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Green Lands

Spring 1995



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Green Lands

Volume 25 Number 2

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Green Lands is a quarterly publication of the West Virginia Mining & Reclamation Association, with offices at 1624 Kanawha Boulevard East Charleston, West Virginia 25311 (304) 346-5318, FAX 346-5310.



Our Cover (photo by Chip Ellis) Hobet Mining, Inc., named the outstanding reclamation operation in the U.S. last year, is now the official winner of the 'Callaghan' Award, symbolic of the best in West Virginia. Our cover story begins on page 12.

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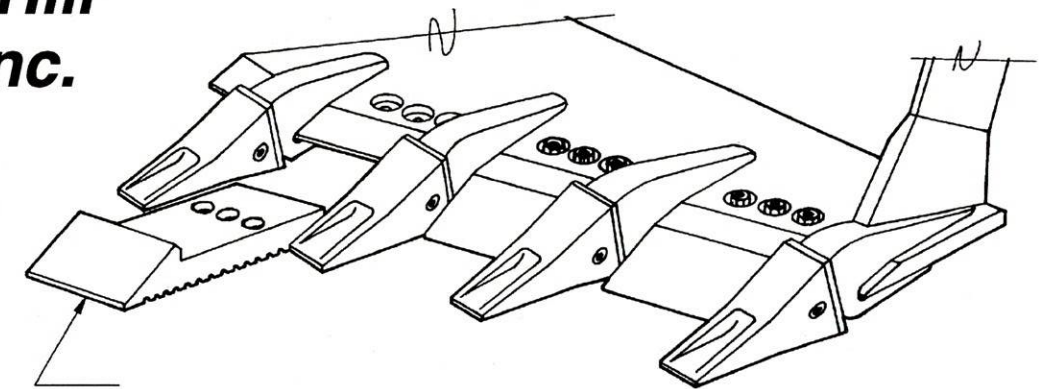
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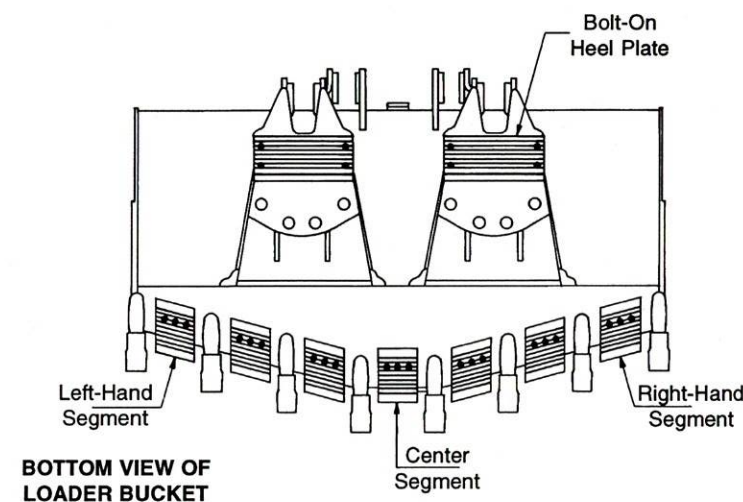
Bolt-On Segments & Heel Plates Available from Crown Hill Equipment, Inc.

Quality manufactured Bolt-On Segments & Heel Plates by GH Hensley for Caterpillar 980, 988, & 992 loaders.



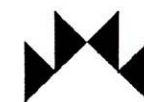
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988	6Y3609 or 9V5793	6Y3609HX
992	6Y3610 or 6W0276	6Y3610HX

