at the weir sites on Stover B and Dillon watersheds. The open land at each of these weir sites is less than 5 acres.

Precipitation on the watersheds during the 4-year observation period ranged from 39.4 to 62.0 inches per year; it averaged 48.9 inches (table 2). Summaries of the precipitation data showed wide variations from year to year, but little variation among watersheds. Water-year 1970 was about 10 inches below the 4-year average annual precipitation, and water-year 1972 was about 12 inches above average. Since streamflow is related to precipitation, the concentrations of chemical parameters for these two water-years would indicate the influence of streamflow on stream chemistry.

Table 2.—Total Yearly precipitation, by Watershed and Year of Measurement, in Inches

Watershed	Calendar year 1970	1971	1972	1973	Watershed mean
Stover A	39.9	46.0	60.7	47.4	48.5
Stover B	39.5	42.3	63.3	53.8	49.7
Wingrove A	38.5	46.2	60.3	44.8	47.4
Dillon	39.7	45.6	63.8	51.4	50.1
Yearly mean	39.4	45.0	62.0	49.4	48.9

The geology of the area is Pennsylvania era, Pottsville series, and Kanawha group. A stratigraphic column extending from the mean weir elevation to a point on a ridge line common to all four watersheds includes seven coal beds one foot or more thick and several coal seams less than a foot thick. The Upper, Middle, and Lower Eagle coal seams occur about the middle of the stratigraphic column within a 50- to 75-foot section. Near the top of the mountain, the Peerless and No. 2 Gas coal seams are found. The interval between these two seams is 50 to 75 feet.

Evidence from a survey of mine spoils in southern West Virginia indicates that overburden rock above the Upper Eagle and No. 2 Gas coal seams has a potential for high acidity and could be a source of toxic ions (Plass and Vogel 1973).

When this study was begun in 1969, there was no evidence of recent land disturbance on any of the watersheds. The chemistry of the water in Wingrove A watershed indicates that an outcrop of one of the coal seams had been exposed and mined. Data from Wingrove A illustrate the variation that can result from relatively minor disturbances.

The first disturbance due to surface-mining occurred in Stover A watershed in the fall of 1969. A road was constructed across a corner of the watershed on the upper third of the slope. In January 1970 several severe earth slides occurred on the fill slopes of this road.

Mining of the Eagle seams occurred in the following sequence. In Stover A watershed, mining began in September 1971, and regrading and seeding were completed by September 1972. Stover B watershed was mined, regraded, and revegetated during the period September 1972 to June 1973. In Wingrove A watershed, mining began in June 1973, but was not completed during the study period.

The Peerless No. 2 Gas coal seams have not been mined in any of these watersheds.

Mining and regrading during the study period were conducted under West Virginia laws and regulations controlling surface-mining. Outslope length was controlled to some degree, and most fill slopes were less than 100 feet long. Suspected toxic material, black over-burden rock, waste coal, and large rock fragments were buried in the pits during mining. Regrading created relatively level benches that pitched slightly toward the highwalls. In revegetation treatments, quick-cover grass and legume species were used. Seeding was done during the growing season as areas were mined and regraded.

WATER SAMPLING AND ANALYSIS

Water sampling was begun in May 1969 and continued through April 1974. This time period included four complete water-years. Grab samples were collected at the weir sites at 2-week intervals, providing 26 samples for each water-year. Standard laboratory procedures were used to determine the following water characteristics: pH, specific conductance, alkalinity, sulfate, calcium, bicarbonate, magnesium, iron, aluminum, manganese, zinc, and potassium.

Statistical comparisons were used to evaluate the significance of before-mining variations between samples for growing and dormant seasons and for three water-years. The data from Stover B, Wingrove A, and Dillon watersheds for water-years 1970, 1971, and 1972 were used for these analyses.

The dormant season lasted from November 1 to April 30 and the growing season from May 1 to October 31. All data for the three water-years were tabulated by season for each chemical component. For most variables, there were 39 observations for each season. A T-test was used to determine the significance of the differences in the seasonal means.

An analysis of variation was used to determine the significance of yearly variation for each chemical component before mining, for each watershed. Observations for the 1970, 1971, and 1972 water-years were compared to determine if differences between water-years were statistically significant.

Data for Stover A watershed for water-years 1971, 1972, and 1973 were used to characterize after-mining changes. In January 1970, road-building and resulting slides created conditions similar to mining disturbance and were judged to represent the beginning of mining disturbance in the watershed. The eight-month before-mining period was not adequate for describing water quality. Mining and after-mining data for Stover A watershed were compared with before-mining water quality in the other three watersheds. Observed changes in water chemistry provided a preliminary estimate of the direction and magnitude of change. The validity of assumptions derived from this data will be tested during future years of measurement.

Similar analyses for iron, manganese, and aluminum were not attempted because these parameters did not occur in measurable amounts in all samples. Seasonal watershed variations were compared in tabular summaries showing the frequency of occurrence by concentration.

The term "significant" as used here refers to the result of statistical analysis. It is a term used to describe differences meeting specific numerical criteria. The term does not imply that the chemical changes will have an effect on stream flora or fauna or use by man.

A weir site on the experimental watersheds near Beckley, established in 1969 in cooperation with Consolidation Coal Company.

RESULTS

The effect of mining on water quality is based on comparisons of the water-chemistry variables before and after mining.

Water pH

The pH of a stream is one of the characteristics most widely used for judging water quality. pH, which represents the balance between acidic and alkaline components, is relatively easy to determine by field or laboratory testing methods.

The evaluation of pH before mining showed that watershed means ranged from 6.4 to 7.3 while observed values ranged from 5.3 to 8.0. Comparisons between dormant and growing-season pH values showed significant increases during the growing season on all watersheds. This variation amounted to about 0.3 pH point for the values observed.

Variations in mean pH values by water-year and watershed were not consistent. There was little variation in mean yearly pH in Stover B watershed, where yearly means ranged from 7.2 to 7.3. The lowest mean pH values occurred in Wingrove A watershed, where means varied from 6.0 in water-year 1970 to 6.9 in water-year 1972. Variations and inconsistencies in the data indicate that each watershed has individual characteristics and that factors other than flow influence variation in pH.

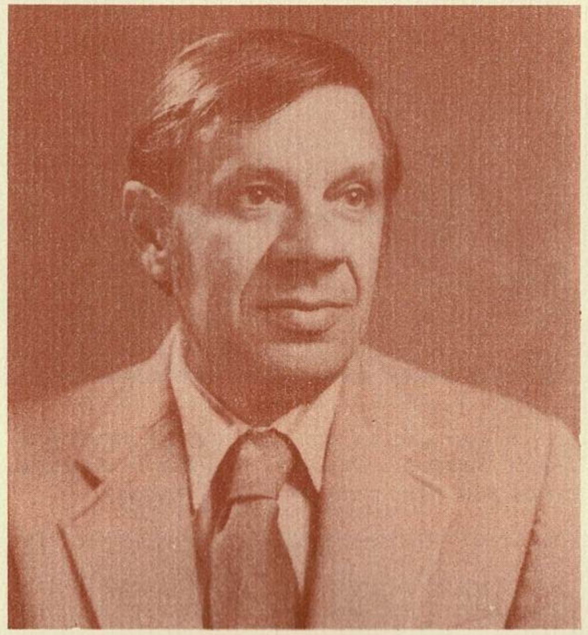
During and after mining, the pH increased and continued to increase through 3 yater-years on Stover A watershed (fig. 2). The mean pH increased from 7.2 in 1971 to 7.5 in 1973. No increase in pH was evident on Stover B or Wingrove A watersheds during or after mining. A trend may develop as more data are collected.

