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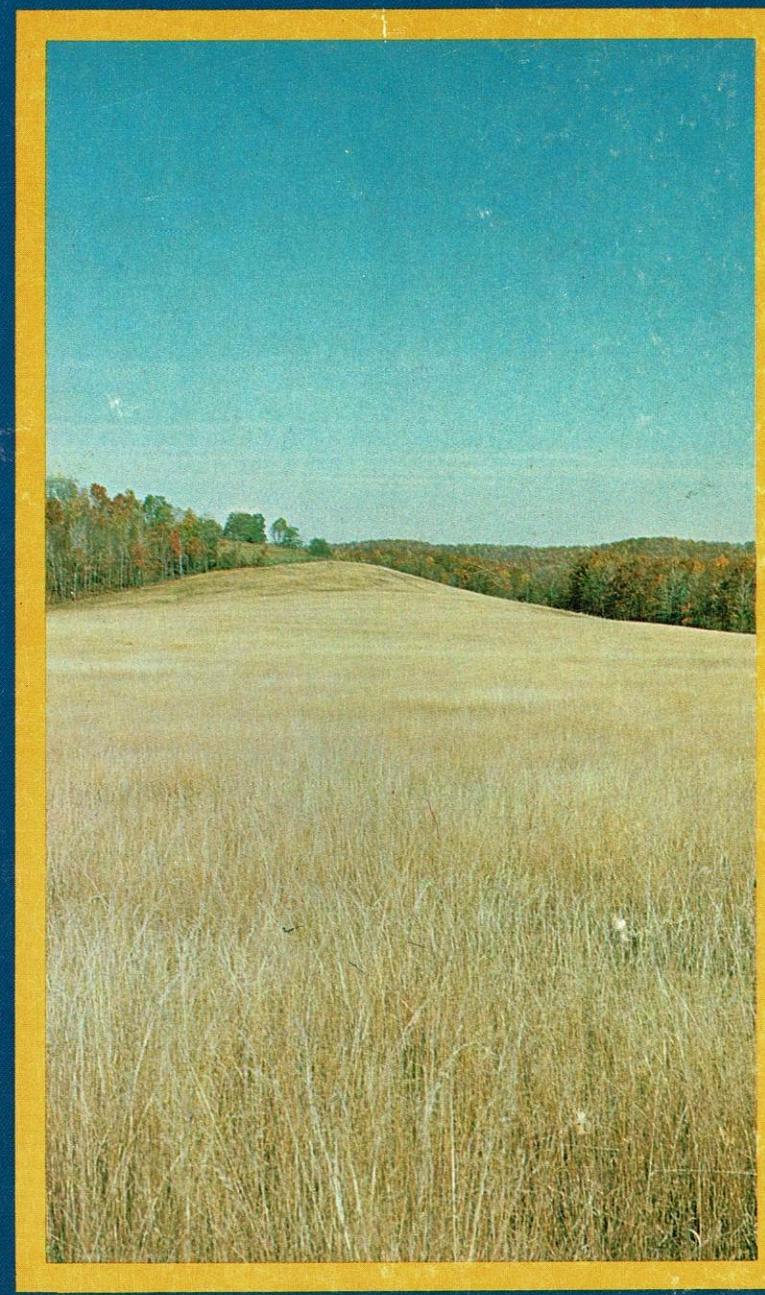
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QUARTERLY
WINTER 1977-78



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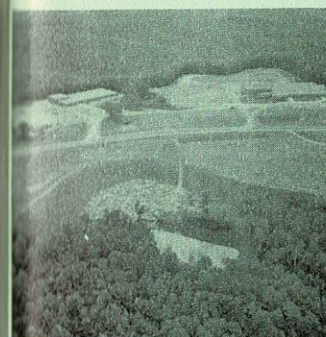
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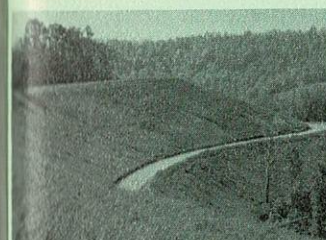
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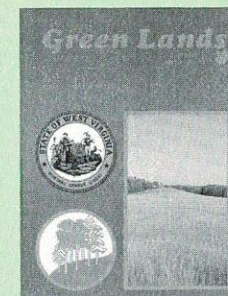
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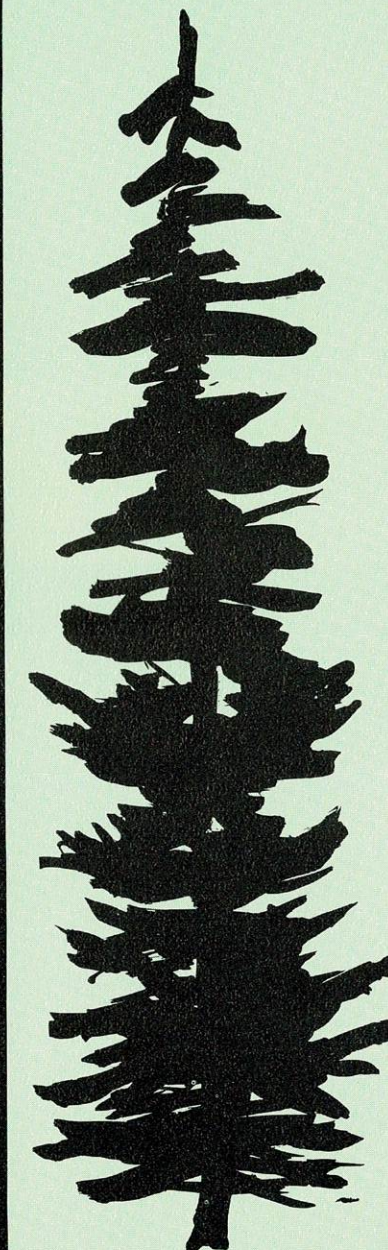
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Our Cover

The decade of the 1970's has been one of great progress for the surface mining industry in West Virginia. The cover of this special issue of GREEN LANDS QUARTERLY reflects our belief that this progress has resulted largely from a spirit of cooperation between the State of West Virginia and the surface mining coal industry as represented by the WVSMRA.





Encroachment or coexistence? The surface mining process need not be at odds with even the immediate environment. These scenes, from Grafton Coal's operation in Lewis County and



Barbour Coal's job in Barbour County, respectively, illustrate the possibilities for mining with minimal disturbance and aesthetically pleasing reclamation.

The Issue and the Industry

The surface mining of coal, or stripping, as it is more widely known, is nearly a century old in practice, but still relatively young as an industry.

West Virginia, long synonymous with coal in the nation's mind, was an early leader in production and, in 1939, saw fit to enact this country's first surface mining law.

Lax by today's standards, that law nevertheless marked the Mountain State as a pioneer on both sides of the controversy yet to come. For the coal industry has changed with the country's shifting priorities.

West Virginia is the only state which lies entirely within Appalachia, still the most productive coal region in the world. As such, West Virginia has been a focal point for much of the controversy over surface mining.

As U.S. industry shifted into high gear with the onset of World War II, West Virginia coal boomed and environmental protection was a phrase scarcely conceived, let alone practiced.

Production was the priority of the day and the coal industry, consistent with the mainstream of American life, placed all emphasis on tonnage mined, not acreage reclaimed.

By the early 1960's Americans began to realize the long term futility of wasting the country's natural resources, and priorities shifted toward conservation and environmental protection.

In West Virginia, as elsewhere, the need for change was apparent. Recognizing this, the State reorganized its Conservation Commission, in 1961, into the Department of Natural Resources with a Division of Reclamation to oversee surface mining.

In 1967, the State Legislature passed what many considered to be the most stringent surface mining law in the country. Certainly it proved a turning point in reclamation, for West Virginia has led the nation in acres reclaimed every year since then.

During that time, the abolition argument has cooled off and heated up repeatedly. As with most controversial issues, reality has worked a compromise between the two extremes.

In any event, the results of this decade long debate must be satisfying to moderates on both sides of the issue. True, West Virginia has lost its position as the nation's leading producer of coal. But it has traded that honor for another, perhaps more important achievement. West Virginia has struck the balance of energy and environment that Congress was seeking for the entire nation when it gave approval to the Surface Mining Control and Reclamation Act of 1977.

We do not seek to dwell in these pages on the trial and error of the past. It is our intention to illustrate what is possible here in West Virginia today and wherever coal is mined tomorrow.

The

West Virginia Surface Mining



The West Virginia Surface Mining and Reclamation Association is the largest trade organization of its kind in the nation, representing nearly 300 companies and thousands of individuals involved directly and indirectly with the surface mining of coal.

The organization was founded in 1966 to serve as spokesman for the industry in West Virginia, and to assist member companies in compliance with the State's constantly evolving mining and reclamation laws.

Tailoring its services to meet the needs of its members and the industry at large, the Association has confronted problems on many fronts.

One trait common to the handful of companies that formed the WVSMRA was a sense of responsibility to the communities in which they lived and worked, and one of the initial tasks facing that group was to transmit that responsibility to the rest of the industry. Today's membership rolls and the respect for West Virginia operators throughout the industry are testimonies to the success of that effort.

The Association took active part in the passage in 1967, of what became known as the most stringent surface mining law in the country. From the legislative battles emerged a law that turned the corner environmentally, yet allowed the industry the opportunity to adapt and comply.

It was fortunate for the surface mining industry that by 1971, the WVSMRA was firmly established. For in that year, the abolition movement was near its peak. The story of the move to abolish surface mining in West Virginia was perhaps more widely covered in the gubernatorial election of 1972. But in 1971, an abolition bill actually went to the floor of the House of Delegates for a vote.

The Association effort played a key role in the legislative compromise which led to a revision of the 1967 surface mining law.

Throughout the 70's the WVSMRA has been involved in legislative proposals on the federal level, through testimony, guided tours, and exhaustive meetings and consultations. The result has been a federal bill modeled largely on West Virginia's nationally recognized program.

and Reclamation Association

The Association was the only state coal organization in the nation invited to the signing of the Surface Mining Control and Reclamation Act by President Jimmy Carter on August 3, 1977.

Association influence has also been heavily felt in the implementation phases of these laws. More restrictive laws emphasize the need for advanced technology in mining and reclamation techniques.

West Virginia operators have perfected the "controlled placement" theory of surface mining in developing the two most innovative mining methodologies of the 70's, steep slope haulback and mountaintop removal. In addition, the Association itself was awarded two EPA grants to further the cause of mining technology research.

A tripartite research agreement signed in 1968 among the Association, the West Virginia Department of Natural Resources, and the U.S. Forest Service is still in effect, helping members achieve higher standards of reclamation through improved revegetation, mining methods, water disposal and control, mulching, and other techniques.

In the spring of 1977, the Association lent its support to an amendment to the West Virginia law, which required the total elimination of highwalls and officially banned placement of spoil over the outslope, a practice discontinued four years earlier.

Though skeptics find it hard to accept, Association member companies favor a balance of environment and industry. Certainly, the Association is on record as promoting compliance with existing laws, and many members have gone far beyond the requirements of the law to protect the environment in particular situations.

It is the stated position of the West Virginia Surface Mining and Reclamation Association that West Virginians are justly proud of their state and that our members should and will do everything in their power to both protect and utilize our abundant natural resources. The Association believes that economic, environmental, and energy goals are not mutually exclusive, and that each can be achieved through reasonable regulation, strict enforcement, and industry cooperation.





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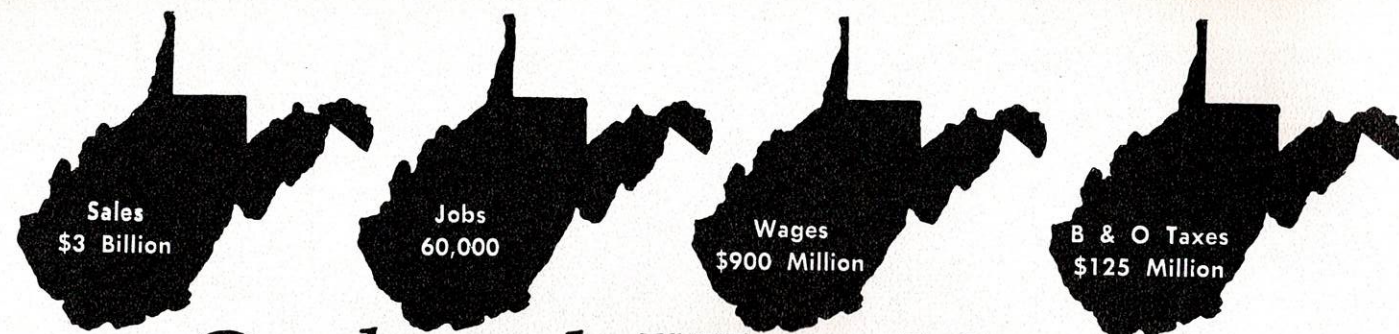
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Coal and West Virginia

Souvenir shops throughout West Virginia are given to selling various objects made from coal. One of the more popular items is a map of the Mountain State, solid black, and coal through and through.

Few symbolisms could be closer to the truth, for it is probable that no state depends so heavily on one industry as does West Virginia on coal.

West Virginia ranks 34th in population, 41st in area, but 2nd in coal production. The State produces over 100 million tons of coal annually, nearly 20% of the U.S. total, at a market value in excess of \$3 billion.

The industry statewide, employs directly more than 60,000 people. It pays over \$900 million in wages, making coal miners the best paid industrial workers in the nation.

It pays taxes to the state of more than \$125 million annually, about three-fourths of the total paid by all individuals combined.

Those are just the direct figures. It's probably impossible to determine exactly how many jobs depend on coal, how many dollars are spent, how much tax is collected, and how many towns exist because the coal industry is there.

Look up West Virginia in the **World Almanac & Book of Facts** and you'll see the opening line, "West Virginia's fortunes have long been based on those of the bituminous coal industry."