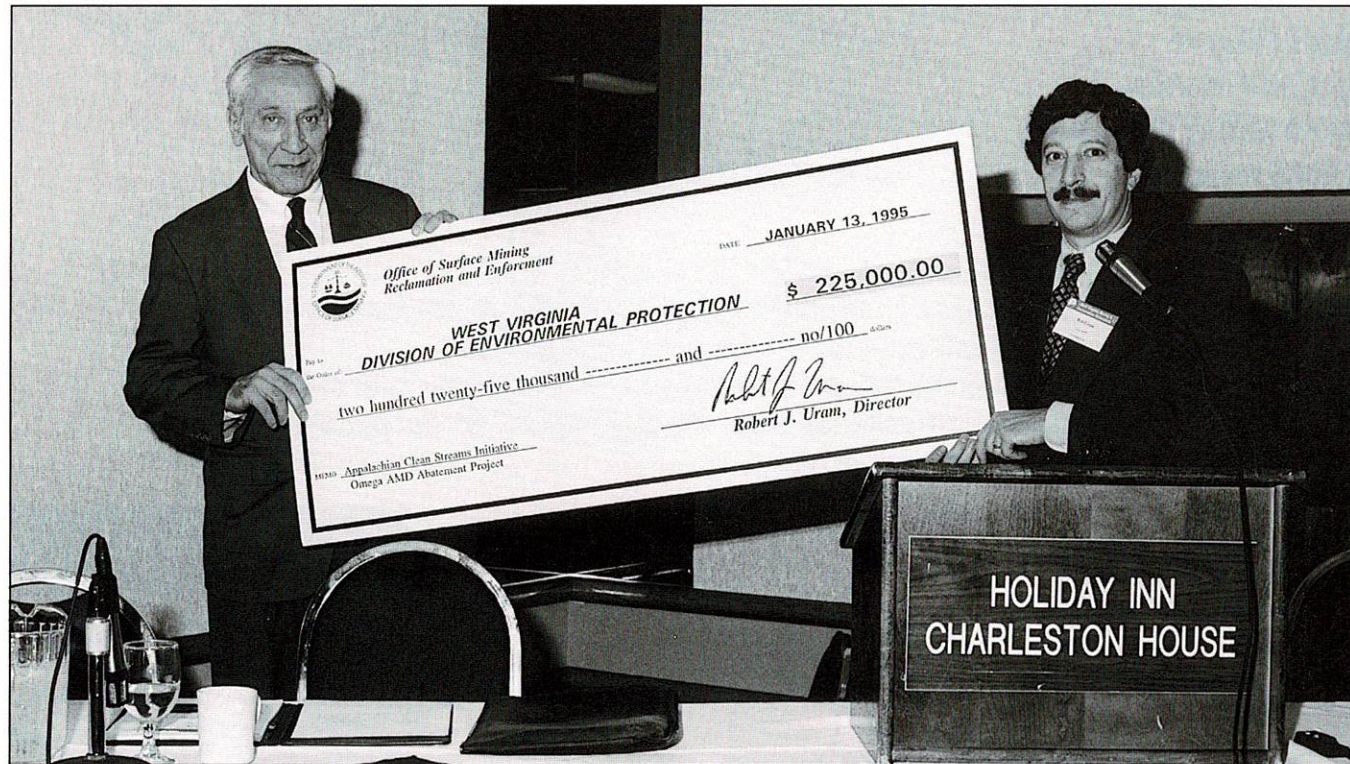


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OSM Director Bob Uram (r) appeared at this year's West Virginia Mining Symposium. Among several duties the Director performed was the presentation of a check for \$225,000 to WV-DEP Director Dave Callaghan (l). The check represents a grant whereby money collected from West Virginia coal companies is given to the State agency by the federal agency.

800 attend 22nd Mining Symposium

It appears that 22nd Annual West Virginia Mining Symposium, held in January in Charleston, set new attendance records for a WVMRA event.

Nearly 800 people attended various events on the 48 hour program, which included four half-day technical sessions, two awards programs and the traditional reception for West Virginia State legislators. The Symposium began with a Wednesday afternoon workshop manned by staff members from the WV Division of Environmental Protection.

On Thursday, a full day was scheduled, highlighted by the Mountaineer Guardian Awards luncheon, which recognized some 80 mining operations and prep plants for fatal free production.

Thursday night's legislative reception was especially important this year, in light of the unusual number of new lawmakers following the November election. More than half of the Legislature attended the session.

Friday's session was attended by OSM Director Bob Uram, who used the occasion to present DEP Director Dave Callaghan with a check for \$225,000 for use on an acid mine drainage treatment project.