Meters that continuously measured and recorded pH in Stover A and Stover B watersheds indicated that increases in flow relating to storm events did not affect pH. There was no evidence that high flows resulted in a rapid temporary change in pH.

Specific Conductance

Specific conductance relates directly to total dissolved solids. An increase in specific conductance follows any disturbance in a watershed. The magnitude of the increase is based on the type and extent of the disturbance. It can be determined easily in the field or laboratory.

Before-mining values ranged from 57 to 101 mmhos/cm. Growing-season values were higher than dormant-season values. Differences attributed to season were significant on Dillon and Stover B watersheds where specific conductance ranged from 53 to 58 mmhos/cm in the dormant season and from 59 to 75 mmhos/cm in the growing season.



Before-mining yearly variation in specific conductance was significant in Stover B and Wingrove A watersheds. The highest values occurred in Wingrove A, where mean year specific conductance ranged from 81 to 101 mmhos/cm. Before-mining yearly means on Stover B and Dillon watersheds ranged from 57 to 66 mmhos/cm. Variation in specific conductance did not coincide with rainfall patterns on Stover B and Dillon. On Wingrove A, which receives underground mine drainage, the highest specific conductance occurred in 1970, a year of low rainfall.

Road construction and mining disturbance in Stover A caused an increase in specific conductance. There was a consistent yearly increase of about 60 mmhos/cm for 3 years (fig. 3). At the end of the study period, specific conductance for Stover A was about six times higher than before mining. As mining occurred on Stover B and Wingrove A watersheds, specific conductance increased. These increases did not necessarily mean a decrease in water quality. The changes in concentration of each chemical component will permit an assessment of the importance of this variable on contemplated water use.

Alkalinity

Alkalinity represents the total bases in a stream not neutralized by the acidic components of the water. It is believed that moderate increases in the level of alkalinity favor increased aquatic biological activity and are unimportant for many water uses.

Low alkalinity levels before mining reflect the influence of the surface geology, soils, and vegetation residues. Yearly variation before mining was not significant in Wingrove A and Dillon, where alkalinity ranged from 11 to 12 ppm. Concentrations in Stover B ranged from 13 to 20, and there was a significant difference between yearly means. Alkalinity was consistently higher during the growing season for all watersheds before mining. Dormant-season concentrations ranged from 9 to 12 ppm and growing-season concentrations from 13 to 20 ppm.

After mining, mean yearly alkalinity increased in Stover A at a rate of about 5 ppm per year (fig. 4). On this watershed, alkalinity doubled during the study period. A similar trend developed in Stover B and Wingrove A after mining. These increases were not excessive. They indicated that mining disturbance contributed more alkaline than acidic ions to the water. The increase could benefit aquatic flora and fauna.

Sulfate

Sulfate compounds occur in sandstones and shales overlying the coal beds in these watersheds. The overburden rocks are more important sources of sulfate than the waste coal. Waste coal is a very small percentage of the total volume of overburden disturbed by the mining process.

Concentrations of sulfate varied significantly from year to year before mining. On Stover B and Dillon, yearly means ranged from 8 to 12 ppm. The sulfate levels in Wingrove A were approximately twice as high, ranging from 18 to 26. This evidence, in addition to lower pH levels and high specific conductance, supports the assumption that an old mine opening is contributing pollution to Wingrove A. The highest concentration on Stover B and Dillon occurred during the year with the highest rainfall. The peak concentration on Wingrove occurred during the year with the lowest rainfall.

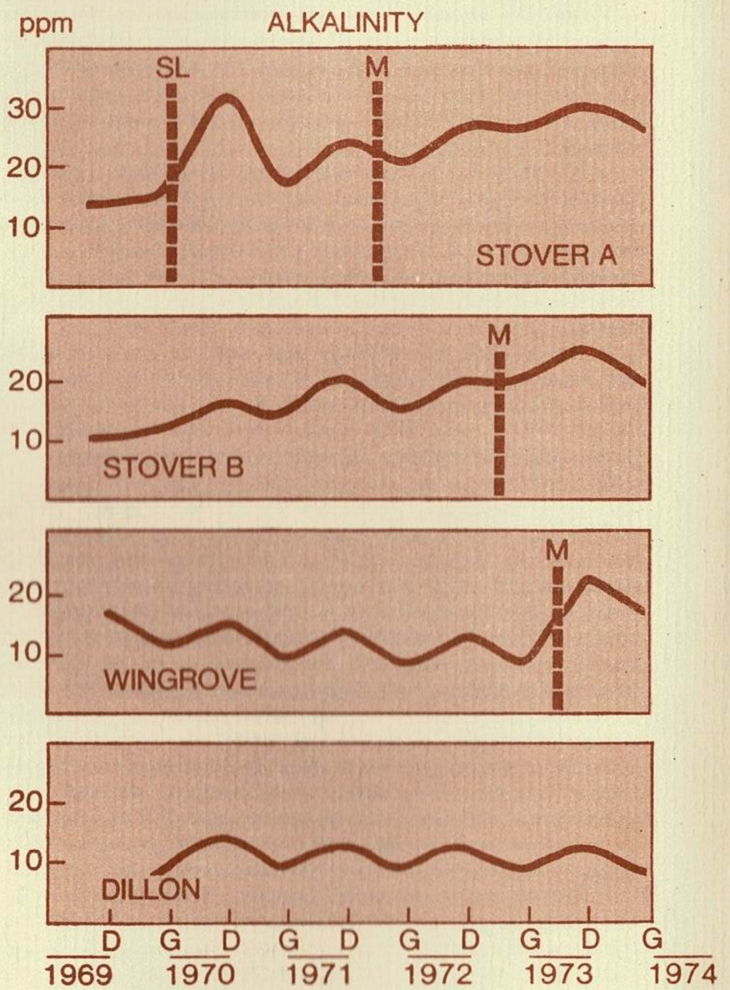


Figure 4.—Mean alkalinity by season for each watershed.

There is evidence that sulfate concentrations may be higher during the dormant season. Dillon watershed had significantly higher dormant-season sulfate. The mean concentration ranged from 9 ppm during the growing season to 11 ppm in the dormant season. Sulfates were higher during the dormant season on the other watersheds, but the differences were not significant.