There is no indication that that situation will change in the foreseeable future. West Virginia has mined more coal than any other state, but still has more in reserve than all but three states.

Twenty-five states import West Virginia coal, and the Mountain State accounts annually for over 45% of this country's coal exports.

Just as West Virginia and coal are inseparable, so are the deep and surface mining industries. Throughout the 1970's surface mining has accounted for about 19% of the state's total coal output, an increase over past decades.

But, more significantly, individual companies rely on both methods of operation. There are many areas in which the operator has no choice of mining methodology. Often one method makes the other possible or feasible.

As the nation's coal industry gears up to meet the energy challenge of the next 20 years, West Virginia stands on the threshold of an economic prosperity that the state has never before known. Seldom has an industry been so matured, yet able to anticipate such future potential, as the surface and deep mining of coal in West Virginia.

West Virginia lies at the heart of coal country, the only state entirely within the Appalachian region.



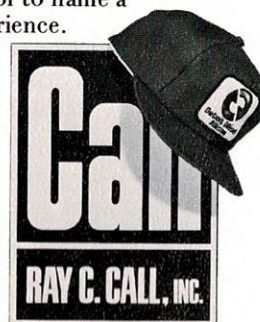
The Mountain State has always been at or near the top in coal production. Few if any states rely so heavily on any single industry.



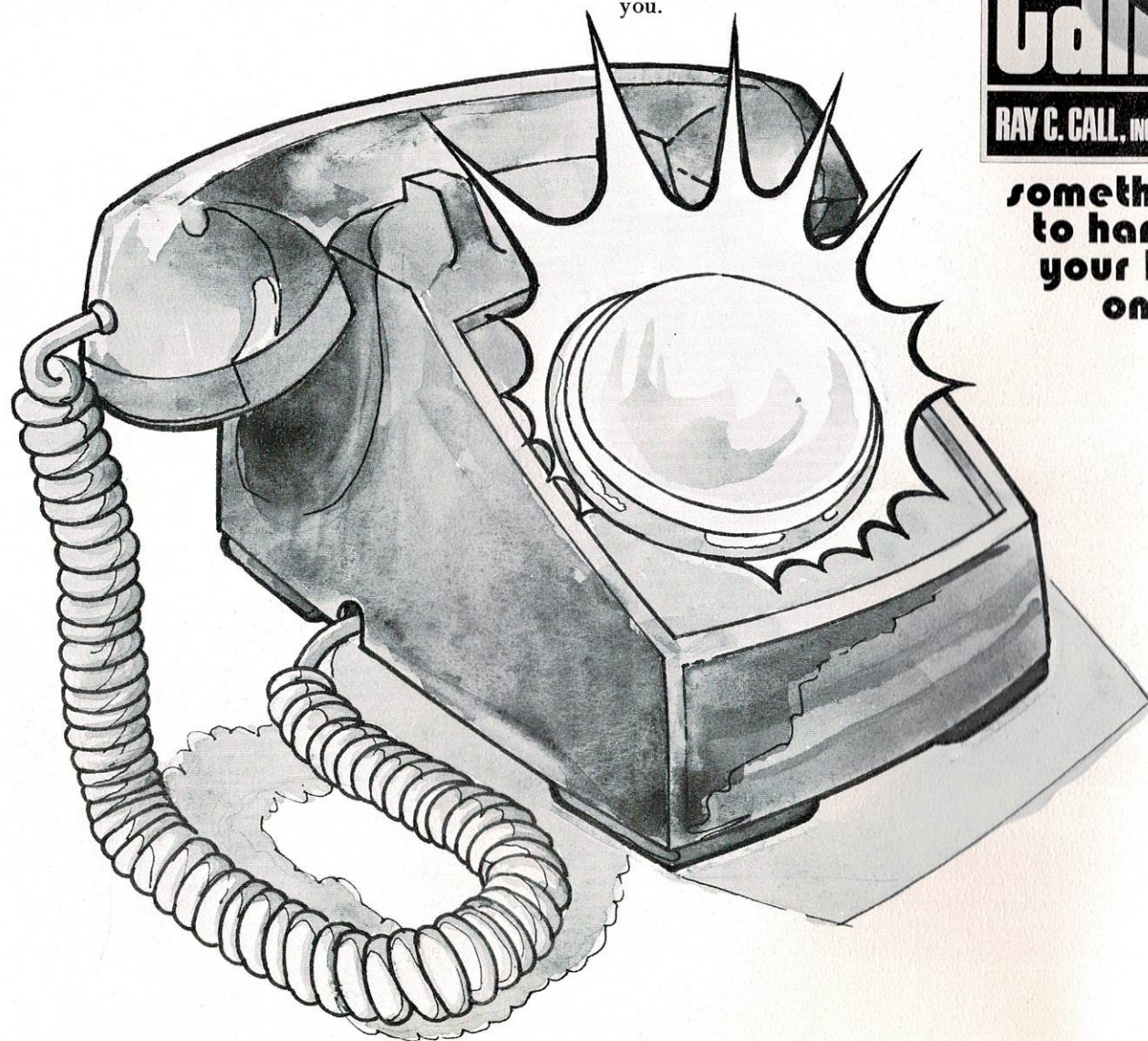
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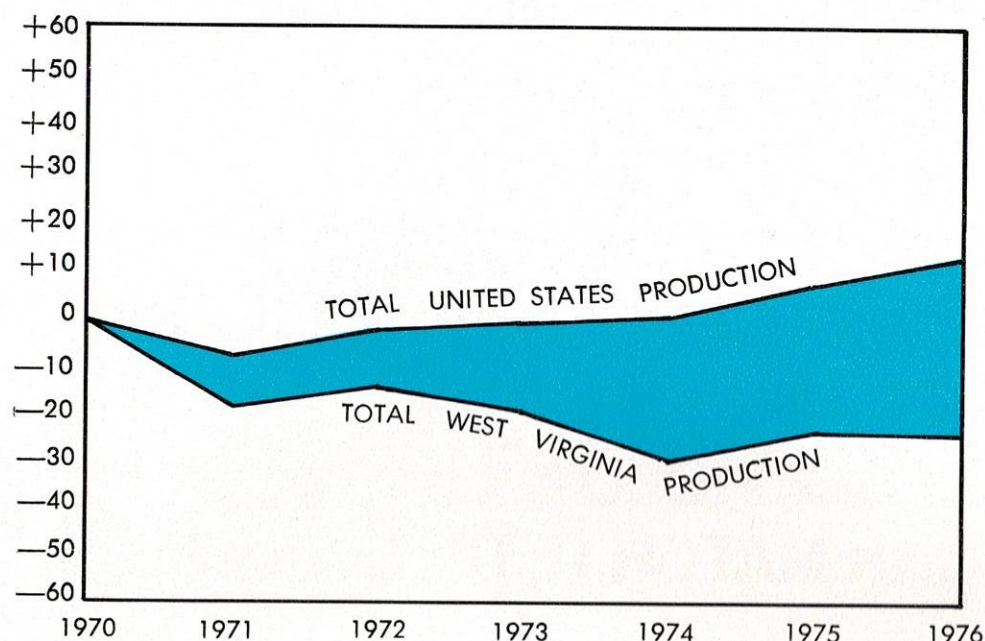


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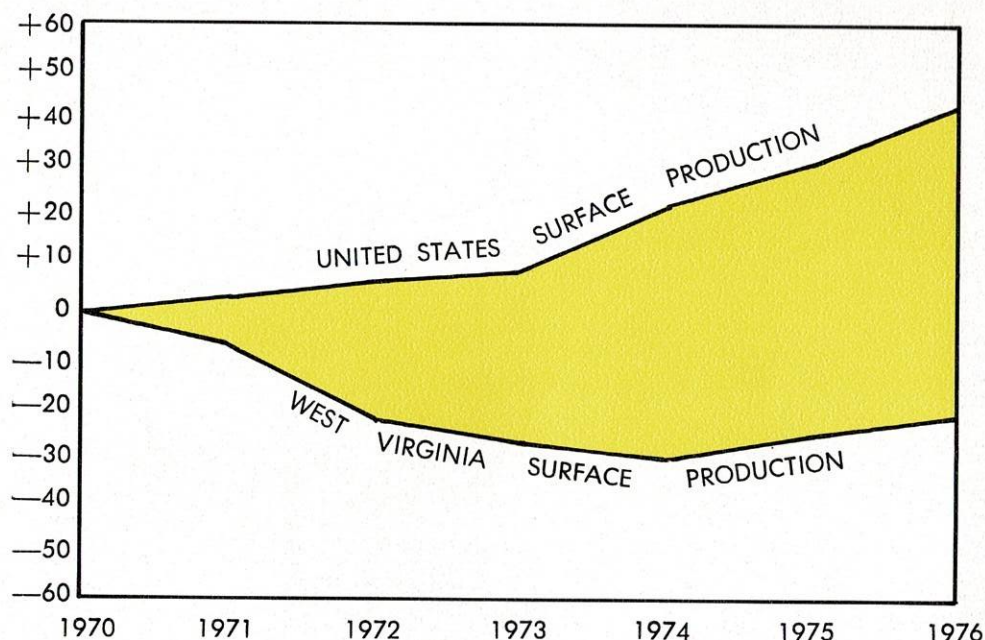
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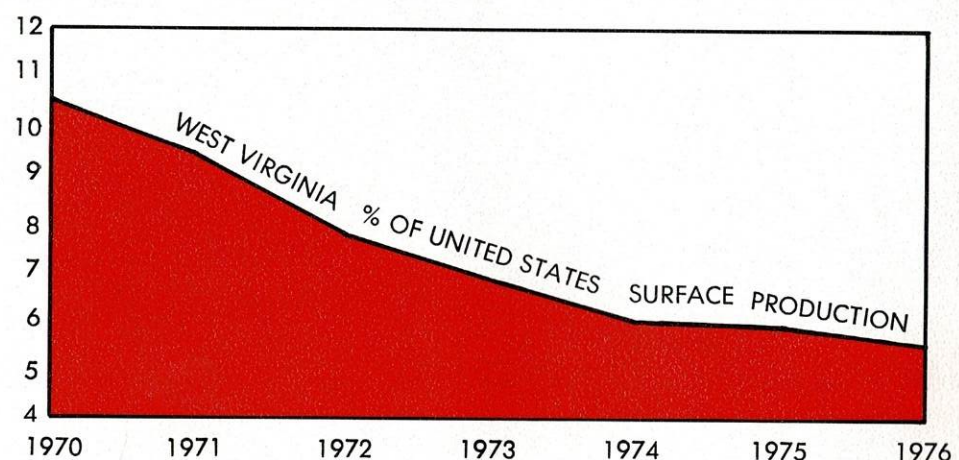
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United States and West Virginia coal production figures have been going in opposite directions during the 70's. Nationally coal production is up 10.3% while West Virginia shows a 24.5% decline.



In the surface mining sector of the coal industry, the difference is even more pronounced. United States production is up 41.4% over 1970. West Virginia's production has fallen 24.1%.



Several factors, primarily western expansion and West Virginia's outstanding reclamation record, have combined to cut sharply into the Mountain State's share of national surface mine production. When the decade began, the figure stood at 10.5%. Now, it's only 5.6%.

Production is Down Reclamation is Up

West Virginia has produced more coal than any other state, over 8 billion tons in all. However, the Mountain State can no longer lay claim to the number one position in annual production. Kentucky now holds that distinction and West Virginia is actually closer to third place than to first.

Among the leading coal producers, West Virginia has suffered the sharpest decline in production in the 1970's, losing 24.5% of its annual tonnage since the decade began.

Surface production figures tell the same story. While western states like Montana and Wyoming were enjoying multiplied production which catapulted them into top ten tonnage positions, West Virginia's figures dipped by 24.1% dropping the state from 5th to 8th.

Regulation of the industry is, of course, inseparable from any discussion of production results. When the state of West Virginia shifted priorities to lend more emphasis to the environment, a decline in coal production was inevitable.

It is a tribute to the viability of the state coal industry in general, and the surface mining industry in particular, that tonnage figures have rebounded somewhat while environmental goals have largely been met.

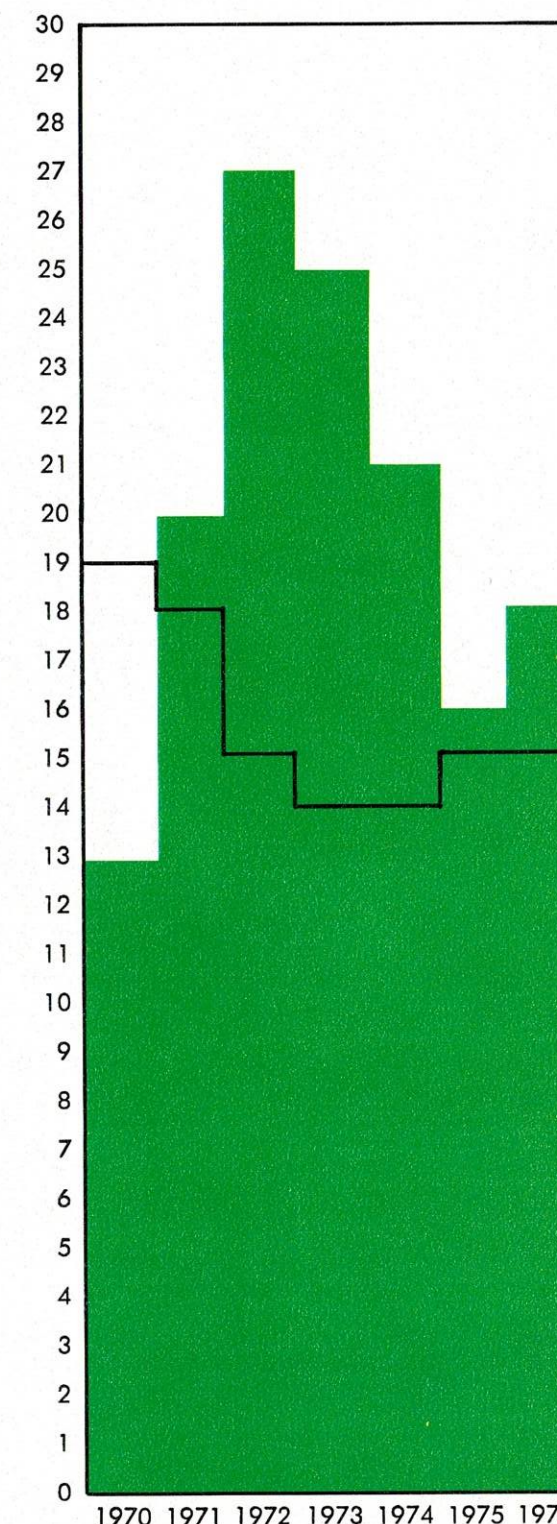
The State's Special Reclamation Fund, active since 1964, has accounted for over 26,000 reclaimed acres of abandoned land, all through revenues derived from the coal industry. Remining, which brings old surface mined areas up to present day reclamation standards, has proved a significant factor in boosting both mining and reclamation figures.