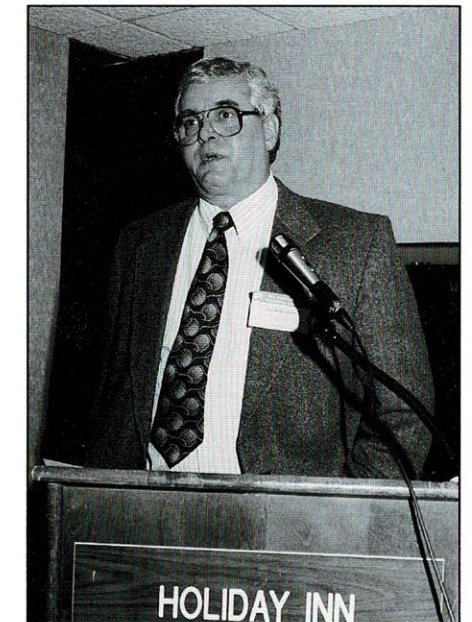
Uram also was on hand to help Callaghan present the 1994 Reclamation Awards at the Symposium's closing banquet. Following the presentation of 23 Reclamation Awards, the 22nd West Virginia Mining Symposium was declared a huge success and duly adjourned.



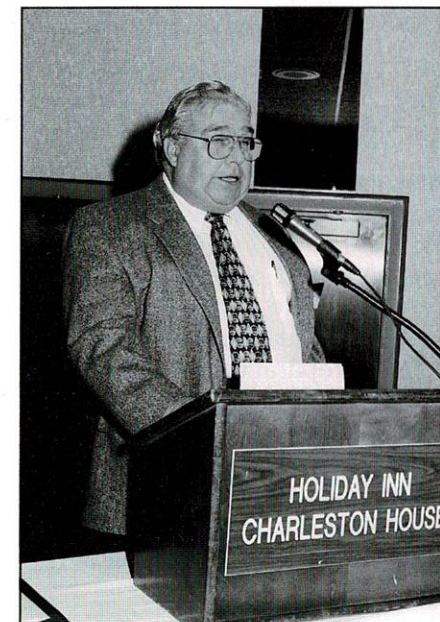
WVMRA Chairman Sid Young welcomes a capacity crowd to the 22nd West Virginia Mining Symposium.



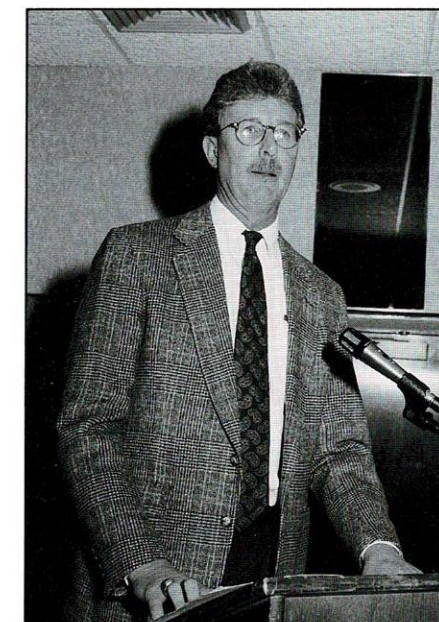
Ken Politan, WV-DEP. "Remining - Finally?"



Jim Rutherford, MSHA. "Surface Mine Safety"



Joe Boggs, Safety Brake, Inc. "Emergency Braking System for Heavy Coal Trucks"



John Smith, Rudd Equipment Co. "Large Backhoes & Their Role in Appalachian Mining"



Bob Bailey, Bowles Rice
McDavid Graff & Love
"Uncle Sam Wants You - Federal Prosecutors in the Coalfields"



Rawl Sales & Processing won the "Milestones of Safety Award," for the best overall safety record last year. Standing left to right are MHS&T Director Steve Webber, Cliff Fugett, John Jones, James Staggs, WVMRA Chairman Sid Young, Ed Chafin. Kneeling are James Slater and Gary Harper.