There was a rapid increase in sulfates in Stover A after mining, and more sulfates were being released three years after disturbance than during the first year (fig. 5). One year after disturbance by roadbuilding and severe slides, the mean sulfate in Stover A was 61 ppm. Two years later the yearly mean increased to 159 ppm. There was a 60-ppm increase in the yearly mean between the second and third years. Each of the other mined watersheds showed a corresponding increase in sulfate.

Although sulfates increased and occasionally exceeded Public Health Standards after mining, the concentrations do not cause great concern. Since the samples were collected in first-order streams, below the disturbance, dilution will reduce this concentration.

Calcium

Calcium, a constituent of shales and sandstones, often occurs in the cementing materials that bind sedimentary rock particles together. There was no limestone in the overburden removed during this mining operation.

Significant variations in calcium concentrations between water-years occurred on all three watersheds before mining. Mean yearly concentrations ranged from 4 to 8 ppm and averaged 5 ppm before mining. Concentrations were highest during the low rainfall year on Wingrove A and Dillon, but not on Stover B. A comparison of calcium concentrations by season shows that calcium concentrations were significantly higher during the growing season on all watersheds.

After mining, the concentration of calcium increased rapidly and continued to increase at an accelerating rate during the study period (fig. 6). Between water-years 1971 and 1972 on Stover A, mean calcium increased 7.7 ppm, and between 1972 and 1973 the increase was 14.9 ppm. The increase in calcium provides an explanation for the increase in pH and alkalinity. The other watersheds showed a similar increase in calcium soon after mining.

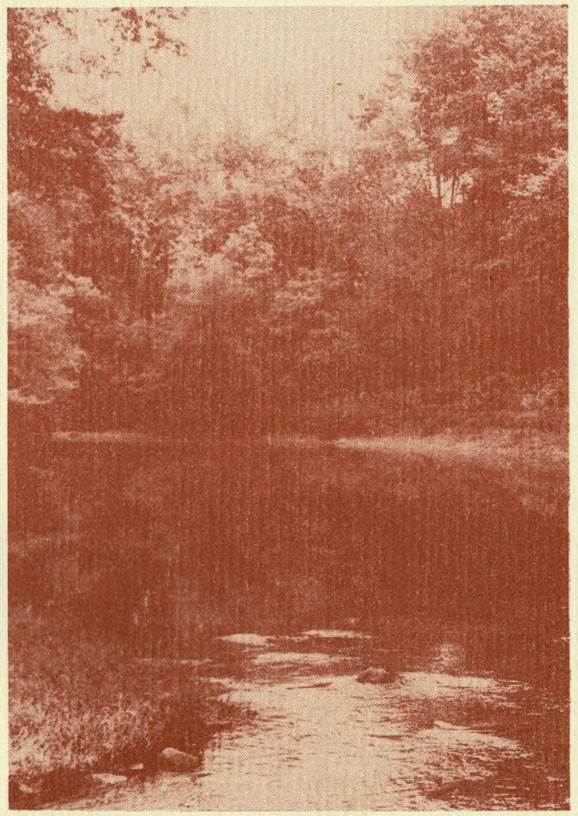
The maximum concentrations of calcium are probably not high enough to impair water quality. An overall increase is an advantage as it raises pH, favors aquatic flora and fauna, and reduces the concentration of some metallic ions.

Magnesium

Magnesium occurs as a cementing mineral in sedimentary rocks. It is also a component of certain sandstones and shales.

Concentrations of magnesium were between 2 and 4 ppm before mining. On Stover B and Dillon there was no significant difference in magnesium concentrations by years. Significant differences did occur on Wingrove A. This may relate to the suspected source of pollution. Low concentrations of magnesium were associated with high rainfall on Wingrove A and Dillon, but not on Stover B. Magnesium concentrations were higher during the growing season. These differences were significant on Stover B and Wingrove A, but not on Dillon.

After mining, the concentration of magnesium increased at an accelerating rate. On Stover A, magnesium concentration increased 4.2 ppm from 1971 to 1972, and 9.2 ppm between 1972 and 1973 (fig. 7). At the end of the study period, magnesium concentration on Stover A was 21.1 ppm. Similar increases in magnesium occurred on the other watersheds soon after mining and regrading.



Bicarbonate

Bicarbonate is a common component of natural waters. Extreme hardness or high bicarbonate concentration may be an important consideration for some industrial uses.

Concentrations averaged from 12 to 24 ppm in the three watersheds before mining. Lowest concentrations occurred in Wingrove A and Dillon. There was little difference between yearly means. Stover B had the highest concentrations and the greatest variance between years. Rainfall patterns had little influence on concentration.

Significantly higher bicarbonate concentrations occurred during the growing season on all watersheds. Means for the dormant season ranged from 11 to 14 ppm, and the range for the growing season was 16 to 25 ppm.

Road-building and mining on Stover A resulted in higher bicarbonate concentrations (fig. 8). A uniform increase occurred during the study period, concentrations reaching 25 ppm at the end of the study period. Similar increases occurred in Stover B and Wingrove A during and after mining.

Zinc

The metallic ion zinc occurs in most natural waters. Potential health hazards at high concentrations make it an important variable.

The average concentration of zinc during the water-years before mining ranged from 0.12 to 0.28 ppm. The concentration was similar for all watersheds. Highest concentrations occurred during the year with the lowest rainfall.

Stover B and Dillon watersheds had higher concentrations of zinc during the dormant season. The reverse was true on Wingrove A.

The evidence from Stover A indicates that the concentration of zinc will increase after mining (fig. 9). Mean yearly concentration at the end of the study period was about 0.50 ppm. The erratic nature of the concentration of this ion obscures trends that may have occurred on Stover B and Wingrove A after mining.

Potassium

Potassium is a common component of natural water. It represents no potential problems relating to use by man.

Concentrations of potassium ranged from 1.7 to 2.7 ppm before mining. There was a significant variation between yearly means on all watersheds. Highest concentrations occurred during 1970, the year of low rainfall.

Dormant-season means were significantly higher for Wingrove A and Dillon watersheds. The differences amounted to approximately 0.35 ppm. There was no significant difference between seasons in Stover B.

Mining disturbance in Stover A did not cause an increase in potassium, nor was there an increase in potassium in Wingrove A and Stover B after mining (fig. 10).

Iron, Manganese, and Aluminum

High concentrations of metallic ions of iron, manganese, and aluminum are considered undesirable contaminants in terms of aquatic biota and use by man. The Public Health Service water quality standards establish undesirable concentrations of iron at 0.30 ppm and aluminum at 0.05 ppm. There are no standards for manganese.

In these analyses, iron includes both ferrous and ferric compounds. It is believed that a high percentage of the iron occurs as ferrous iron in natural water systems.

About a fourth of the samples collected before mining had concentrations of 0.01 ppm or more iron (table 3). About 90 percent of the samples had iron concentrations of 0.30 ppm or less. The highest concentration recorded was 5.7 ppm.