Each year, from 1971-1976, more acres have been reclaimed in West Virginia than have been mined. For the decade to date, reclaimed acreage has outnumbered mined acreage by more than 30,000, roughly the equivalent of nine years of reclamation through seven years of mining.

Federal law now imposes a tax of 15¢ per ton on deep mined coal and 35¢ per ton on surface mined coal for the purpose of reclaiming abandoned lands. West Virginia operators will pay about \$20 million annually into this fund, and the State will retain at least \$10 million of that total.

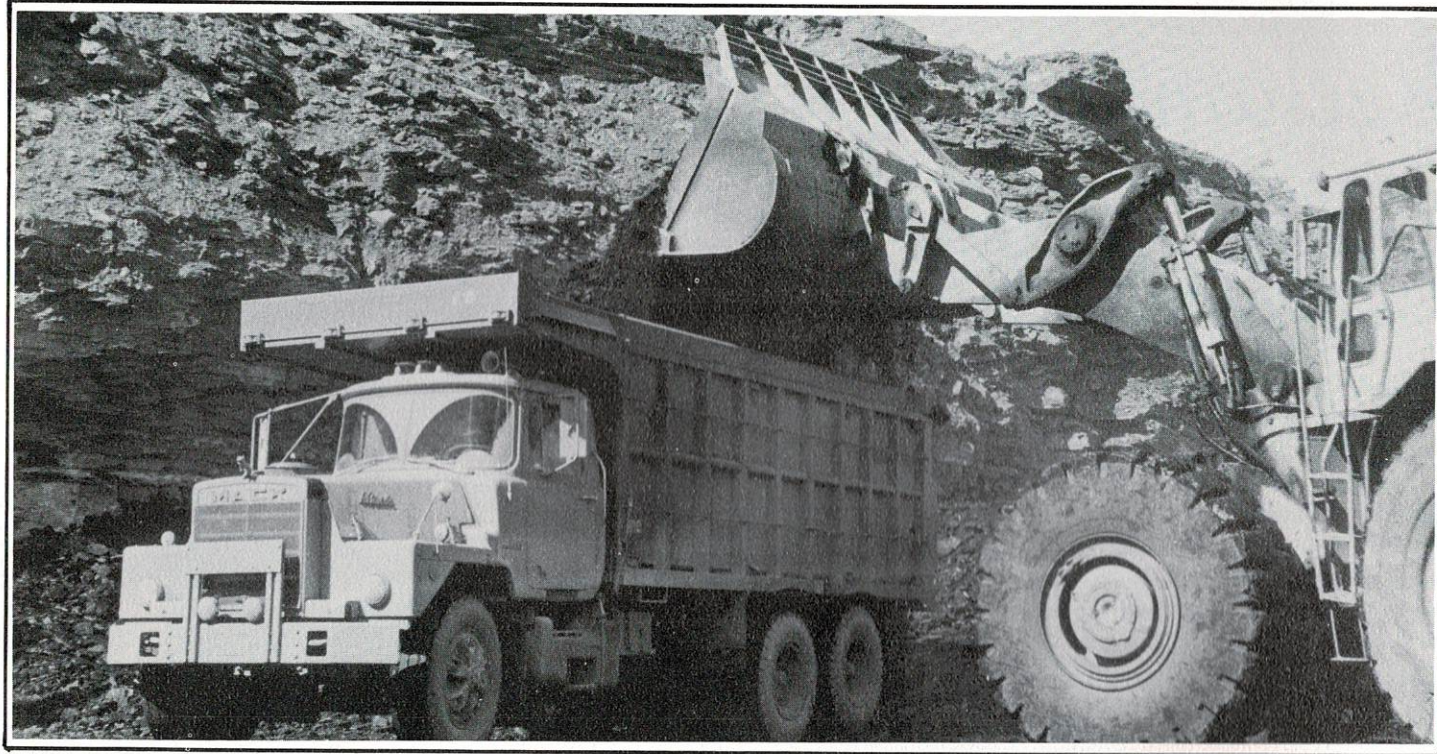
Surprisingly, West Virginia ranked only seventh in orphan land acreage figures released by the U.S. Soil Conservation Service. This is probably due to the State's stringent laws and past efforts at reclamation which have disposed of one-third of all orphaned lands statewide.

Utilizing federal reclamation tax revenues, West Virginia could eliminate all abandoned sites by 1990.



Largely due, to the industry-financed Special Reclamation Fund, West Virginia has been making great progress in reclamation of areas mined in past decades. Through 1976, the State and the industry together has reclaimed over 30,000 more acres in the 1970's than were mined. That's two years worth of mining at present rates.

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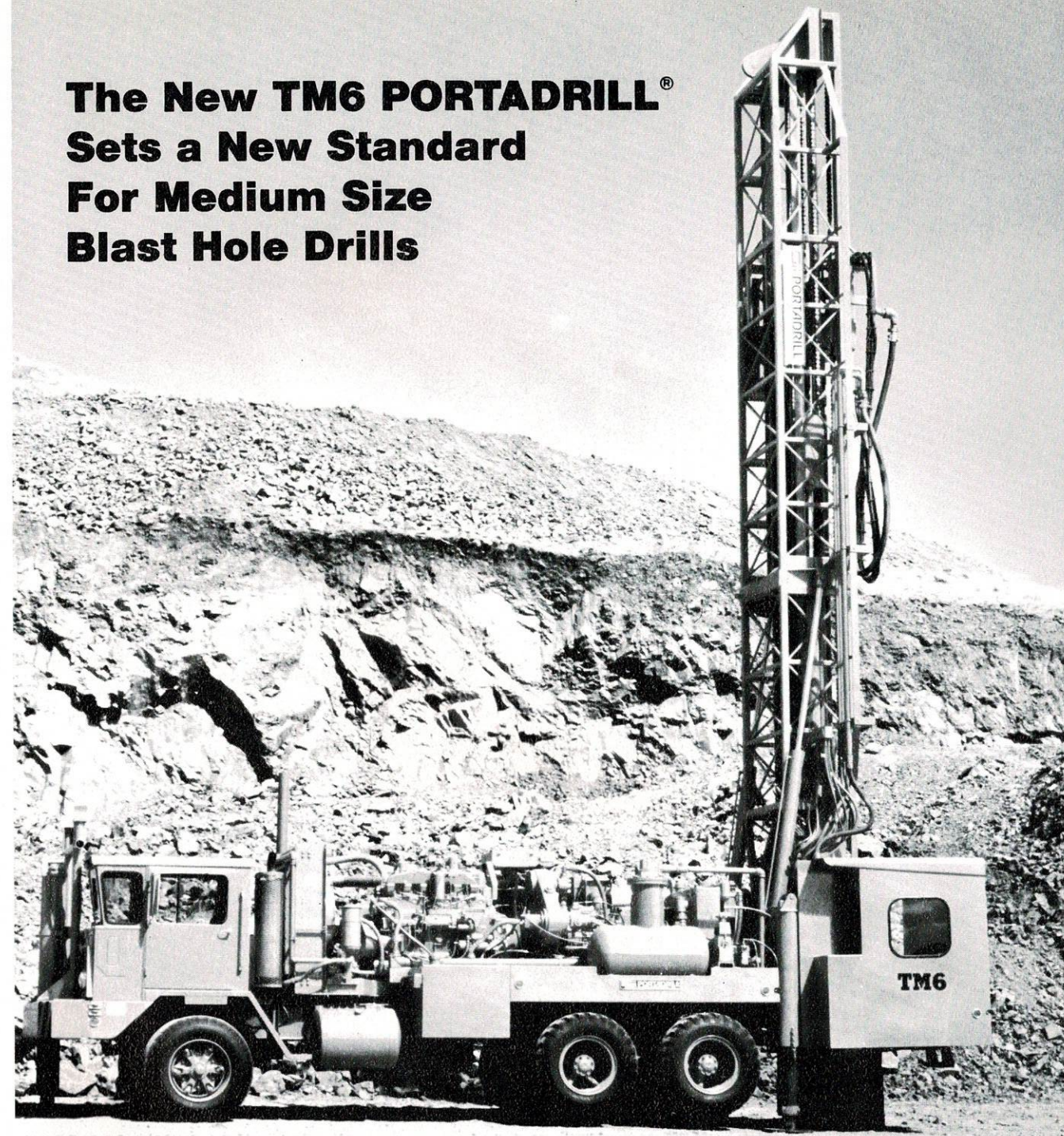
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Room At The Top

At least one body of surface mining technology of the 1970's had its roots in the late 60's. That would be mountaintop removal.

Cannelton Industries, under contract to Perry and Hylton, Inc., initiated this concept late in 1967 and coal is still being mined at the site ten years later. Operations will continue for several more years.

When mining is completed, nearly 14 million tons of coal will have been extracted from that one operation, compared with approximately 4 million tons which would have been recoverable by underground mining.

That's the basic idea behind mountaintop removal—100% overburden displacement and 100% recovery of mineral utilizing the "controlled placement" method of mining to its fullest extent.

The concept has environmental advantages too. When the mountaintop is resculptured, all highwalls are eliminated, outcrops are undisturbed, and drainage is easier to control than perhaps in any other mining situation. Excess overburden is transported to engineered valley fills leaving a gently rolling plateau behind.

Yet mountaintop removal is perhaps typical of the emotionalism which has surrounded the surface mining industry over the last 20 years.

Mountaintop removal allows total mineral recovery while providing flat usable land, a scarce commodity in the mountainous counties of southern West Virginia.



Mountain View High School sits on a 53 acre tract of land that was part of a mountaintop removal operation.

The land was donated to the McDowell County Board of Education by the Pocahontas Land Corporation.



For those who confuse the term with mountain removal and, therefore, see the process as one of leveling West Virginia, there have been few sharper contrasts between the State's coal industry and its mountain heritage.

Ironically, mountaintop removal could be a key to reaching an accommodation between West Virginians and their mountains.

West Virginia has been blessed with an abundance of coal but very limited in developable land.

The technology of mountaintop removal allows for maximum efficiency in mineral recovery, and simultaneously creates productive land which is much in demand, but short in supply.

McDowell County is a case in point. Only 6% of the entire county is flat enough to be developed and, as flood damage reports tragically illustrate, most of that is deep in the flood plain.

Mountain View High School, however, will never suffer a flood as it serves the county's students from a 53 acre tract on a former mountaintop removal operation near Welch. Independence High School, in nearby Raleigh County, also rests on a mountaintop removal site.

But education is only one aspect of life in West Virginia which could be enhanced by this mining method.

Housing, shopping, recreation, agriculture, and just about every other conceivable land use is applicable to the mountaintop removal situation.

There is little doubt that southern West Virginia's terrain has inhibited its economic growth. A simple lack of living space has plagued an area otherwise rich.

Now coal, an old and familiar partner in the regional economy, may provide relief from an unexpected direction providing West Virginians with alternatives for future community planning.



Independence High School in Raleigh County also was built in concert with a mountaintop removal operation. Land stabilization is so effective by this method that the Sterling Smokeless Coal Co. was able to complete mining operations while construction was underway.



The finished product amply illustrates the unique land development possibilities of mountaintop removal. While nobody wants "a shopping center on every mountain", the fact remains that newly created flat land may fill a present need for housing and all the other uses that surface mined land has been put to for years.



Putting It Back Mountain State Style

This operation on Trace Fork in Mingo County was the original application of the haulback method on extremely steep slopes in southern West Virginia. Mining was begun here in January, 1973, by Hobet Mining and Construction Co. which returned the area to nature in less than two years by utilizing controlled placement methodology.

Of necessity is born invention. That old saw, as it applies to West Virginia's coal industry, has meant reconciling its role as the state's leading breadwinner with the need for environmental protection.

West Virginia's surface mining operators have made a big contribution in that direction with the development and perfection of the steep slope haulback, another form of the "controlled placement," method of mining.

First adapted to steep slopes by Hobet Mining and Construction Company in 1973, the haulback method has virtually revolutionized mining and reclamation techniques in mountainous southern West Virginia.

Haulback basically involves moving overburden laterally along the bench and backfilling against the highwall behind the actual mining operation. By contrast, the old "shoot'n'-shove" method consisted of pushing the overburden down-slope and leaving the highwall exposed.

Although still a fairly new concept, haulback is more widespread each year and clearly is becoming standard operational procedure on West Virginia's steep slopes.

The haulback technique requires quite a bit of adaptation on the part of the operator. When blasting is conducted, it must be controlled and precise. Benches often must be wider than usual to accommodate the extra machinery necessary for concurrent reclamation. Supervision and equipment maintenance become critical. Extra haulage machinery means extra manpower and all of the above results in greatly increased expenses.

Refinement of these procedures has had a positive effect on the cost factor, but steep slope haulback remains an expensive initial proposition.

Returns on that investment have been great, however. Advantages to the haulback method are almost too numerous to mention.