81 operations win Mountaineer Guardian

Seventy-five separate coal mining operations were honored in January for mining a total of more than 540 million tons of coal without a fatality. In addition, six coal preparation plants received special recognition for their fatal free productivity.

The occasion was the Mountaineer Guardian Safety Awards luncheon, a major activity of the 22nd Annual West Virginia Mining Symposium. Presentations were made by Steve Webber, Director of the West Virginia Office of Miners' Health, Safety & Training.

The top honor went to Rawl Sales & Processing Co.'s Sprouse Creek Processing Plant near Matewan in Mingo County. With a work force of 44, Sprouse Creek has processed over 100 million tons of coal over the last 17 years without a fatality. The plant was also recognized for its outstanding overall safety which resulted in zero reportable accidents from October 26, 1992, through December 31, 1994.

Sprouse Creek becomes the fourth West Virginia operation to receive the prestigious "Barton B. Lay, Jr. Milestones of Safety Award."

The Mountaineer Guardian Award program is jointly sponsored by WVMRA and the State Office of Miners' Health Safety & Training. It recognizes the employees of coal mines and coal mine preparation plants who demonstrate high standards of safety by reaching tonnage goals without a fatal accident.

Vice President K. O. Damron summarized the progress of the industry in overall safety. "For the third consecutive year we experienced a decline in mining fatalities in West Virginia. This is a very positive report, but we are still not satisfied.

"We are pleased that our expanded Mountaineer Guardian Program is providing recognition to those companies and individuals who have done so much to bring us to within reach of our ultimate goal of zero coal mining fatalities."

Mountaineer Guardian Winners

Company	Mine	Company	Mine
Appalachian Mining Co.	Alloy No. 1	Hart-Hat Coal Co., Inc.	No. 1
Arch of West Virginia	Ruffner	Heartland Resources, Inc.	Lincoln Surface High
Arch of West Virginia	Wylo	Power Energy	20 Mile Surface # 901
B. J. M. Coal Co.	Camp Creek	Hobet Mining, Inc.	No. 21
Battle Ridge Co.	Orgas No. 2	Juliana Mining Co., Inc.	Amos Run
Buffalo Coal Co.	Grant/Tucker/Preston	Laurel Coal Corp.	Coalburg No. 9
C. J. Coal Corp.	Hackers Creek	Leah Coal Co., Inc.	No. 2-A
C & W Coal Co.	Surface Operations	Lexie Coal Corp.	No. 8-A
Cannelton Industries, Inc.	Dunn Coal & Dock	Long Branch Energy	No. 14
Cannelton Industries, Inc.	Lady Dunn Processing	Maple Meadow Coal Co., Inc.	Maple Meadow Prep
Cannelton Industries, Inc.	Stockton Complex	Marrowbone Development	Tug Valley Processing
Carter-Roag Coal Co., Inc.	No. 1-A	Marson Coal Co.	Sewell No. 4
Cedar Point Mining, Inc.	No. 1	McElroy Coal Co.	McElroy
Colony Bay Coal Co.	Colony Bay	Meador Energy, Inc.	No. 1
Conquest Coal Mining, Inc.	No. 3	Meadow River Co.	New River
Consolidation Coal Co.	Arkwright No. 1	Mistic Energy, Inc.	No. 2
Consolidation Coal Co.	Blacksville No. 2	New Ridge Mining Co.	Varney Surface Old
Consolidation Coal Co.	Humphrey No. 7	Hickory Coal Co.	Rockhouse/Left Fork
Consolidation Coal Co.	Ireland No. 8	Opportunity Coal Co., Inc.	No. 25
Consolidation Coal Co.	Osage No. 3	Patriot Mining Co.	Patriot Surface
Copperas Coal Corp.	Robinson Run No. 95	Philippi Development, Inc.	Sentinel
Cow Creek Coal Co.	Red Oak	Premium Energy, Inc.	Mingo Surface
Cub Branch Mining Co.	No. 7	Princess Beverly Coal Co.	Princess Beverly
Cumberland River Coal Co.	Frank Maynard Branch	Rawl Sales & Processing	Sprouse Creek Prep
Cyprus Kanawha Corp.	Ragland Prep Plant	Rocky Hollow Coal Co.	Rocky Hollow
D. & K. Coal Co.	Sycamore South	San-West Coal Co., Inc.	No. 3
D. R. & H. Coal Co., Inc.	No. 4-A	Select Mining, Inc.	No. 3
Daniel's Branch Coal Co.	No. 1	Sheep Fork Energy, Inc.	No. 2
De'Lyn, Ltd.	No. 1	Shiloh Mining, Inc.	No. 1
Eastern Associated Coal	No. 7	Stoney Coal Co.	No. 1
Eastern Associated Coal	Harris No. 1	Stoney Coal Co.	No. 8
Eastern Associated Coal	Rocklick Plant	Talon Resources, Inc.	Central Ridge
Eastern Mingo Coal Co.	Federal No. 2	Terry Eagle Coal Co.	Hutchinson Branch # 1
Eastwood Construction, Inc.	No. 1	Tommy Creek Coal Co.	Tommy Creek No. 1
Elk Run Coal Co.	No. 7	Top Gun, Inc.	No. 1
Elk Run Coal Co.	Black Castle	U. S. Steel Mining Co., Inc.	No. 50
Elk Run Coal Co.	Queen	U. S. Steel Mining Co., Inc.	Shawnee
Elkay Mining Co.	White Knight	Vandalia Mining Corp.	Monac Surface
Evergreen Mining Co.	Tower Mountain	Western Mingo Coal Co.	No. 1
	Cowen	Wind River Resources	Cozy Surface