Table 3.—Frequency of occurrence and concentration of iron by season and watershed, before and after mining, in percent

Watershed	Dormant-season concentration (ppm)			Growing-season concentration (ppm)		
	0	.01 to .30	0.31+	0	.01 to .30	0.31+
Before mining:						
Stover B	61.5	23.1	15.4	43.6	23.1	33.3
Wingrove A	84.7	10.3	0	87.2	12.8	0
Dillon	97.4	2.6	0	89.7	10.3	0
Mean	82.6	12.2	5.2	73.5	15.4	11.1
After mining:						
Stover A	82.0	10.3	7.7	97.4	2.6	0

There is evidence that iron occurs at higher concentrations during the dormant season. Stover B had higher concentrations of iron before mining than either Wingrove A or Dillon.

There was no obvious increase in the concentration of iron after mining in Stover A. Seventy-eight percent of the samples from Stover B, Wingrove A, and Dillon had concentrations of iron below 0.01 ppm before mining. In Stover A, 93 percent of the samples collected after road construction, slides, and mining had concentrations of iron below 0.01 ppm. If this trend occurs in other watersheds after mining, the possibility exists that changes in water chemistry resulting from mining reduce the frequency of occurrance of iron.

Manganese was a minor component of the water before mining. Over 80 percent of the samples collected had concentrations below measurable concentrations, and all quantities were less than 1.65 ppm (table 4). There was little evidence that season affected concentration.

Table 4.—Frequency of occurrence and concentration of manganese by season and watershed, before and after mining, in percent

Watershed	Dormant-season concentration (ppm)			Growing-season concentration (ppm)		
	<0.01	.01 to .20	0.21+	<0.01	.01 to .20	0.21+
Before mining:						
Stover B	76.9	2.6	20.5	89.8	5.1	5.1
Wingrove A	92.3	2.6	5.1	69.2	10.3	20.5
Dillon	100.0	0	0	87.2	7.7	5.1
Mean	89.7	1.7	8.6	82.0	7.7	10.3
After mining:						
Stover A	79.5	2.5	18.0	89.7	0	10.3

In Stover A, after disturbance by mining, 84.6 percent of the samples had concentrations below measurable amounts. The percentage for Stover B, Wingrove A, and Dillon watersheds before mining was 85.9. Thus there is no evidence that mining affected the concentration of manganese.

Before mining, there was a trend for higher concentrations of aluminum during the dormant season (table 5). Aluminum occurred at concentrations below 0.01 ppm in 11.5 percent of the samples, and 72.7 percent had concentrations of 0.01 to 0.05 ppm. There was wide variation in concentration between the three years of sampling before mining. In 1972, the year with highest total rainfall, all samples had less than 0.05 ppm aluminum, and a third of the samples had less than 0.01 ppm. Highest concentrations occurred in 1970, the year with the lowest yearly rainfall, when 61.6 percent of the samples had 0.05 ppm or less.

Concentration of aluminum after mining was similar to that before mining. The percentage of samples with aluminum concentrations below 0.01 ppm was 11.5 percent both before and after mining. Before mining, 72.7 percent of the samples had concentrations of 0.01 to 0.05 ppm. After mining, the percentage was 79.5.

Table 5.—Frequency of occurrence and concentration of aluminum by season and watershed, before and after mining, in percent

Watershed	Dormant-season concentration (ppm)			Growing-season concentration (ppm)		
	<0.01	0.01 to 0.05	0.06+	<0.01	0.01 to 0.05	0.06+
Before mining:						
Stover B	0	71.9	33.1	13.2	79.0	7.8
Wingrove A	2.6	76.9	20.5	30.8	53.8	15.4
Dillon	5.0	85.0	10.0	18.4	71.0	8.6
Mean	2.5	77.3	20.2	20.9	67.8	11.4
After mining:						
Stover A	2.6	84.6	12.8	20.5	74.4	5.4

DISCUSSION

The variations in the chemical composition of water flowing from an undisturbed forested watershed are poorly documented. Studies on three experimental watersheds in the eastern United States provide some information about water chemistry for undisturbed watersheds and the effects of clearcutting on water quality (Johnson and Swank 1973, Aubertin and Patric 1974, Likens et al. 1970). Variations in concentrations were related to soil, geology, vegetation, and rate of flow. Disturbance resulting from clearcutting caused changes in the water chemistry.

Results from my case history of four West Virginia watersheds provide additional information about the natural variation in water chemistry. Data for 12 water-chemistry variables indicate that significant variation occurred between watersheds before mining. Within each watershed, variations in water quality were related to season of year, rate of flow, and year-to-year fluctuations.

The analyses of water quality before mining showed significant variation between growing season and dormant season for all variables except sulfate and manganese (table 6). Aluminum and zinc concentrations were significantly higher during the dormant season. All other variables were higher during the growing season. The high dormant-season values may relate to increased biological activity due to summer temperatures.

Significant variation in water quality also occurred from year to year before mining, for all parameters except alkalinity, magnesium, and bicarbonate. Climatic conditions and streamflow contribute to this variation. Sulfate, calcium, magnesium, zinc, and potassium concentrations seemed to relate to rainfall and streamflow patterns more than the other variables. It is assumed that temperature would also influence concentrations of some variables by accelerating biological activity.

Two of the three watersheds used to document water quality before mining had not been disturbed recently. The forest cover probably had been cut one or more times, but there was little evidence of this disturbance at the time the study was begun. Comparisons of the water-quality variables indicate the differences that can occur between contiguous watersheds. These natural variations should be recognized in a generalized description of water chemistry for a region.

The third watershed, Wingrove A, apparently had some drainage from a small underground mine. This had an effect on the water quality, and the watershed could not be considered representative of undisturbed conditions. Similar conditions exist on other West Virginia watersheds.

These analyses emphasize that we cannot judge the effects of surface-mining disturbance unless we know what the water quality was before mining. Variations before mining may result in values that exceed predetermined water-quality standards.

During and after mining, 8 of the 12 parameters increased as weathering processes released chemical components of the overburden rock. Within a few weeks after mining, pH, specific conductance, alkalinity, zinc, and bicarbonate began to increase and continued to rise at a uniform rate for years. Sulfate, calcium, and magnesium concentrations began to rise soon after mining, and the rate of increase for the first 3 years after mining accelerated from year to year.

Table 6.—Summary of water quality, and the effect of time, season, and mining disturbance

Characteristic	Before mining[a]			After mining[b]		
	Range in means	Season variation	Yearly variation	Mean	Direction of change	Rate of change
pH	6.4-7.3	Sig.	Sig.	6.9-7.8	Increase	Uniform
Specific conductance	55-100 mmhos/cm	Sig.	Sig.	87-483	Increase	Uniform
Alkalinity	10-20 ppm	Sig.	Not Sig.	13-33	Increase	Uniform
Bicarbonate	11-25 ppm	Sig.	Not Sig.	19-38	Increase	Uniform
Zinc	0.12-0.18 ppm	Sig.	Not Sig.	.29-.57	Increase	Uniform
Potassium	1.7-2.7 ppm	Sig.	Sig.	2.5-4.6	No change	——
Sulfate	8-26 ppm	Not Sig.	Not Sig.	17-207	Increase	Accelerating
Calcium	3.4-7.8 ppm	Sig.	Sig.	7.7-54.5	Increase	Accelerating
Magnesium	1.8-3.6 ppm	Sig.	Not Sig.	3.3-26.6	Increase	Accelerating
Iron	.01-5.70 ppm	Yes	Yes	.01-.13	No change	——
Manganese	.01-1.60 ppm	No	Yes	.01-1.50	No change	——
Aluminum	.01-.32 ppm	Yes	Yes	.20-3.60	No change	——

[a] Before-mining data include data from Stover B, Wingrove A, and Dillon watersheds for water-years 1970, 1971, 1972.