The acreage affected and, therefore, under bond is reduced by 25-40%. Water is more easily controlled and fewer siltation structures are required. Highwalls are effectively eliminated with an aesthetically pleasing end result.

Overburden materials are kept entirely on the bench. The tree line below is, therefore, maintained, giving the entire site more stability.

A reduction in disturbed area also lowers costs for revegetation and makes concurrent reclamation inherently easier by maintaining accessibility for revegetation equipment.

Mapping and bond release procedures of the Department of Natural Resources are also greatly simplified.

Professional pride should not be overlooked as a factor in the haulback operation. As the pictures on these pages illustrate, the haulback method minimizes disturbance and facilitates a full return to natural conditions.

Perhaps no greater compliment could have been paid those who have practiced and perfected the steep slope haulback method than the inclusion of West Virginia operations in the House Interior Committee Report as examples of what good reclamation should look like.



An aerial view of Hobet's Trace Fork job reveals the difference between old and new methods. At the left is an old permit which allowed downslope spoil placement and highwall retention. To the right is a clear illustration of the reduction in disturbed area. Note the sediment control structure to the right of center.



Princess Susan Coal Co. is responsible for this Kanawha County scene which exemplifies the advantages of controlled placement.

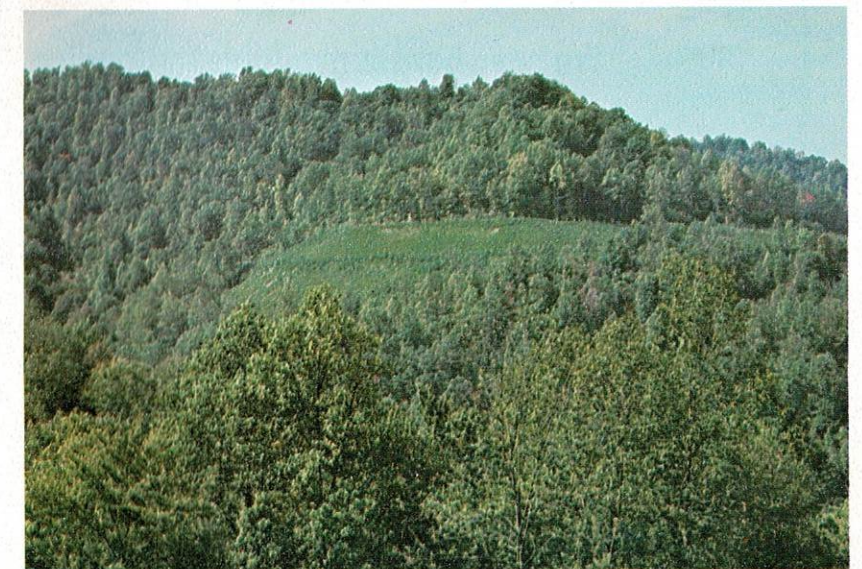
Haulback also has application in the rolling topography of northern West Virginia, such as this job in Lewis County.



This model operation near Charleston has become something of a showcase for visiting groups anxious to see what has been accomplished in West Virginia's surface mining and reclamation industries.

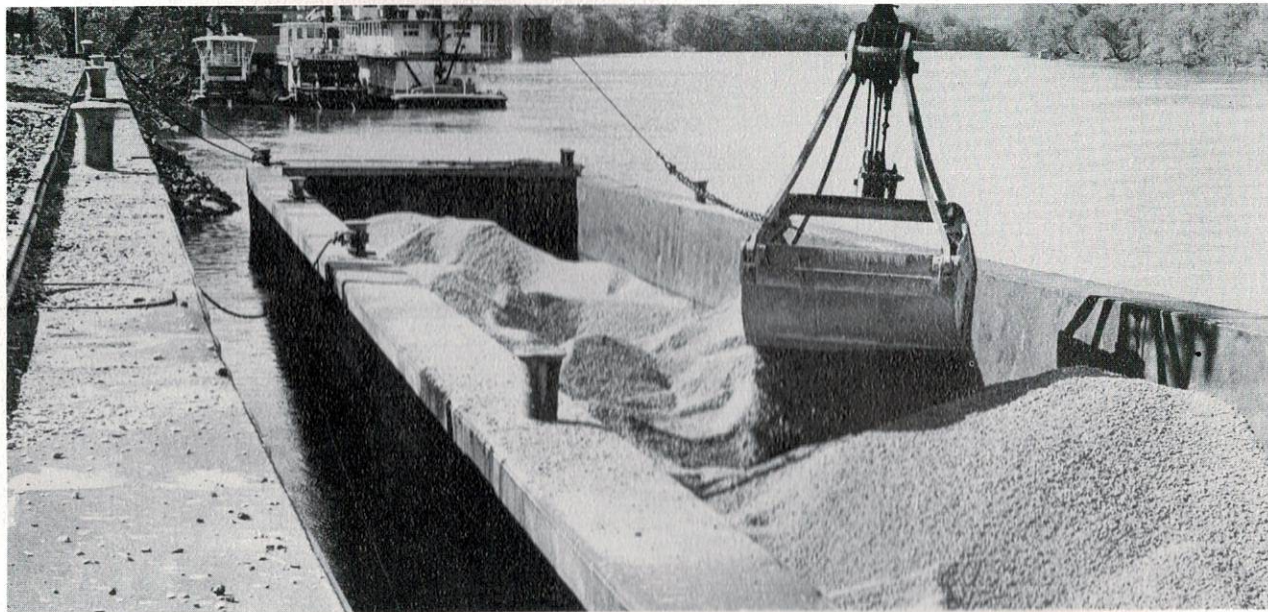


Viewed from eye level across the valley, this completed operation is nearly indistinguishable from its natural surroundings.



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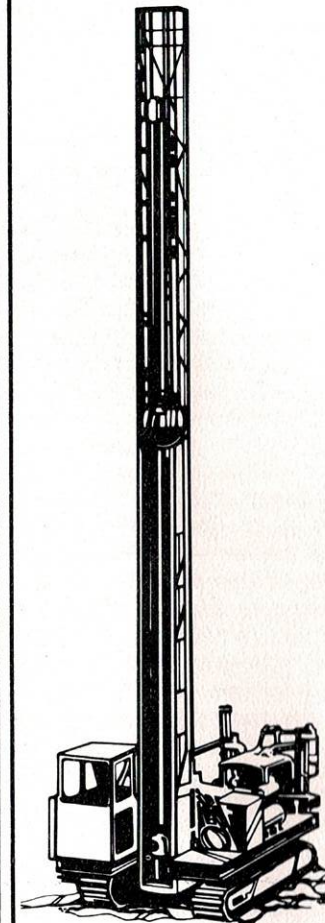
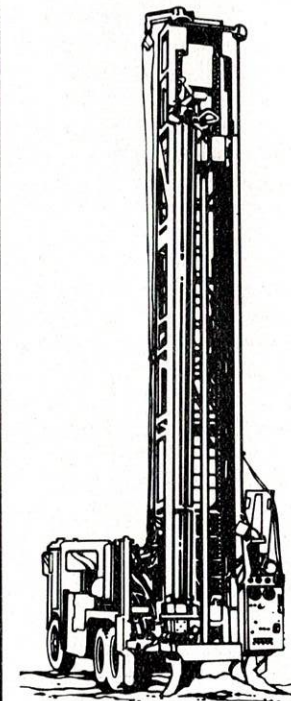
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THE WEST VIRGINIA CODE—Chapter 20, Article 1, Section 7

In addition to all other powers, duties, and responsibilities granted and assigned to the director in this chapter and elsewhere by law, the director is hereby authorized and empowered to:

(28) Delegate the powers and duties of his office, except the power to execute contracts, to appointees and employees of the department, who shall act under the direction and supervision of the director, and for whose acts he shall be responsible;

(31) Promulgate rules and regulations, in accordance with the provisions of chapter 29-A of this Code, to implement and make effective the powers and duties vested in him by the provisions of this chapter and take such other steps as may be necessary in his discretion for the proper and effective enforcement of the provisions of this chapter



STATE OF WEST VIRGINIA
DEPARTMENT OF NATURAL RESOURCES
CHARLESTON 25305

IRA S. LATIMER, Jr.
Director

May 16, 1973

MEMORANDUM TO: Franklin J. Parker, Assistant Chief
FROM: Benjamin C. Greene, Chief
Division of Reclamation
SUBJECT: Steep Slopes

After several months of review, evaluating recommendations, and based upon two years of continuing experience under the 1971 amendments, the following requirements were initiated beginning May 1, 1973 for all surface mining permit applications.

On all slopes where the original surface is 50% and greater, the mining and reclamation plan submitted shall include a complete detailed procedure for site preparation, placement of overburden, control of the overburden after placement, and final stabilization. This information will be incorporated into our "form revision" and be directly reflected on what is now Form DR-5.

Should the question arise, authority for the aforementioned requirement is contained in Section 11 and 13.

Should you have any questions concerning this matter, please feel free to advise.

BCG:cn

cc: Mr. James E. Pitsenbarger
Mr. Joe L. Beymer
Mr. Charles Sheets
Mr. Stephen Layton

After 22 years of changing, refining, and updating its surface mining law, West Virginia's state Legislature turned the corner on reclamation with the paragraphs quoted above, part of the 1961 law, which created the Department of Natural Resources and granted its Director broad powers to achieve the intent of the Act.

As a pioneer in every aspect of the coal mining industry, West Virginia has had to suffer and solve the problems inherent with such a role.

Fortunately, the Mountain State was blessed with a certain amount of foresight in dealing with the particular set of difficulties brought on by the unrestricted presence of surface mining.

In 1939, West Virginia passed the nation's first surface mining law. Though quite simple in its requirements, it laid down the basic principles which still govern the industry today. That first law required a permit prior to operations, a bond of \$150 per acre mined, general reclamation—mainly the replacement of soil, and provided for a punishment of \$50-\$500 and up to one year in jail for willful violators.

Thus began a slow but steady evolution of the West Virginia Code as it applies to the surface mining of coal. With the war boom of the early 1940's diminished, the West Virginia Legislature moved to tighten restraints on the industry.

Revisions to the law in 1945 called for specific information on the permit, required a \$50 filing fee, raised the bond to \$500 per acre, minimum \$1000, and allowed one year for reclamation to be completed. The bill also specified operator obligations imposing the first drainage specifications, requiring refuse removal, and setting standards for regrading and revegetation.

Permits were disallowed to operators with reclamation bonds under forfeiture and the fine for violators was raised to \$1000.

In 1947, the "Strip Mining Fund" was created to administer reclamation of lands on which bond was forfeited. The fund was financed through filing fees and forfeited bonds.

The Legislature stood pat on surface mining until 1959, but was still a few years ahead of the environmental movement to come when it tightened permit and inspection procedures. The permit filing fee was raised to \$100. Permits were limited to one year with a \$50 renewal fee. The position of State Surface Mine Supervisor was created with five inspectors charged with enforcement.

In 1961, the duties of these inspection personnel were specified, along with the stipulation that none could hold any financial interest in any mining operation.

Major changes were implemented that year, when the creation of the Department of Natural Resources laid the cornerstone for West Virginia's modern mining and reclamation law.

Although the DNR was to be concerned with much more than surface mining, its Director was granted broad powers in promulgating rules and regulations to govern the industry. Within the DNR, the Division of Reclamation was established to oversee surface mining directly.

The scope of powers delegated to the DNR generally, and to the Division of Reclamation in particular, made West Virginia's reclamation program the most successful in the nation.

LEGISLATIVE CONTROL

Evolution of a Law

Two years later, the Legislature added some refinements to the law which were to have far reaching effects. The bond was changed to a per acre disturbed basis from per acre mined, which increased the bonding fee tenfold in some instances.

Also, the industry backed Special Reclamation Fund was established to reclaim orphaned lands. That fund, financed entirely by the operators, is still at work in West Virginia and was the forerunner of a more comprehensive plan in the new federal surface mining legislation. Also initiated in 1963 were requirements for monthly status reports by the operator and topographical mapping before, during, and after the mining operation.

Minor changes were made in 1964 and 1965, and major reform came again in 1967. The 1967 Act might be described as an expansion of the original 1939 law. Prospecting permits were required for the first time. A pre-plan for reclamation was required. It was mandated that grading, backfilling, and water management be kept current. A mandatory inspection frequency of every 30 days was established with substantial increases in DNR supervisory and inspection personnel provided.

In 1971, additions to the law recognized inflation as bonds, fees, and fines were raised. The application fee went to \$500 and \$100 for renewal, the bond was raised to \$600 to \$1000 per acre disturbed with a \$10,000 minimum, the special reclamation fee went from \$30 to \$60 per acre and penalties for willful violations were raised to \$1000-\$10,000.

Other innovations were the first blasting restrictions, standards for allowable bench width and authorization of inspection personnel to issue cessation orders. Highwalls were thereafter limited to 30 feet. Inspection frequency was increased to 15 day intervals.

New requirements that year included Class III legal advertisement of permit application, and an operators planting and revegetation report.

Substantial funding provided for 20 new field inspectors, fully equipped, and the first use of a Bell Jet Ranger helicopter for inspection and surveillance.

In 1977 amendments to the law, the Legislature directed its emphasis to aesthetic values, mandating total elimination of all highwalls. One other provision of the latest amendments recognized legislatively what had been accomplished administratively four years earlier—"controlled placement" of overburden.

A DNR internal memo dated May 16, 1973, from then Chief of Reclamation Ben Greene to his field supervisors, prohibited the placement of overburden materials on the outslope, where the original slope was 50% and greater. It is this prohibition, more than any other, that separates West Virginia's reclamation performance from that of other states. Greene is now President of the West Virginia Surface Mining and Reclamation Association.

Thus West Virginia's Code as it applies to surface mining for coal and land reclamation incorporates all of the major applicable aspects of the federal law. In fact West Virginia's legislative program, its agency for implementation and enforcement, its operators' innovation and its overall reclamation record have all served as models for federal efforts to legislate, implement and achieve uniform environmental protection standards across the country.