1935

Since 1935: Communism fell in the USSR.

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Man walked on the moon.

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Hobets Mining, Inc. collects the David C. Callaghan Award. Standing (l-r) are OSM Director Bob Uram, Bob Euler, Raymond Smallwood, Larry Emerson, all of Hobet, WV-DEP Director Dave Callaghan, John Lowe of Hobet, WVMRA Chairman Sid Young. Kneeling - Jim Ratcliff of Hobet, DEP Inspector Dan Bays.

Hobet Mining wins 'Callaghan' Award

Hobet Mining, Inc. headed a list of 23 West Virginia coal and contracting companies which were recognized for excellence in environmental enhancement during 1994, at the closing awards luncheon of the 22nd Annual West Virginia Mining Symposium.

Sponsored jointly by the West Virginia Division of Environmental Protection and WVMRA, the Reclamation Awards are presented annually to those companies which were judged to have done outstanding work in mine construction, mine land reclamation and community contribution. To be considered for the award, a company must be nominated by its local DEP inspector.

"We have presented these awards since 1971," said Association President Ben Greene, "and it is always amazing to see the amount of interest and pride generated within the industry for this event. This innovative program was the first of its kind in the nation and has been copied in many states as well as on the national level." "I have visited each of the award winning sites and they reflect very well on the state of mining and reclamation in West Virginia."

Hobet, based in Julian, Boone County, won for its 21 Surface Mine. Hobet received the "David C. Callaghan Award," named for the former director of the State Department of Natural Resources and present director of the State Division of Environmental Protection.

"I am exceptionally pleased to present this award to Hobet Mining," said Greene. "President Raymond Smallwood and his dedicated, professional staff have made Hobet 21 a showcase operation, and I mean that literally, with thousands of visitors touring the site annually. Hobet has achieved a longstanding record of doing everything in the proper manner, from its initial long-term, high capital commitment to Boone County, to its modern, efficient production units, and right down to its reclamation efforts, in which it invariably exceeds all mandated standards. Hobet Mining, Inc. is a shining example of the best that mining and reclamation can be."

The complete list of winners is featured on the following pages.



DAVID C. CALLAGHAN AWARD Hobet Mining, Inc.