[b] After-mining data include data from Stover A for water-years 1970, 1972, 1973.

Specific conductance, pH, and alkalinity are indicators of trends in water quality. The increase in specific conductance after mining was anticipated, but the increase in pH and alkalinity was not higher calcium and magnesium concentrations contributed to the decrease in acidity. Sulfate, calcium, and magnesium were responsible for much of the increase in specific conductance. These trends are similar to the results reported by Curtis (1972) for eastern Kentucky watersheds. The overall effect of this change in chemistry may be considered an improvement in water quality.

Specific conductance is a more sensitive indicator of change in water chemistry than pH. A change in specific conductance relates to all chemical components of the water in a stream. Total dissolved solids are directly related to specific conductance.

The increases in the other chemical components of water during and after mining did not identify conditions that may be detrimental to the flora or fauna of a stream or use by man. This is important because the overburden for the coal seams mined is known to have strata that can be extremely acid if improperly handled during mining.

The documented changes in water chemistry represent maximum values because the samples were collected immediately below the mining operation in small first-order streams. When the water flows into larger streams, dilution and mixing will modify the effect that increases in chemical components have on stream biota and use by man.

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Wildlife Project To Honor Jim Wilkinson

By: David C. Batson, II — Executive Director
The Ruffed Grouse Society of North America

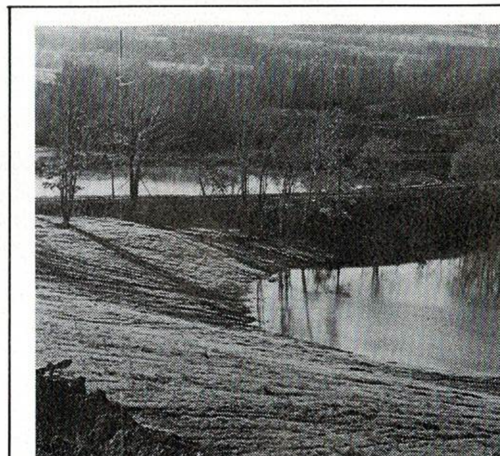
The most significant wildlife project probably in the last decade will begin here in West Virginia within the next few months. This project will be named after a man dedicated to wildlife, the coal industry, and West Virginia. The "Jim Wilkinson Memorial Wildlife Project" will study and develop a productive plan and procedure for effective woodland and wildlife reclamation on surface mined areas.

So important is this project, that the President's Advisory Committee on Environmental Quality requested a presentation even prior to actual implementation. A triparte project between the West Virginia Department of Natural Resources, the West Virginia Surface Mining and Reclamation Association, and the Ruffed Grouse Society of North America, it calls for the development of three major sights in our state. From these sights methods will be researched and developed to formulate an effective technique for woodland-wildlife reclamation. From West Virginia's efforts, other states will be in a position to follow and duplicate these techniques.

Much of West Virginia is not conducive to agriculture reclamation due to terrain and the slump in the small farming industry. Sportsmen, for years, have found wildlife in abundance on abandoned strip mines that have grown up naturally. Unfortunately, the existence of unsightly high walls and spoil banks create environmental and aesthetic problems, even though wildlife usage is high and desirable. Therefore, by using known, successful reclamation techniques which are currently applied to meet the existing regulations; compiling data on the type vegetation which wildlife are using on these sights now; and adding, as well as testing, new species, we are confident we can devise an effective format for woodland-wildlife reclamation.

Presently, the procedures that operators use when this type of reclamation is desired fall short of being as successful as the agriculture methods they have; consequently more emphasis is placed on agriculture reclamation. Once an effective woodland-wildlife technique is perfected, though, West Virginia stands to reap tremendous benefit. Why? Last year, for instance, nearly 26,000 acres were reclaimed within this state. Conservatively, 60% of that acreage would have been better suited to woodland-wildlife than agriculture. So we, therefore, are presented with an opportunity to develop literally thousands of acres of productive wildlife habitat with the help of the surface mine industry.

James L. Wilkinson



Located just a few hundred yards from these sediment ponds is the Fur, Fin and Feather Club which Jim built after reclamation was completed on this permit located in Preston County.

. . . . WVSMRA In Joint Venture With DNR And Ruffed Grouse Society

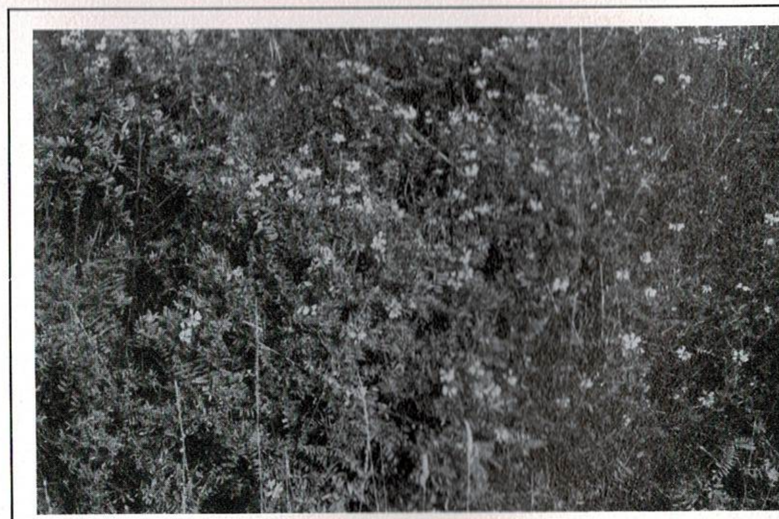
"SYMBOL OF THE RUFFED GROUSE SOCIETY OF NORTH AMERICA"

"Wildlife are dependent upon periodic environment disturbances. The bulk of our species depend on early growth stages of shrubs and herbaceous plants."

Wildlife are dependent upon periodic environmental disturbances. The bulk of our species depend on early growth stages of shrubs and herbaceous plants. Mature forests eventually lose their worth for wildlife as a food resource when the leaf canopy shades out ground plants and shrubs which wildlife are so dependent upon. Forest fires, wind and snow damages, glaciers, etc. are nature's method of controlling plant stages; the most effective, of course, is wildlife and glaciers. These methods are totally inconsistent with human populations; therefore, man is forced to manage nature. Clear cutting, controlled fire, and the abandoning of small farms have been the most popular methods here-to-fore; unfortunately, these methods are slow and costly.