ENROLLED

H. B. 1382

(By MR. BALLOUZ and MR. ARNOLD)

[Passed April 9, 1977; in effect July 1, 1977.]

AN ACT to amend article six, chapter twenty of the code of West Virginia, one thousand nine hundred thirty-one, as amended, by adding thereto two new sections, designated sections eight-a and eighteen-a, providing for a limitation on the issuance of any new permits for surface mining and requiring a special surface mining permit when coal is removed incidental to commercial, residential, industrial or civic construction.

Be it enacted by the Legislature of West Virginia:

That article six, chapter twenty of the code of West Virginia, one thousand nine hundred thirty-one, as amended, be amended by adding thereto two new sections, designated sections eight-a and eighteen-a, to read as follows:

ARTICLE 6. SURFACE MINING AND RECLAMATION.

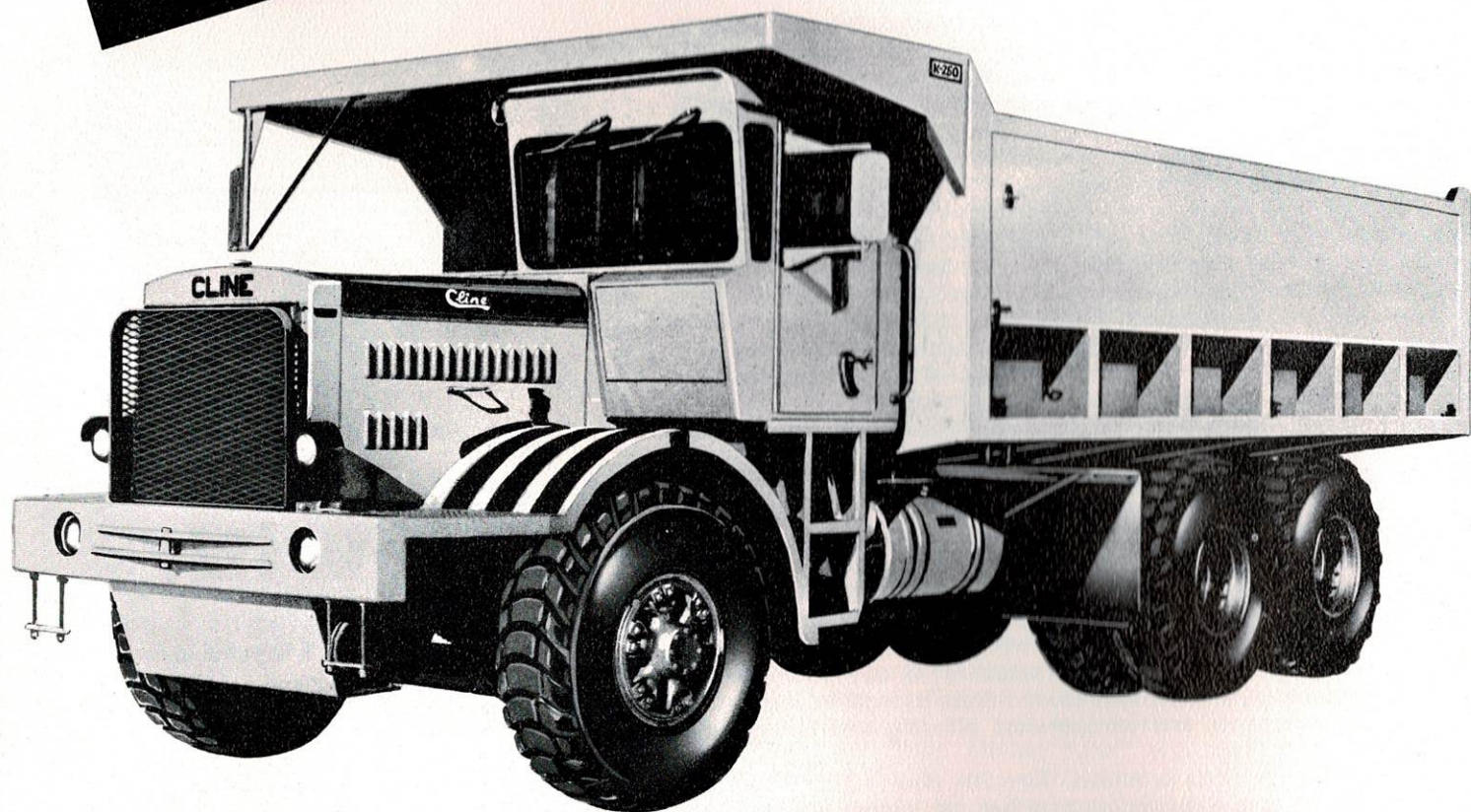
§20-6-8a. Limitation on the issuance of new permits for surface mining.

1 On and after the effective date of this section, no new permits, including prospecting permits, may be issued under the provisions of article six of this chapter for the surface mining of coal in any county, unless the operator is required to perform the following:

6 (1) Insure to the satisfaction of the director that, when engaged in surface mining on slopes of twenty degrees or greater, no debris, abandoned or disabled equipment, spoil material or waste mineral matter will be placed on the natural

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
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Proper reclamation and soil treatment produces excellent results, as shown here.

C&W Coal Company's surface mine/farm in Barbour County, though impressive, is only one of numerous former surface mine sites now producing continuous second cash crops.

Nick Jones, of the Department of Agriculture's Agricultural Research Service, regularly turns out crops like this at the White Oak Experimental Station in Raleigh County.



These adjacent shopping centers in Bridgeport, Harrison County were constructed on surface mined lands. Much of this type development has occurred in the Fairmont-Clarksburg and Weirton areas.

The Wadcutters shooting range, far right, near Summersville in Nicholas County, home of the annual West Virginia State Pistol Championships, illustrates the variety of uses for properly reclaimed land.

Coal and Corn, Cash Crop Cousins

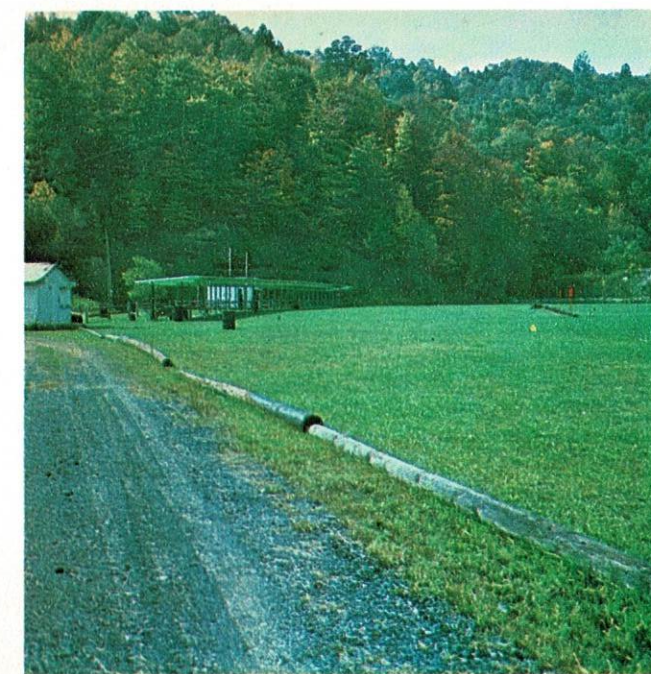
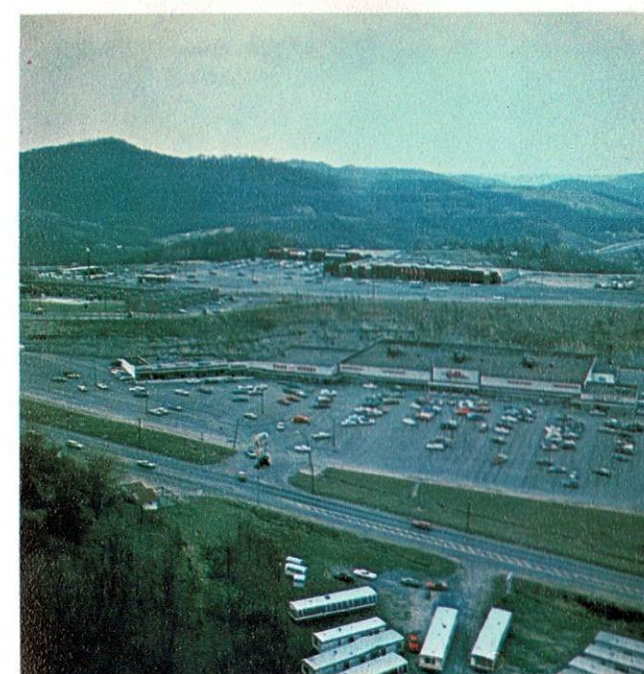
Land use is an aspect of surface mining almost unique in American industry. Nearly all industrial development involves more or less permanent conversion of the land to that particular industrial purpose.

Surface mining, however, provides an opportunity to give land a double usefulness, first mineral extraction, and then permanent development as the local situation dictates.

Tremendous advances made this decade in the fields of agriculture and soil science have expanded the horizons of these opportunities almost beyond limit.

The crops pictured on this page are products of former surface mine sites and they are not at all unique. Every crop native to the State can be grown on former mines. Most reclaimed sites are more productive than ever due to planned improvements in soil and water conditions and terrain more conducive to farming.

Agriculture may be the least publicized post mining land use, but it is by no means the only one. Throughout West Virginia's coal producing counties, hospitals, schools, recreational areas, housing developments, shopping centers, airports, motels, churches, drive-ins, offices, landfills, and just plain woodland and wildlife areas are now being utilized on former surface mine sites.



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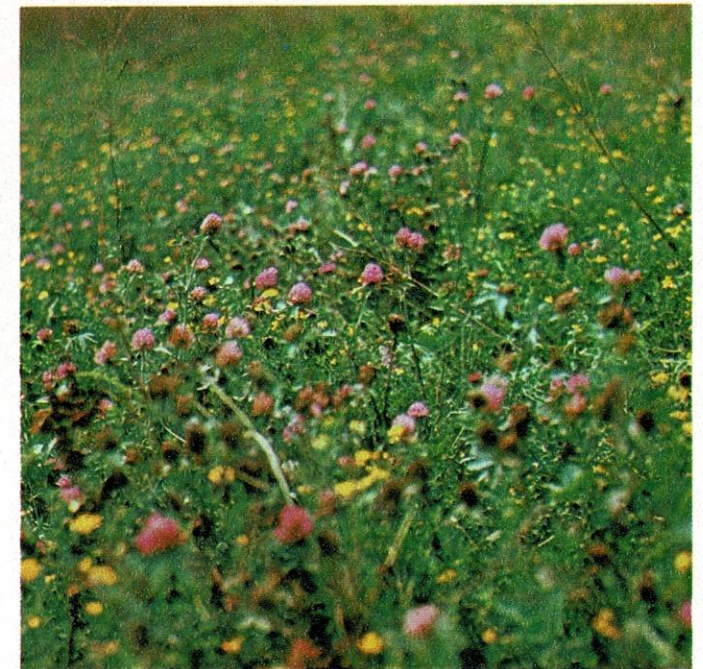
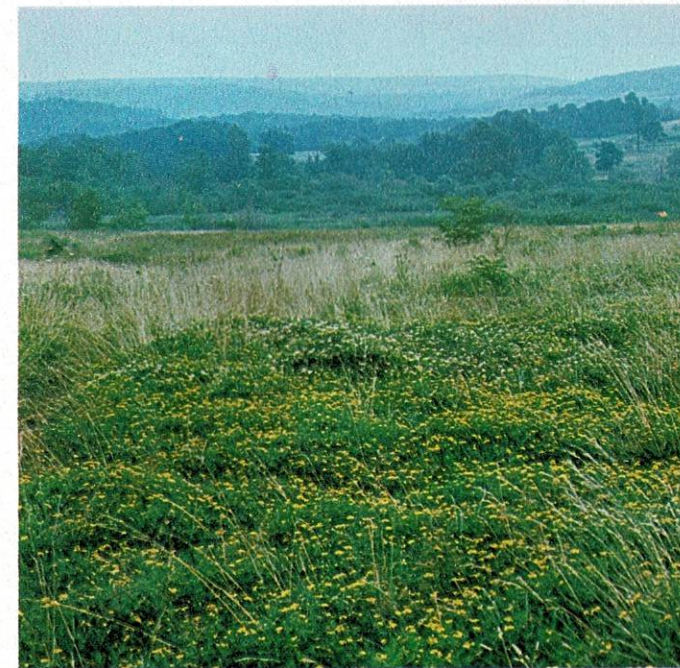
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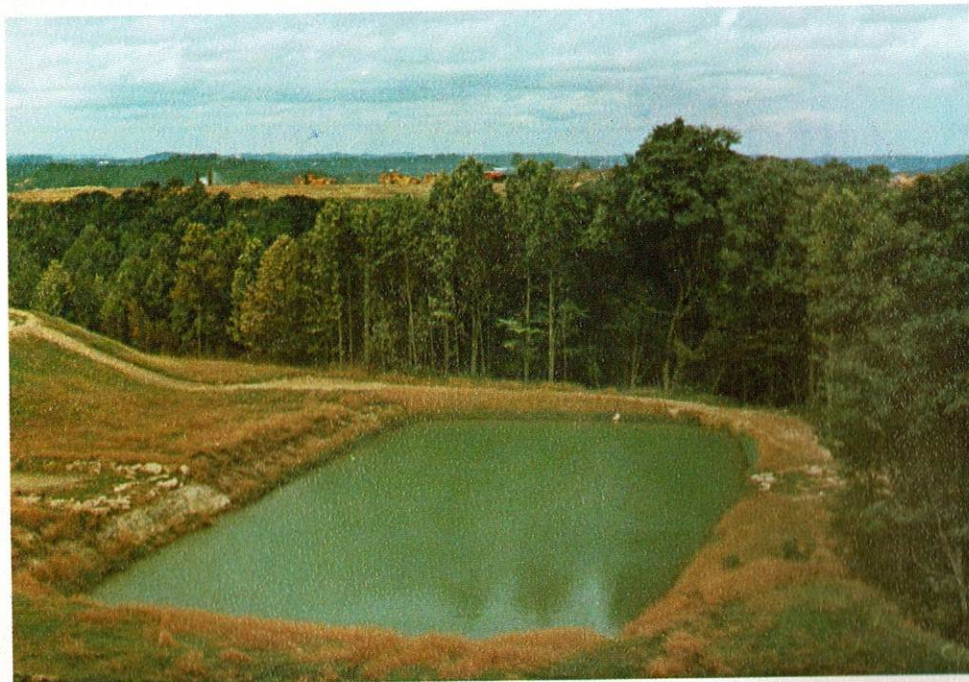
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Pick A Color — Any Color



Improved land stabilization techniques and ongoing soil research have provided the reclamation industry with an increased variety of ground covers with which to revegetate mined land. These same advances, coupled with the use of ground covers shown here, have greatly reduced the time span between cessation of mining and complete reclamation, and increased the practice of concurrent reclamation.