In Boone County, for total commitment to all phases of mining and reclamation excellence. With professional planning, design, construction and reclamation, this operation epitomizes the highest standards of modern coal production, while achieving national recognition for environmental protection. This community minded company is a principal supporter of all civic and local worthwhile activities, with a special emphasis on education. Annually, thousands of school children, senior citizens and interested individuals visit this showcase operation. With a total commitment to environmental protection and future land use, Hobet Mining, Inc. continues on the cutting edge of mining and reclamation evolution.

Nominees for 1994 Reclamation Awards

COMPANY

Ambrec Corp
Arch of West Virginia
Arch of West Virginia
Big Bear Mining Co.
Black Diamond Construction, Inc.
Bradford Coal Co.
Buffalo Coal Co.
C. J. Coal Corp.
Cannelton Industries, Inc.
Carter-ROAG Corp.
Catenary Coal Co.
Coaltrain Corp.
Coal Valley Mining
Consolidation Coal Co.
Consolidation Coal Co.
Cumberland River Coal Co.
Cyprus Kanawha Corp.
D & L Coal Co.
Eastern Associated Coal Co.
Elk Run Coal Co.
Evergreen Mining Co.
Firetower Mining, Inc.
Grafton Coal Co.
Greenbrier Coal Co.
High Power Energy
Hobet Mining, Inc.
Island Creek Coal Co.
Juliana Mining Co.
Majestic Mining Co.
Mary Ruth Corp.
Meadow River Coal Co.
Mepco, Inc.
NuEast Mining Corp.
Peabody Coal Co.
Peerless Eagle Coal Co.
Pen Coal Corp.
Pioneer Construction Co., Inc.
Pioneer Construction Co., Inc.
Pioneer Fuel Corp.
Pocahontas Resources, Inc.
Rawl Sales & Processing Co.
Shafer Brothers Construction
Split Fork Mining Co., Inc.
The Lady H Coal Co., Inc.
U.S. Steel Mining Co., Inc.
Viking Pocahontas, Inc.
Volkstone Co.
Walter Green, Inc.
William Dozer Service, Inc.

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Logan
Wyoming
Boone
Kanawha
Grant
Upshur
Fayette
Randolph
Raleigh
Preston
Raleigh
Raleigh
McDowell
Mingo
Fayette
Mineral
Wyoming
Boone
Webster
McDowell
Randolph
Greenbrier
Nicholas
Boone
Nicholas
Webster
Nicholas
Preston
Fayette
Monongalia
Boone
Boone
Nicholas
Wayne
McDowell
Mercer
Wyoming
Nicholas
Mingo
Monongalia
McDowell
Nicholas
Wyoming
Greenbrier
Preston
Preston
Taylor