Surface mining creates devastating land disturbance, and for a period of time, certainly distasteful; however, through modern technology and strict laws, reclamation is now a successful fact. In the words of one of America's foremost research biologists, Gordon W. Gullion, "a strip mine high wall as we know it, is nothing compared to the wasteland created by the path of glacial movement". Nature immediately takes over this wasteland (and spoil bank) and after several years, vegetation in one form or another appears. We can speed this up and therefore must, as we are given a desperately needed energy resource while at the same time potentially creating some fine wildlife habitat — in many cases far superior to what was there prior to the mining operation.

There are no guarantees when dealing with living creatures and plants; however, the Ruffed Grouse Society feels that it is time the efforts of the industry are supported, instead of fighting this environmental question. By joining and helping them we serve two vital purposes and goals: 1) provide a much needed economic and energy resource, and 2) create and maintain wildlife habitat.



Jim Wilkinson needs no introduction to the people of West Virginia of the surface mining industry. He fought hard and long for effective legislation, as well as demonstrated himself as an inovative leader in conservation, as well as practiced it. As one of the founders of the West Virginia Surface Mining and Reclamation Association and a strong supporter of wildlife conservation, it is a fitting tribute to this wonderful man that we name this project after him. West Virginia mourns his passing — so does the coal industry and conservation; however, we should be proud to have had such a man among us, even though it was for a brief period. What he did and stood for should be a guide for us all.

Anyone wishing to donate to this project may send their check to R.G.S.N.A. headquarters. They should be made payable to R.G.S.N.A./The Jim Wilkinson Memorial Wildlife Fund, and will be applied to this project.

Much of West Virginia surfaced mined land is easily suited to reclamation for wildlife purposes.

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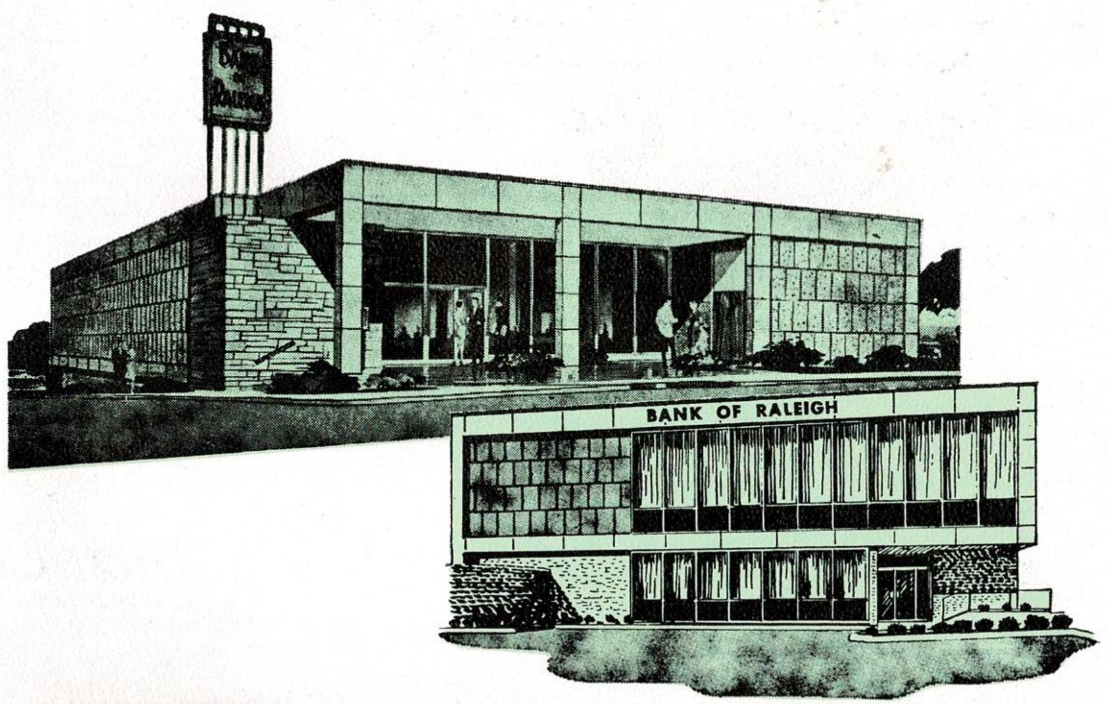

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CALENDAR OF EVENTS FOR 1976

January 14-15	Third Annual West Virginia Surface Mining Wymposium Daniel Boone Hotel, Charleston, WV
February 12-15	Semi-Annual Meeting Doral Country Club, Miami, Fla.
April 3-11	Internation Mining Conference Warsaw, Poland
May 10-13	AMC Coal Show Detroit, Michigan
July 18-21	Annual Meeting Greenbrier Hotel, White Sulphur Springs
October 22-23	Fall Board Meeting Lakeview Country Club, Morgantown, WV

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Long Range Benefits Of Surface Mining

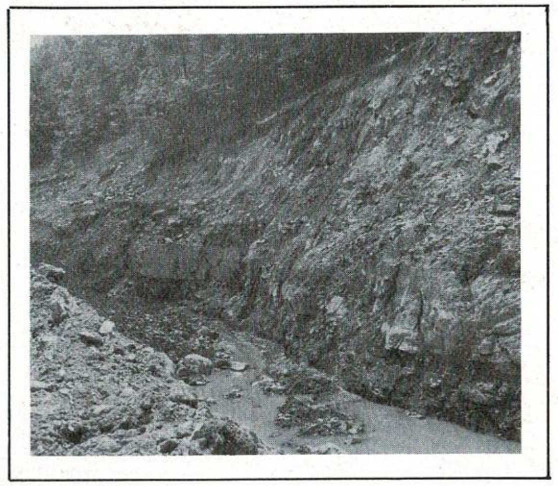
by
Richard M. Smith

We may not have this chance again. The time is right to make massive improvements for the future. In hill country, level land has special economic and aesthetic value. Natural soils in humid climates are acid but planned mining creates neutral soils. Natural soils on many kinds of bedrock are deficient in available phosphorus but planned minesoils can be higher in available phosphorus and in total phosphorus.

Natural soils on many kinds of bedrocks are deficient in available potash, but planned minesoils can be rich in potash. Many natural soils are low in available magnesium, which limits plant growth and contributes to grass tetany of cattle and sheep. Planned placement of coal overburdens can assure abundant magnesium and can prevent grass tetany.

Available water in soils depends on texture, structure, coarse fragments and plant rooting depths. Minesoils that are not excessively packed provide greater rooting depths than many natural soils. Bedrock under natural soils sometimes is seriously limiting. Other limitations result naturally from subsoil fragipans, claypans or duripans that roots cannot penetrate. Desirable textures and coarse fragments can result from planned placement. Subsoil structure is a complex property. When texture and coarse fragments are favorable, subsoil structure requires little attention. An excess of non-porous rock fragments can reduce available moisture capacity, but weatherable, porous coarse fragments and proper packing density can provide maximum available water.

Surface miners who care about the future can help assure that soils and landscapes are improved for the intended use. Preservation is not good enough. Modern conservation must make it better.