Siltation ponds play a large part in controlling runoff from surface mine sites. Surface water flows into the pond which slows it down, allowing retention time for sediment to drop out.

Let's Make One Thing Clear—Water

The West Virginia Code—Chapter 20, Article 6, Section 9a

"Prior to the beginning of surface mining operations, the operator shall complete and shall thereafter maintain a drainage system including any necessary settling ponds in accordance with the rules and regulations as established by the commission."

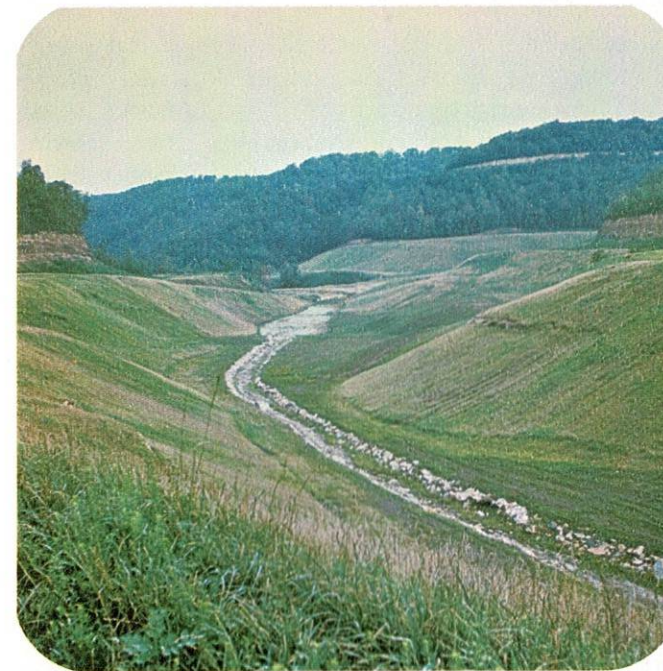
Drainage may seem like just one small topic among many on the subject of surface mining, but West Virginia's Department of Natural Resources thought enough of the matter to devote 135 pages to it.

Titled **Drainage Handbook for Surface Mining**, the booklet, updated in 1975, was an outgrowth of the provision quoted above. It was compiled by DNR in cooperation with the Soil Conservation Service, the U.S. Army Corps of Engineers, the U.S. Forest Service, and other sources knowledgeable of water management practices.

The Handbook and the expertise to which its requirements gave rise have led to a recognition of West Virginia as the nation's surface mining expert on sediment control.

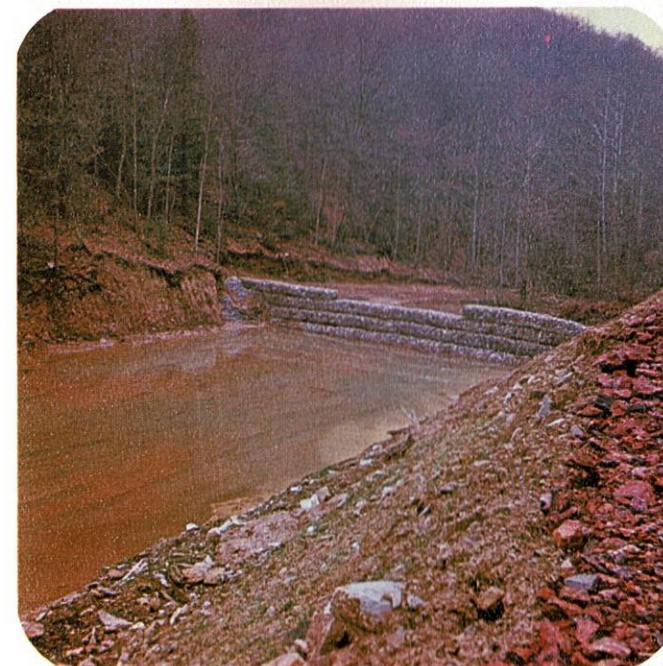
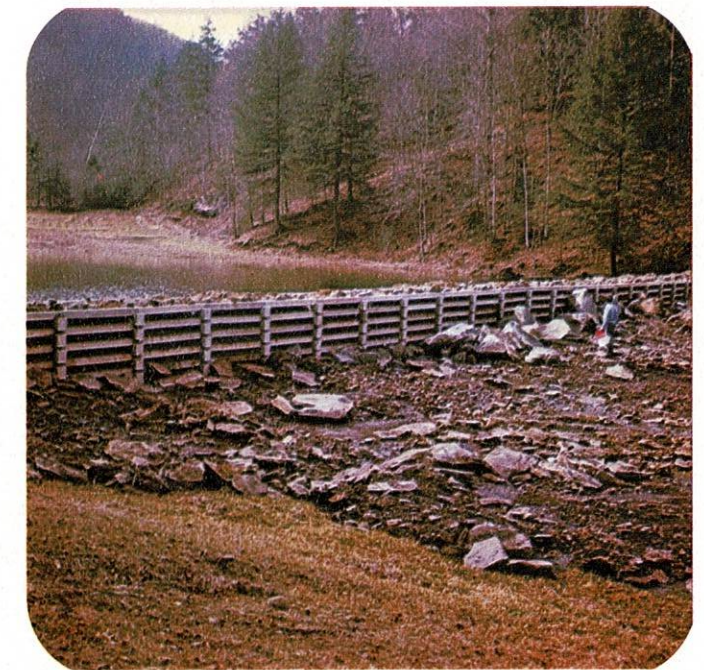
Drainage is a necessary preoccupation in West Virginia mining operations, as it is a key to any successful reclamation plan. Handling water in West Virginia's rugged terrain in conjunction with good reclamation practice requires extensive preplanning and careful day to day management. From that fact evolved the Drainage Handbook.

An underlying principle in West Virginia's law, and rules and regulations governing the surface mining industry is that the environment shall meet certain post-mining standards regardless of its undisturbed condition.

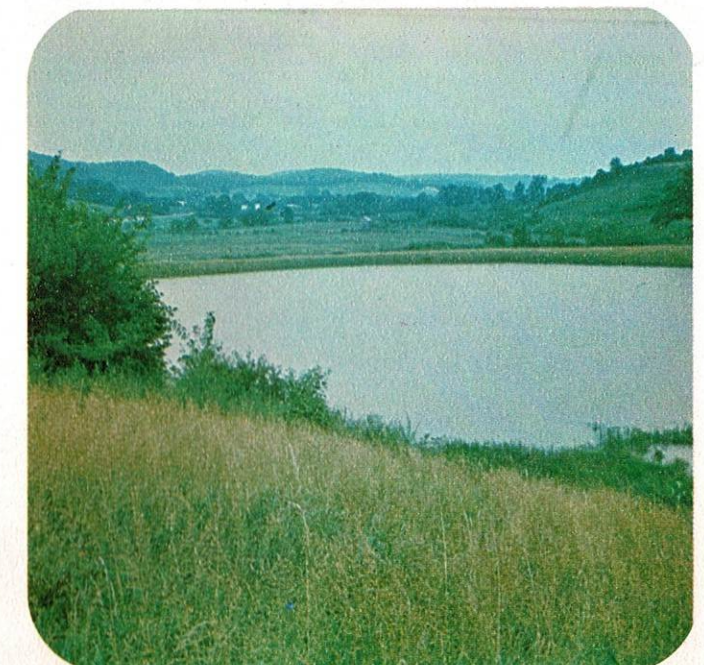


This rock lined channel controls downward flow both as to speed and direction.

Concrete cribbing serves essentially the same purpose as gabion structures. The two are used interchangeably depending on available materials and other local factors.

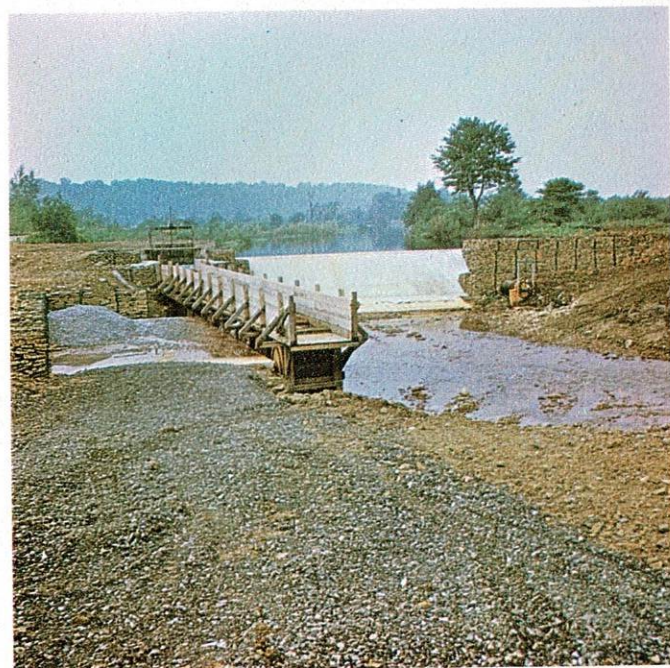


Gabion structures, or rock filled wire baskets, serve to reduce sedimentation in streams flowing from surface mine sites.



Many of the state's larger sediment ponds, like this one near Buckhannon in Upshur County, will prove useful as farm ponds or recreation areas when mining operations are completed.

Many larger operations use lime or limestone chips to neutralize acidity where water flows through a fixed point.



Operators have found it necessary to resort to many different methods to achieve the intent of that principle, as these pages illustrate. However, those efforts often result in land and water situations that are higher quality than before mining, another example of how surface mining may benefit the environment as well as the economy.

Acid water is one problem faced by surface mine operators in many areas of the state. Water may have an acidity problem in an undisturbed area, but when the area has been surface-mined, state law specifies that the same high water quality standards shall be met.

Several systems are in use for acid water treatment. Lime, though more suited to large fixed-location operations, is an effective neutralizing agent.

Soda ash briquettes, more adapted to surface mining operations, are also in wide use.

As in other aspects of the surface mining industry, the technology of the 1970's has provided relief to the problem. Extensive drainage plans, overburden segregation, efficient revegetation methods and other techniques all act to minimize the contact of water with toxic bearing materials.

The Environmental Protection Agency has successfully tested a new system employing sodium hydroxide as the neutralizing agent. Portable, self contained, and nearly maintenance free, the sodium hydroxide system represents another advance by 1970's technology towards maximum environmental protection.



Soda ash briquettes are used to neutralize acid water through units such as the one pictured here.



EPA has conducted successful tests on units like this, which employ sodium hydroxide as a neutralizing agent.

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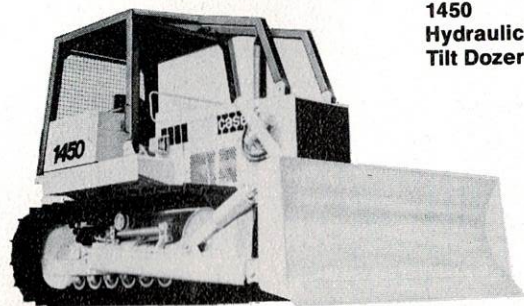
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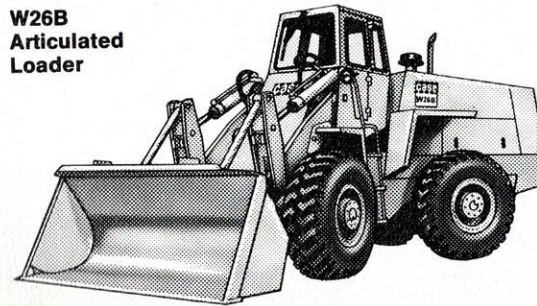
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West Virginia has reclaimed more acres annually than any other state for ten consecutive years, despite the fact that the Mountain State has fallen from sixth to eighth in surface production during that period.

Several factors help account for that seeming contradiction. An important one is the Special Reclamation Fund.

Proposed and supported by the industry itself, the Fund was officially established by the Legislature July 1, 1963, as part of a general revision of West Virginia's surface mining law.

The Department of Natural Resources was charged with administering the fund and the industry with financing it. The original assessment was \$30 per acre for every acre disturbed.

When that sum proved inadequate to carry out the ambitious program to its full potential, the fee was doubled to \$60 per acre in 1971. Thus far, the industry has paid nearly \$10 million into the Fund.

Yearly figures have varied with the coal market and other factors affecting permit applications, but from 1964 through 1976, the Department performed or supervised the reclamation of more than 26,000 acres of abandoned land, at no cost whatsoever to the taxpayer.

The Department of Natural Resources reviews each possible area against its established priorities. Of greatest concern, and first to receive attention, are those areas where water quality is adversely affected and the potential exists for downstream damage.