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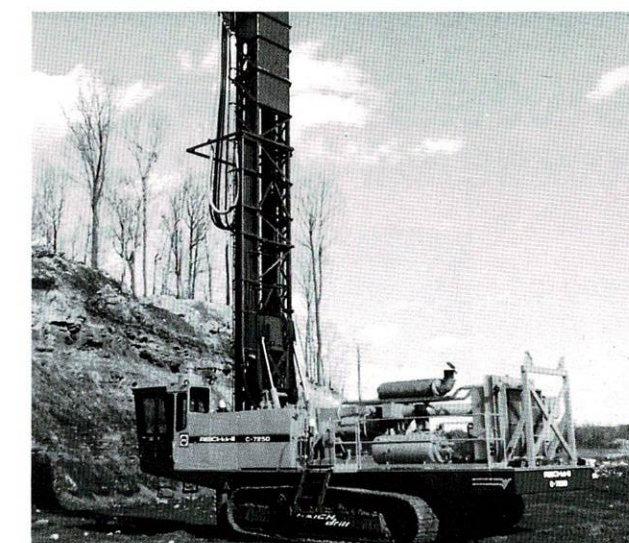
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Ron Sheets
John Waggoner
Jerry W. Stover
Phil Mooney
Brent Wiles
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G. A. Morton
Paul Dixon
Manuel Seijo
Joseph Laughery
Earl Holt
Darrell O'Brien
James C. Lucas
Paul Dixon
Eugene Lacy
Jerry W. Stover
Keith A. Evans
Richard Kennedy
David A. Smith
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R. K. Henry
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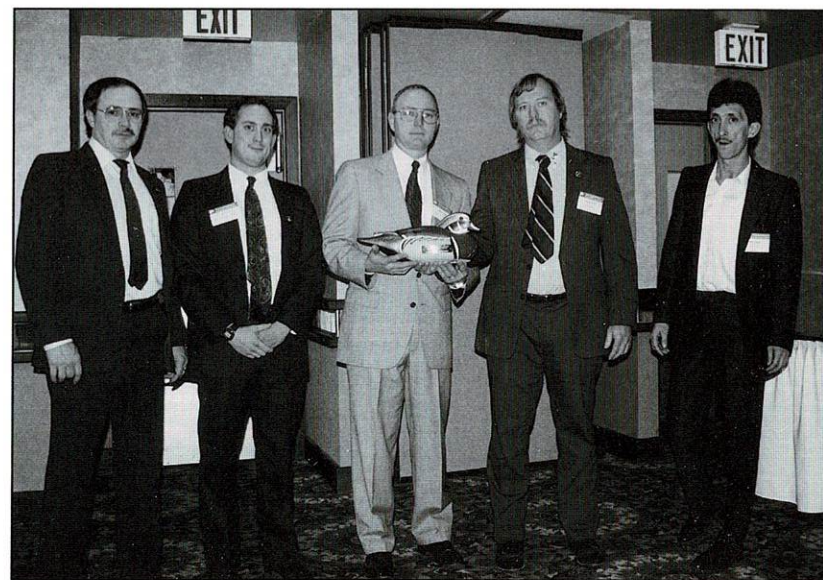
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WETLANDS WEST VIRGINIA AWARD

Arch of West Virginia - Wylo Mine

Presented by Ducks Unlimited for outstanding accomplishment in the creation and preservation of wetlands wildlife habitat.



Tommy Ellison, Dave DePasquale, Dave Long, all of Arch, State DU President Howard Blyler, DEP Inspector Ron Sheets



WILDLIFE WEST VIRGINIA AWARD

Buffalo Coal Company

Presented by the West Virginia Chapter of the National Wild Turkey Federation for outstanding accomplishment in the establishment and enhancement of overall wildlife habitat, with special emphasis on wild turkeys.



Standing - Buzz Gosnell, Steve Shaffer, Denny Dolocek, Don Cussins, all of Buffalo, State NWTF President John Starcher, John Geroski of Buffalo. Kneeling - Melvin Judy of Buffalo, DEP Inspector Dave Idelman.

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Operating Payload			
Standard	51,000 lbs. (23,133 kgs.)	66,000 lbs. (29,937 kgs.)	84,000 lbs. (38,102 kgs.)
High Lift	48,000 lbs. (21,773 kgs.)	60,000 lbs. (27,216 kgs.)	78,000 lbs. (35,381 kgs.)
SAE-Rated Bucket Capacity			
Standard	17 yd ³ (13.00 m ³)	22 yd ³ (16.82 m ³)	28 yd ³ (21.4 m ³)
High Lift	16 yd ³ (12.00 m ³)	20 yd ³ (15.29 m ³)	26 yd ³ (19.9 m ³)
Dump Heights			
Standard	18'-5" (5.61 m)	18'-10" (5.74 m)	21'-6" (6.55 m)
High Lift	19'-10" (6.04 m)	20'-0" (6.10 m)	23'-6" (7.16 m)



Arch of West Virginia, Inc.

In Kanawha County, for the total and complete transformation of the "Hicks Hollow Refuse Area" to a woodland and wildlife habitat for future post mining use. Seven sediment control facilities now contribute to the local waterfowl habitat with management directed to wetlands enhancement. A full range of wildlife species, including black bear, are presently thriving in this environment.



Director Uram, Frank Simmons, Dave DePasquale, Director Callaghan, Dave Long, Duane Stowers, Chairman Young.



Big Bear Mining Company, Inc.

In Wyoming County, for the complete and total reclamation of an underground mining complex in very steep and rugged terrain. An aesthetically pleasing slope and lush revegetation complement the surrounding forested topography.