Dr. Smith's research on the various mine soils throughout West Virginia has resulted in many improvements in mining methods and reclamation technology. One of his most important findings revealed that, many times, the sub-soil unearthed by mining is of a higher quality than the natural soil.

“Coal Man” Dinner Nets Over $54,000

Bernard J. Folio, Chairman of the Association Division, presents C. E. "Jim" Compton as Coal Man of the Year.

A goal of over $54,000 for West Virginia University's Mountaineer Scholarship Fund was attained at the first "Coal Man of the Year" Testimonial Dinner, held at the Ramada Inn, Morgantown, West Virginia on December 4. The dinner, sponsored by the West Virginia Surface Mining and Reclamation Association and the Mountaineer Scholarship Fund, concluded a year-long fund-raising effort, in which the surface mining industry and related businesses contributed $175,000 toward the Fund, through private contributions and other fund-raising events.

C. E. "Jim" Compton was chosen as first recipient of this award, which was recently initiated to recognize the most outstanding contributor to the surface mining industry. During his 35 years in the coal business, Compton has continuously innovated new mining methodology and land reclamation. Additionally, he designed and developed the first coal auger for commercial use in 1949. He has been an avid fan and supporter of West Virginia University sports teams for many years.

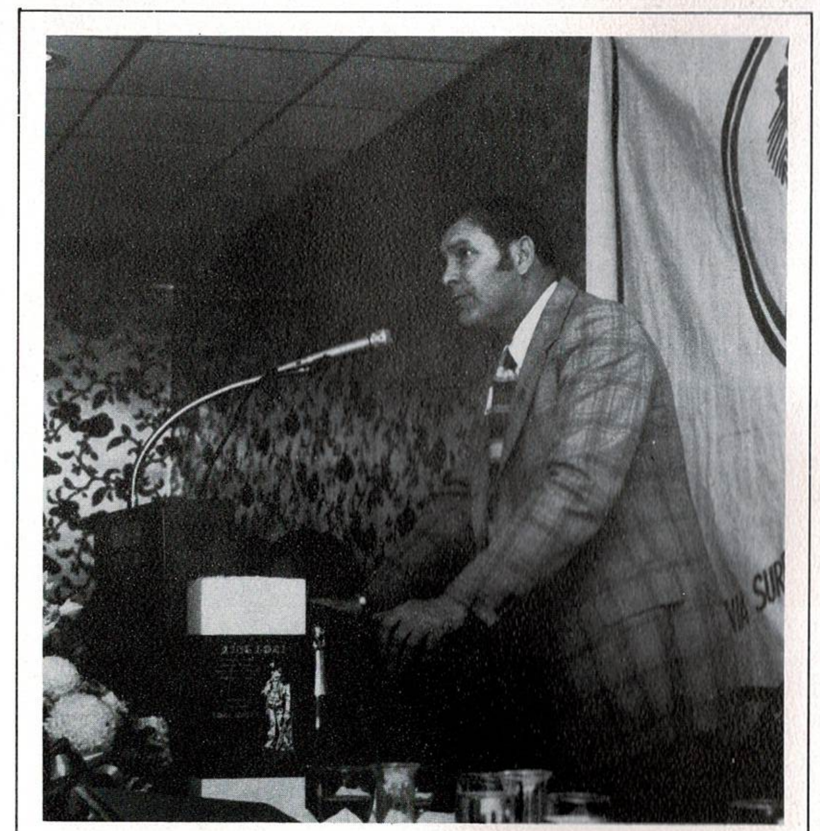
Nearly 400 persons attended the 100-a-plate dinner, which featured special guests Joe Stydahar, former WVU All-American and All-Pro football player; Lysander Dudley, Director of Development for WVU; and James R. McCartney, Secretary of State.

Paul Miller, WVU development officer for athletes, was very pleased with the success of the dinner, and the interest and support received from the surface miners. "It's exciting that an organization would take on itself to choose the Mountaineer Scholarship Fund as a project. The athletic staff is looking forward to this being one of our annual fund-raising dinners, which would also be one of the largest throughout the state." He added that the proceeds from this first dinner would more than likely insure the Fund of reaching their $500,000 goal set in 1974.

Charter members of the Director's 100 Club, composed of men sponsoring a full scholarship for University athletes, were also recognized at the dinner. Dr. Leland Byrd, director of athletics for WVU, presented engraved plaques to these coal producers, and expressed his gratitude to those attending the dinner for their generous support. Paul Miller assisted in the presentation and noted that 60 percent of the members were in surface mining or related industries.

Guest speaker Joe Stydahar, now employed by a manufacturing firm near Chicago stated his pride in his home state and the coal industry. "Wouldn't it be a wonderful thing to purify all the waters, streams and lakes in the state. I think that one of these days, these great men working toward reclamation will achieve their goals," he remarked. Stydahar also added that he hoped to return to West Virginia in a year and a half to spend the rest of his life here.

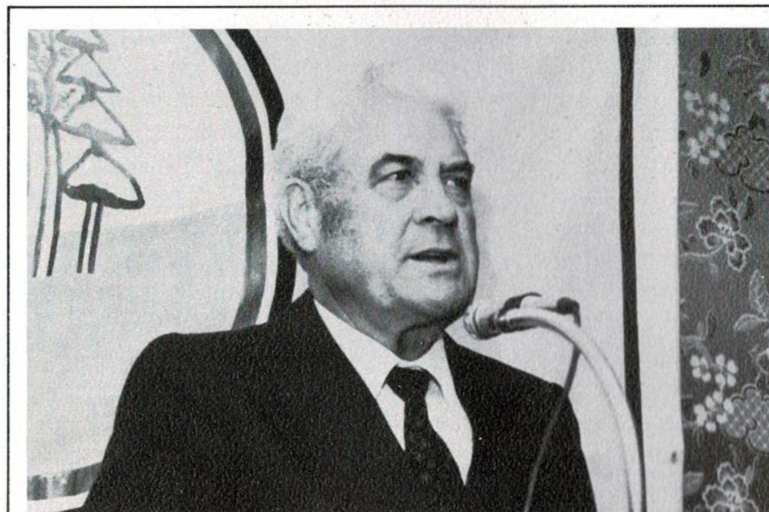
Chairman of the Board H. L. Kennedy welcomed participants to the first "Coal Man of the Year" testimonial. Nearly 400 coal industry representatives and business people turned out to honor C. E. "Jim" Compton for his 35 years of service to West Virginia.



Presentation of the Director's 100 Club Awards was handled by WVU Athletic Director Leland Byrd. Awards were given to those individuals and companies who sponsor at least one full scholarship a year at WVU.