The second priority involves land stability, particularly those sites near public areas. All other areas, mainly sites with aesthetic problems, fall into a third category.

When an area is designated for special reclamation, the DNR lets the project out for bid. Most of the actual reclamation work is done by Soil Conservation Districts, private reclamation firms, or surface mining companies operating in the same area.

All reclamation, including preplanning, must be submitted for DNR approval and subject to the same requirements as post mining reclamation.

Ben Greene, President of the West Virginia Surface Mining and Reclamation Association, is proud of what the Special Reclamation Fund has accomplished. "This situation is somewhat unique," he stated. "Here we have an industry voluntarily going back and making an honest attempt to correct past problems. I know of no other state or industry in the nation that can point to such a worthy program at no cost to the taxpayer."

West Virginia was the first state to have such a program and it appears to have been the model for a similar one adopted as part of the federal Surface Mining Control and Reclamation Act of 1977. Moneys received under the federal plan will, in part, be turned back to the states.

These additional funds should give West Virginia a major boost in its effort to eliminate every abandoned mine site.



Areas like Sharps Knob in Pocahontas County, shown here, have been completely stabilized through the use of special reclamation funds.



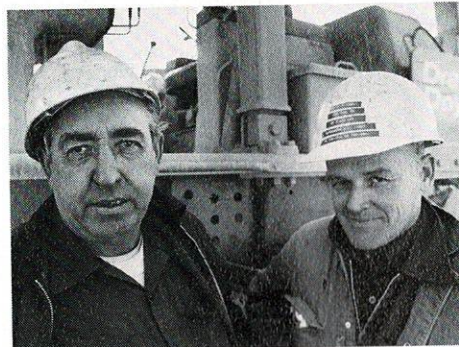
Vecellio and Grogan's Jim White "disappears" in this stand of birdsfoot trefoil near Star Bridge in Randolph County. Following "special reclamation" complete stabilization is obvious.

"I think this machine would go in solid rock."

"We're taking off a 40- to 45-foot highwall here, through limestone and soapstone, without even shooting. Just with the ripper and the blade. Never bought a pound of powder. It's ripping right through, no problem."

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"I would say there are many features on this machine that other dozers don't have. Better features, stronger features. It's been in tough limestone rock, and in this country that'll show on any



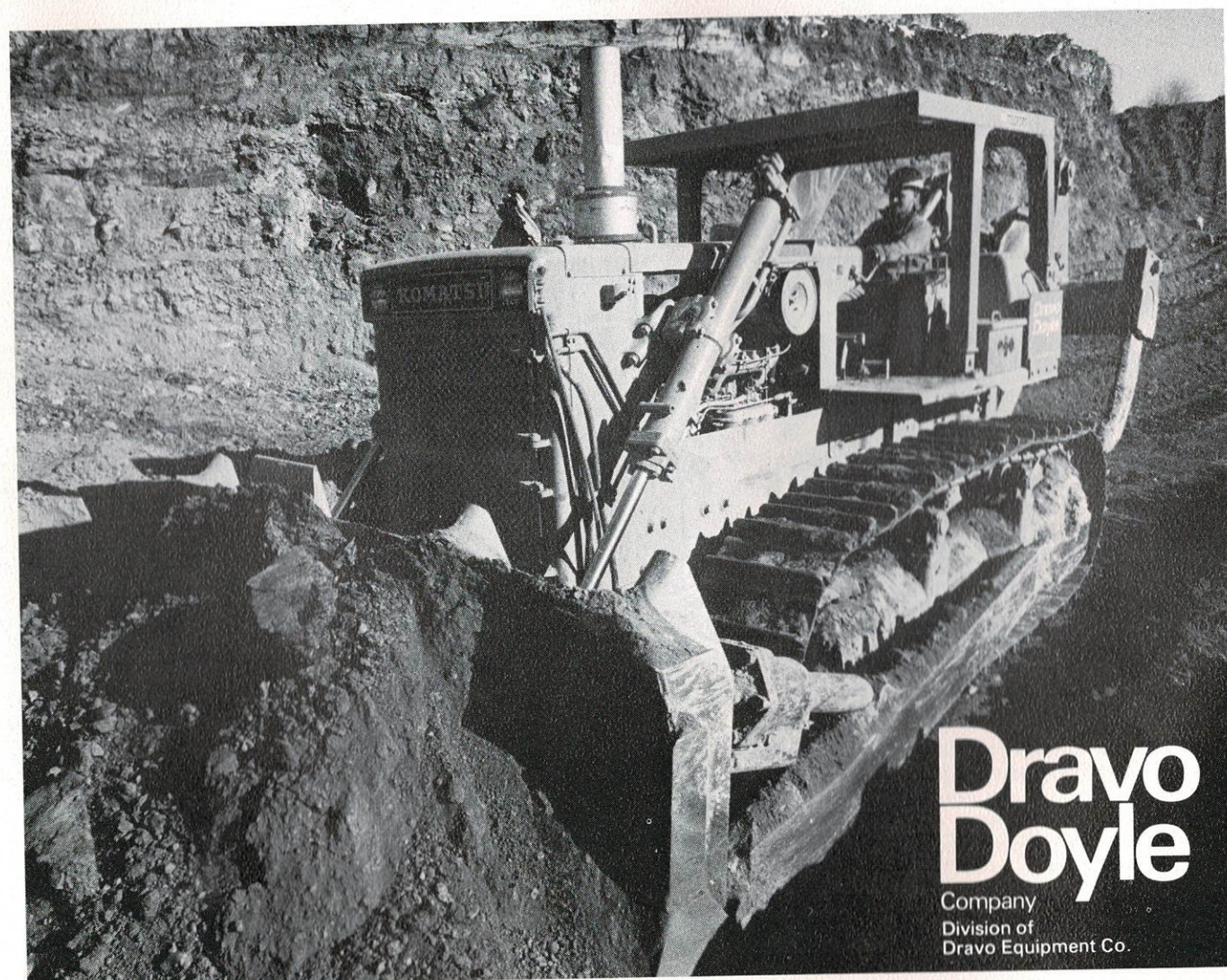
Willard and Bill Mitchell, H&W Coal Co., Clarksburg, W. Va., talk about their Komatsu 155.

piece of equipment. But I can't see any rapid wear at all on this machine. Tracks, blade, anything.

"The reliability's been 100%. It's been ready any time we've been ready."

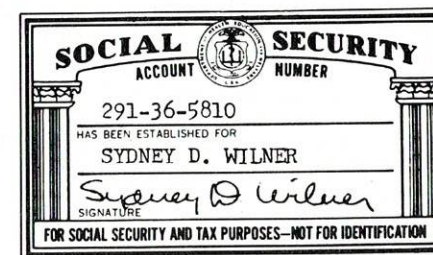
"Dravo Doyle's been very good in my opinion. They're a good outfit. They're 'A' number 1. We're well satisfied. That's the reason we've told some of our friends about them."

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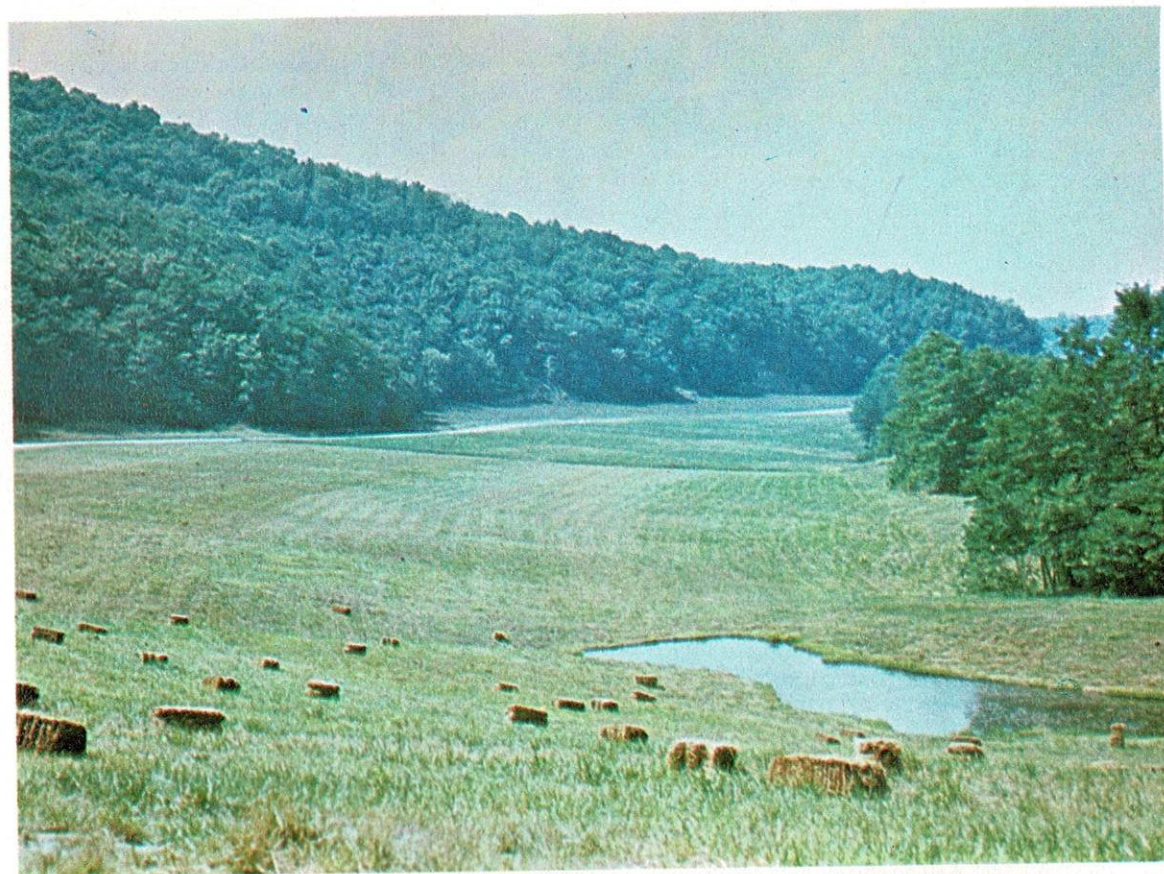
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Remining truly represents the best of both worlds. Coal production is increased and previously mined land is reclaimed to modern standards.



These scenes from C&W Coal Company's remining operation in Barbour County might just as easily be from an "undisturbed" farm in the same area.

Remining—the Best of Both Worlds

Opinions on any aspect of the surface mining industry are about as varied as the colors of autumn. There just aren't many things about which these various proponents can agree.

Here's one.

The technology of the 70's has enabled West Virginia's coal operators to recover large quantities of the mineral which weren't considered economical to mine ten or twenty years ago.

Much of this coal occurs in previously mined areas, which were not properly reclaimed by today's standards.

The West Virginia Department of Natural Resources requires that any area under permit be returned to present standards, regardless of its previous condition. Thus an area which is remined represents the best of both worlds, increased coal production and decreased orphaned lands.

Coal mining, like most businesses, is conducted on a cost/profit feasibility basis. That is, within a given permit area, only as much mineral is extracted as can be done within certain economic limits.

Operators have a general idea before the job begins how much of the seam can be mined profitably. In previous decades only a fraction of the coal was recovered in many cases before excessive overburden or other problems called for a shutdown.

However, advances in both mining and reclamation techniques which began to accelerate in the 1960's have broken into a full sprint in this decade.

Bigger and more effective earth moving machines, controlled placement mining methods, and innovative pre-planning have made recoverable, pockets of valuable mineral which were "unminable" previously. This is especially true in areas with overburden too thick for conventional surface techniques and geologic conditions unsuited to deep mining.

Reclamation is the aspect of remining which has really paid dividends to the citizens of West Virginia. Many of the areas in need of further reclamation have already been involved in remining, and every acre that is reclaimed in this fashion is one acre less than the State has to worry about.

Since March of 1975, when the DNR's Division of Reclamation initiated an inventory of remined areas, over 125 linear miles of old highwalls have been eliminated.

With such activity on the increase, remining will hold an important position in the joint effort of the surface mining industry and the State Department of Natural Resources to eliminate all orphaned lands in West Virginia.



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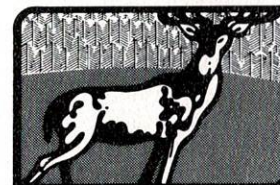
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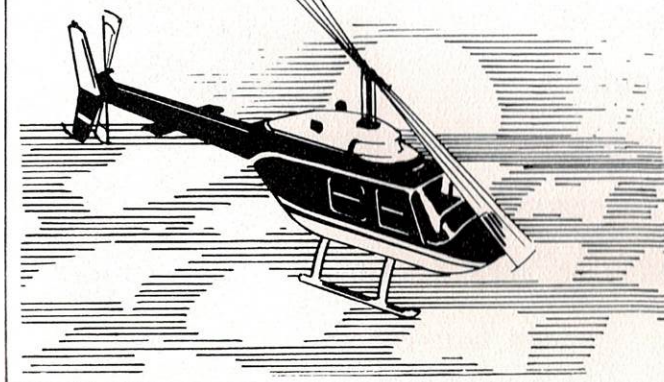
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Glossary

A brief explanation of frequently used terms in the surface mining industry

BACKFILL—The operation of refilling an excavation. Also the material placed in an excavation in the process of backfilling.

BENCH—The surface of an excavated area at some point between the material being mined and the original surface of the ground on which equipment can set, move or operate. A working road or base below a highwall as in contour stripping for coal.

BOX CUT—The initial cut driven into a property, where no open side exists; this results in a highwall on both sides of the cut.

CFS—Cubic feet per seconds—measurement of water flow.

COAL SEAM—A layer, vein, or deposit of coal. A stratigraphic part of the earth's surface containing coal.

COMPACTION—The closing of the pore spaces among the particles of soil and rock, generally caused by running heavy equipment over the area, as in the process of leveling the overburden material.

CONTOUR—An imaginary line connecting points of equal height above sea level as they follow the relief of the terrain.

CONTOUR MINING—The removal of overburden and mining from a coal seam that outcrops or approaches the surface at approximately the same elevation, in steep or mountainous areas.

CONTROLLED PLACEMENT—Method of surface mining that dictates preplanning, site preparation, removal and control of overburden during the mining operation and provides for a productive, stable end use.

CORE DRILLING—The process by which a cylindrical sample of rock and other strata is obtained through the use of a hollow drilling bit which cuts and retains a section of the rock or other strata penetrated.

CROP COAL—Coal at the outcrop or near the surface of the seam. It is usually considered of inferior quality due to partial oxidation, although this is not always true.

CUT—Longitudinal excavation made by a surface-mining machine to remove overburden in a single progressive line from one side or end of the property.

DISTURBED LAND—Land on which excavation has occurred or upon which overburden has been deposited, or both.

DIVERSION DITCH—A man-made waterway used for collecting surface runoff on the uphill side of a mine in order to keep it out of the workings; a ditch designed to change the normal or actual course of water.

DRAGLINE—An excavating machine that utilizes a bucket operated and suspended by means of lines or cables, one of which hoists or lowers the bucket from a boom; the other, from which the

name is derived, allows the bucket to swing out from the machine or to be dragged toward the machine for loading. Mobility of draglines is by crawler mounting or by a walking device for propelling, featuring pontoon-like feet and a circular base or tub. The swing of the machine is based on rollers and rail. The machine usually operates from the highwall side of the mine.

DRAINAGE BASIN—The area from which water is carried off by a drainage system, a watershed or a catchment area.

DRAINAGE PLAN—The proposed methods of collection, treatment, and discharge of all waters within the affected drainage area as defined in the pre-mining plan.

DRIFT—A deep mine entry driven directly into a horizontal or near horizontal mineral seam or vein when it outcrops or is exposed at the ground surface.

EFFLUENT—Any water flowing out of the ground or from an enclosure to the surface flow network.

EMERGENCY SPILLWAY—A spillway designed to convey water in excess of that impounded for flood control or other beneficial purposes.

EXCAVATION—The act of removing overburden material.

FILL—Depth to which material is to be placed (filled) to bring the surface to a predetermined grade. Also, the material itself.

FILL BENCH—That portion of the bench which is formed by depositing overburden beyond the cut section.

FLOOD 10-YEAR—The flow of a stream which has been equaled or exceeded, on the average once in 10 years (or other designated period).

FORAGE—Unharvested plant material which can be used as feed by domestic animals. Forage may be grazed or cut for hay.

FRENCH DRAIN—A covered ditch containing a layer of fitted or loose stone or other pervious material.

GABION—A mesh container or waste basket used to confine rocks or stones and used to construct dams or line stream channels.

GEORGIA V-DITCH—Grading is performed to create positively draining swales midpoint between and parallel to the highwall and lowwall to convey water runoff to drains established to carry the water away from the spoil area.

GERMINATION—Sprouting; beginning of growth.

GOB—Waste coal, rock pyrites, slate, or other unmerchantable material of relatively large size which is separated from coal and other mined material in the cleaning process.

GOUGING—Gouging is a surface configuration intended to trap precipitation, increase infiltration and reduce erosion.

GRADE—

- (1) The inclination or slope of a stream channel or ground surface, usually expressed in terms of the ratio or percentage of number of units of verticle rise or fall per unit of horizontal distance.
- (2) The finished surface of a road bed, top of an embankment or bottom of an excavation.
- (3) To establish a profile by backfilling.

GROUND COVER—Any living or dead vegetative material producing a protecting mat on or just above the soil surface.

GROWING SEASON—The season which in general, is warm enough for the growth of plants, the extreme average limits of duration being from the average date of the last killing frost in spring to that of the first killing frost in autumn. On the whole, however, the growing season is confined to that period of the year when the daily means are above 42 F.

HAULBACK METHOD—This method removes coal by stripping and augering with no material being placed on the downslope. Lateral movement reduced disturbed acreage by nearly two thirds when compared with conventional surface mining because the overburden is hauled by truck laterally along the bench and then backfilled against the highwall.

HAULROAD—Road from pit to loading dock, tipple, ramp, or preparation plant used for transporting mined material by truck.

HIGHWALL—The unexcavated face of exposed overburden and coal in a surface mine or the face or bank on the uphill side of a contour surface mine excavation.

HYDROLOGY—The science that relates to the water systems of the earth.

HYDROSEEDING—Dissemination of seed hydraulically in a water medium. Mulch, lime, and fertilizer can be incorporated into the sprayed mixture.

IMPERVIOUS—Prohibits fluid flow.

IMPOUNDMENT—A reservoir for collection of water. Collection of water by damming a stream

or the like. May be used in connection with the storage of tailings from a mine.

INTERMITTENT STREAM—A stream or portion of a stream that flows only in direct response to precipitation. It receives little or no water from springs and is dry for a large part of the year.

LATERAL MOVEMENT—See Haulback Method.

LEACHING—The removal of materials in solution by the passage of water through soil.

LEGUME—A member of the legume or pulse family, leguminosae. One of the most important and widely distributed plant families. Includes many valuable food and forage species, such as the peas, beans, peanuts, clovers, alfalfas, sweet clovers, lespedezas, vetches and kudzu. Practically all legumes are nitrogen-fixing plants.

LITTER—Freshly fallen or slightly decomposed organic debris.

LOAD—(water quality use) The quantity of material carried by flowing water—generally expressed as pounds per day.

LONGWALL STRIPPING—Longwall mining accomplished in areas of shallow cover where surface mining might normally have been conducted. The outby end, where the longwall controls, pumps, and face conveyor discharge end are located, is located in a ditch that is exposed to the surface. Roof chocks are used to protect the mining area and the roof (or overburden) is allowed to settle into the mined out section.

MINE DRAINAGE—Any water forming on or discharging from a mining operation. May be alkaline or acid in nature.

MINED-LAND—Land with new surface characteristics due to the removal of mineable commodity by surface mining methods and subsequent surface reclamation.

MOUNTAINTOP REMOVAL—In this mining method, 100 percent of the overburden covering a coal seam is removed in order to recover 100 percent of the mineral. Excess spoil material may be hauled to a nearby hollow to create a valley fill.

MULCH—A natural or artificial layer of plant residue or other materials placed on the soil surface to protect seeds, to prevent blowing, to retain soil moisture, to curtail erosion, and to modify soil temperature.

MULTIPLE SEAM MINING—Surface mining in areas where several seams are recovered from the same hillside.

NURSE CROP—A planting or seeding that is used to protect a tender species during its early life. A nurse crop is usually temporary and gives way to the permanent crop. Sometimes referred to as a companion crop.

OPENCUT—A method of excavation in which the working area is kept exposed.

OPEN PIT MINING—Surface mining, a type of mining in which the overburden is removed from the product being mined and is dumped back after mining; or may specifically refer to an area from which the overburden has been removed and has been filled.

OPERATION—All of the premises, facilities, railroad loops, roads, and equipment used in the process of extracting and removing a mineral commodity from a designated surface mine or

in the determination of the location, quality, and quantity of a natural mineral deposit.

ORPHAN BANKS—Abandoned surface mines, operated prior to the enactment of comprehensive reclamation laws, that require additional reclamation.

OUTCROP—Coal which appears at or near the surface; the intersection of a coal seam with the surface.

OUTSLOPE—The exposed area sloping away from a bench cut section.

OVERBURDEN—The earth, rock, and other materials which lie above the coal.

OVER THE SHOULDER—A method of handling overburden whereby it is moved parallel to the highwall instead of at right angles to the wall as normally done.

PERCOLATION—Downward movement of water through soils.

PERMEABILITY—The measure of the capacity for transmitting a fluid through the substance.

pH—The symbol or term refers to a scale commonly used to express the degrees of acidity or alkalinity. On this scale pH of 1 is the strongest acid, pH of 14 is the strongest alkali, pH of 7 is the point of neutrality at which there is neither acidity or alkalinity. pH is not a measure of the weight of acid or alkali contained in or available in a given volume.

PIT—Used in reference to a specifically describable area of open cut mining. May be used to refer to only that part of the open cut mining area from which coal is being actively removed or may refer to the entire contiguous mined area.

PREPLANNING—Process of foreseeing reclamation problems and determining measures to minimize off-site damages during the mining operation and to provide for quick stabilization of the mining area.

PROSPECTING—The removal of overburden, core drilling, construction of roads, or any other disturbance of the surface for the purpose of determining the location, quality or quantity of the natural mineral deposit.

RECLAMATION—The process of reconvertng mined land to its former or other productive uses.

RED DOG—A gob pile after it has burned. The material is generally used as a road surfacing material; it has no harmful acid or alkaline reaction.

REFUSE—All the solid waste from a coal mine, including tailings and slurry. Other synonyms are: dirt, gob, shale, slate, etc.

REGRADING—The movement of earth over a depression to change the shape of the land surface. A finer form of backfilling.

RETENTION—The amount of precipitation on a drainage area that does not escape as runoff. It is the difference between the total precipitation and total runoff.

REVEGETATION—Growth which replaces original ground cover following land disturbance.

RIPRAP—Broken rock, cobbles, or boulders placed on earth surfaces, such as the face of a dam, bank of a stream, or lining drainage channels, for protection against the action of water.

RUNOFF—That portion of the rainfall that is not absorbed by the deep strata: is utilized by vegetation or lost by evaporation or may find its way into streams as surface flow.

SEAM—A stratum or bed of coal.

SEDIMENT—Solid material, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by air, water, gravity, or ice and has come to rest on the earth's surface either above or below sea level.

SEDIMENT BASIN—A reservoir for the confinement and retention of silt, gravel, rock, or other debris from a sediment-producing area.

SEDIMENT STRUCTURE—A barrier or dam constructed across a waterway or in other suitable locations to form a silt or sediment basin.

SEEP—A more or less poorly defined area where water oozes from the earth in small quantities.

SHOTGUN MIXTURE—Seeding a number of species at random.

SHOVEL—Excavating or coal-loading machine that utilizes a bucket mounted on and operated by means of a handle or dipper stick that moves longitudinally on gears and which is lifted or lowered by cable. The entire machine is mounted on crawlers for mobility and the upper structure is mounted on rollers and rail for swing or turn.

SILT—Small mineral soil grains the particles of which range in diameter from 0.05 to 0.002 mm (or 0.02-0.002 mm in the international system).

SLIP or SLIDE—A mass of spoil material that moves downward and outward to a lower elevation due to the force of gravity, generally caused by overloading of the downslope, freezing and thawing, or saturation of the fill.

SLOPE—(See Grade (1))

SLOPE STABILITY—The resistance of any inclined surface, as the wall of an open pit or cut, to failure by sliding or collapsing.

SLURRY—Refuse separated from the coal in the coal cleaning process of relatively small size which is readily pumpable in the washing plant effluent. A pulverized coal-liquid mixture transported by pipeline.

SOLID BENCH—That portion of the bench located on undisturbed material.

SPILLWAY—A waterway in or about a dam or other hydraulic structure for the escape of excess water.

SPOIL—(See ACID SPOIL or TOXIC SPOIL) The overburden or non-coal material removed in gaining access to the coal or mineral material in surface mining.

SURFACE MINING—Mining method whereby the overlying materials are removed to expose the mineral for extraction.

TERRACE—Sloping ground cut into a succession of benches and steep inclines for purposes of cultivation or to control surface runoff and minimize soil erosion.

TOE—The point of contact between the base of an embankment or spoil bank and the foundation surface. Usually the outer portion of the spoil

bank where it contacts the original ground surface.

TOPOGRAPHY—The shape of the ground surface, such as hills, mountains, or plains. Steep topography indicates steep slopes or hilly land; flat topography indicates flat land with minor undulations and gentle slopes.

TOPSOIL—Presumed fertile soil material—used as a top dressing. Distinction has been made among synthetic, weathered, and geologic topsoil. Synthetic topsoil can include sand and stone chips as well as fly ash, sawdust, or manure not usually a part of geological soil and rock. Weathered topsoil is the natural top-dressing material that has been subjected to weathering throughout geologic time.

VALLEY FILL METHOD (Also HEAD OF THE HOLLOW)—Placement of overburden material from adjacent contour or mountaintop surface mines is placed in compacted layers in narrow, steep-sided hollows to facilitate surface drainage.

VOLUNTEER—Springing up spontaneously or without being planted; a volunteer plant.

WATER BAR—Any device or structure placed in or upon a haul or access road for the purpose of channeling or diverting the flow of water off the road.

WATERSHED—Surface region or area contributing to the supply of a stream or lake, drainage area, drainage basin, catchment area.

WEIR—A notch over which liquids flow and which is used to measure the rate of flow. A dam across a stream for diverting or measuring the flow.

pittston



We put it back . . . because we care!
Pittston Coal Company is doing its part
towards achieving energy independence for our
nation—while preserving our state's natural beauty.

The Pittston Company Coal Group / Lebanon, Virginia



HAULPAK® 35C/50.

Others charge from \$2,000 up to \$6,000 more to meet our standards.

Our HAULPAK trucks in the 35- and 50-ton class include **all** these features as standard equipment. Competitive trucks lack two or three or four or more. Adjusting prices for everything you want (and need), you could pay \$2,000 or \$4,000 or \$6,000 extra and **still** not have the workability you get standard in a HAULPAK truck.

Our exclusive traction-sensing differential, for instance, helps a HAULPAK truck climb wet, slippery grades where other trucks may bog down. Our

HYDRAIR® II air-over-oil suspension is so good, we offer an exclusive one-year or 5,000-hour warranty on it. Our frame with its massive "horse-collar" mid-section is one of the strongest built.

Sit down with your WABCO distributor and compare feature with feature, price against price. Maybe you'll discover that only **our** standards are up to **your** standards.

WABCO
An American-Standard Company

A tradition of excellence...since 1885



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