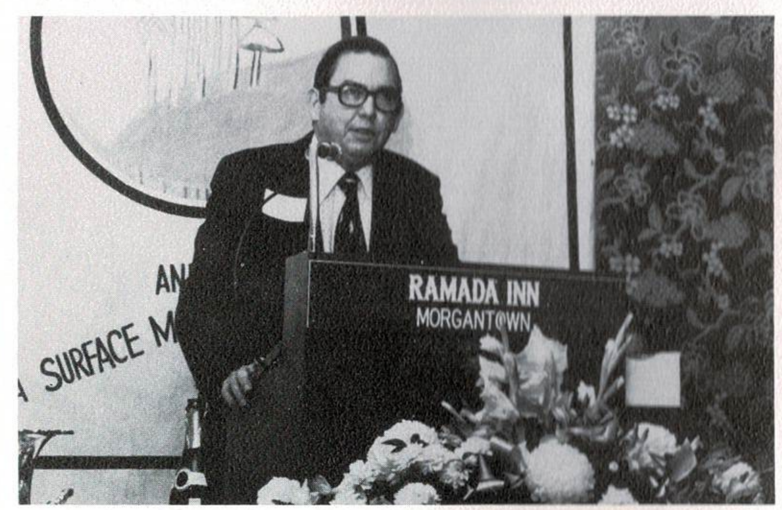
(Continued on Page 41)

. . . . 400 Attend Testimonial



Former WVU All-American and National Football League All-Pro, Joe Stydahar flew in from his home in Chicago to pay tribute to the coal industry and his old friend Jim Compton.

Association President Ben E. Lusk was master-of-ceremonies for the evening. To his left on the head table were Jim and Julia Compton; Bernard and Kathryn Folio; Mike and Hazel Kennedy; and Dr. Leland Byrd.



A special presentation was made to Mrs. Shirley Wilkinson in honor of her late husband. Jim Wilkinson was a charter member of the WVSMRA and past president of the organization. The presentation was made by G. S. Matthis, Northern Division president of Island Creek Coal Company.

. . . . "distinguished West Virginian"

Secretary of State James R. McCartney lauded the coal industry for its interest and concern for athletics in West Virginia saying, "Success in sports brings the state together in one collective voice." He presented a certificate to Compton on behalf of Governor Moore, commending him as a "distinguished West Virginian."

West Virginia University director of development, Lysander L. Dudley Sr. praised the coal industry's supportive role in University athletics.

Lysander L. Dudley, Sr., director of development at WVU, commended the coal industry's supportive role in University athletics. He also stated his desire to see the University lead the nation in energy research and added that he personally planned to work toward that goal.

Calling the coal industry, West Virginia and the WVU Athletic Department a great tripartite, Secretary of State James R. McCartney lauded the surface mining industry for their interest and concern for University athletics. Noting that when one thinks of West Virginia, he naturally thinks of coal, McCartney said, "A coal man is one who is a hard worker, but is also providing the economic base for the state." He added that a successful athletic program is good for the state as well as the University. "Success in sports brings the state together in one collective voice" he said.

McCartney presented a certificate to Compton on behalf of Governor Arch A. Moore, Jr., commemorating him as "a distinguished West Virginian."

Bernard J. Folio, chairman of the WVSMRA's Associate division introduced the honoree and presented him and his wife with a large oil painting of Compton.

A special presentation was made to Mrs. Shirley Wilkinson to honor her late husband, Jim, former president of the Association, who died last summer. G. S. Matthis, president of the Northern Division of Island Creek Coal Company, presented her with a similar oil painting of her husband, in commemoration of Wilkinson's many contributions toward the industry and Association.

After dinner, entertainment was provided by Benny Benack and the Dodge Kids.

Marshall Students Tour Area Surface Mines

The West Virginia Surface Mining and Reclamation Association sponsored a tour of surface mine sites for 25 geology students from Marshall University on October 28. The students, under the direction of Dr. Richard Bonnett, assistant professor of geology, at Marshall, were interested in viewing coal extraction, as well as various reclamation processes. Sites visited included Cannelton Industries, Cannelton Hollow; Princess Susan Coal Company, Kelley's Creek; Valley Camp, Kelley's Creek; and Scholl and Wilcher, Rush Creek.

Tom Kerns of Cannelton, Harlan Dahmer of Princess Susan and Max Brown of Scholl and Wilcher met with the students at the sites to explain the different surface mining methods and answer questions. Department of Natural Resources inspectors Tom Matheny and Richard Casdorph also assisted with the tour, explaining the state-imposed requirements on surface mining in West Virginia and the enforcement of these laws.

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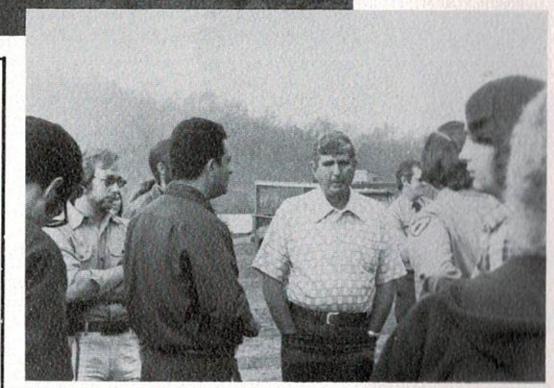

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a *Dr. Richard Bonnett, assistant professor of geology at Marshall University, examines the fill area on Princess Susan's coal property, Kelley's Creek.*

b *On the initial stop of the tour, John Sturm, WVSMRA, outlined new mining methods used in West Virginia.*

c *Students inspect an active pit on Cannelton Industries property.*

d *DNR inspectors Tom Matheny and Richard Casdorph (left), and Cecil Tolbert and Harlan Dahmer, Princess Susan, discuss present mining methods utilizing total highwall elimination (as seen on the left), as compared to previously used methods (depicted on the right).*

e *Vegetation cover at Princess Susan Coal Company is examined by the students.*

f *Cannelton employees Tom Kerns and Ray Evans discuss method of operation with DNR inspector Richard Casdorph.*

g *This nearly completed Scholl and Wilcher mountain-top removal operation is just minutes from downtown Charleston and is a proposed site for a future housing development.*

h *Tom Kerns and Tracy Hylton explain method of operation utilized at Cannelton Industries.*

i *A rock core of a valley fill on Princess Susan coal property is examined by students.*

Second IMRC To Poland

In April of last year, nearly 200 coal industry representatives and members of related businesses traveled to Dusseldorf, West Germany for a week-long conference on mining technology. The success of the trip was so overwhelming and the response so great that the second International Mining and Reclamation Conference has been scheduled for April 3-10, 1976, in Warsaw, Poland.

Continuing the theme of "Explore the World of Mining," this year's conference is designed to give coal people from the United States a first-hand look at mining technology abroad. Technical papers and presentations from Polish mining officials will preceed field trips to underground and surface mining sites, said to be some of the most advanced in the world.

Polish deep mining features utilization of complex longwall systems almost exclusively, while surface mining is achieved through use of wheel excavators in huge open pits. Their methods of reclamation should be of great interest to surface mine operators in the United States.

Arrangements for the conference are now being finalized and will be available soon, along with a total cost package that should be similar to last year. Please remember that space is limited and will be given on a first come, first serve basis.

If you or members of your company or organization are interested in participating, please contact: West Virginia Surface Mining & Reclamation Association, 1624 Kanawha Boulevard, East, Charleston, West Virginia — Phone (304) 346-5318.