Director Uram, Lloyd Adams, Director Callaghan, Inspector John Waggoner, Chairman Young.



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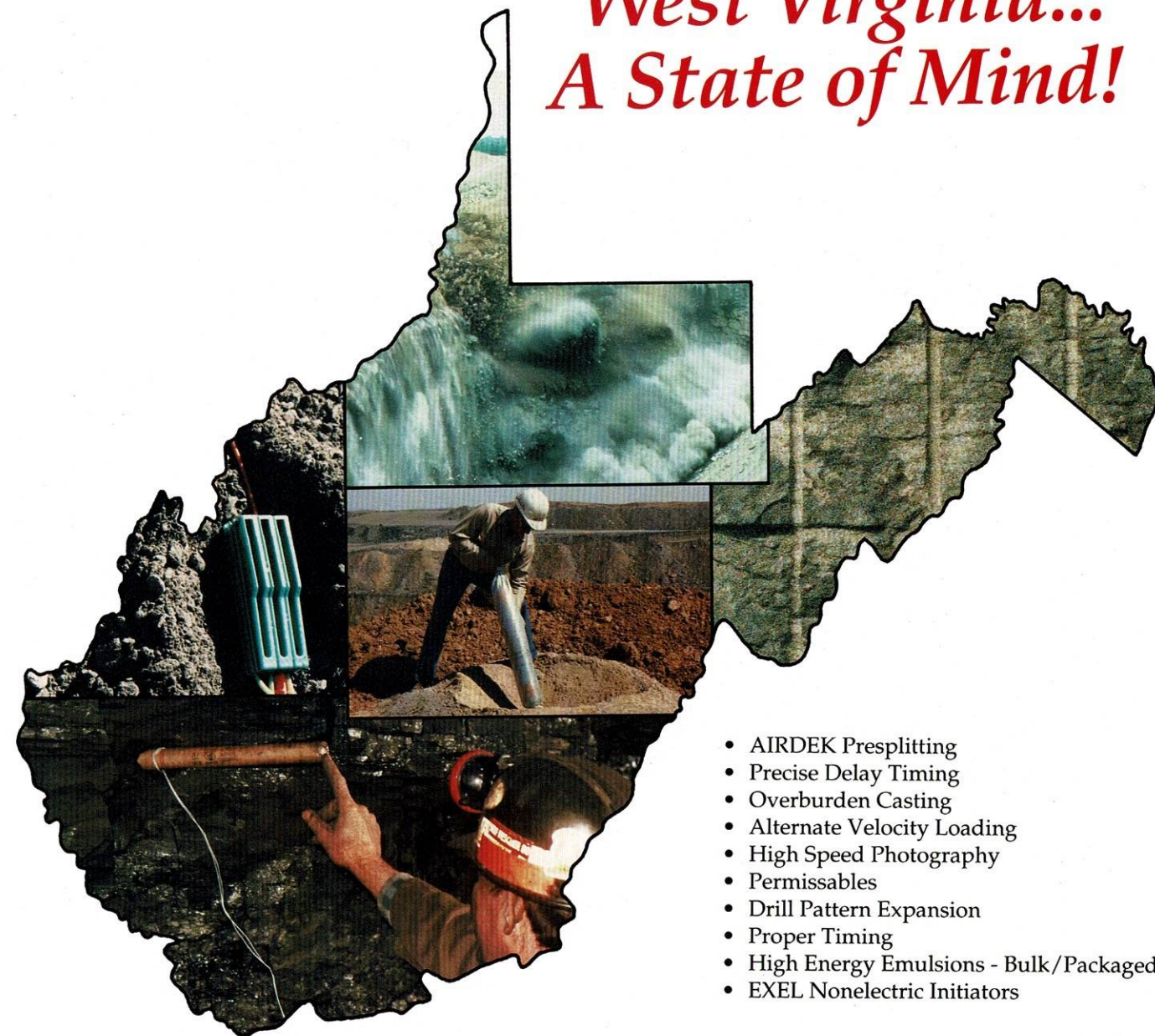
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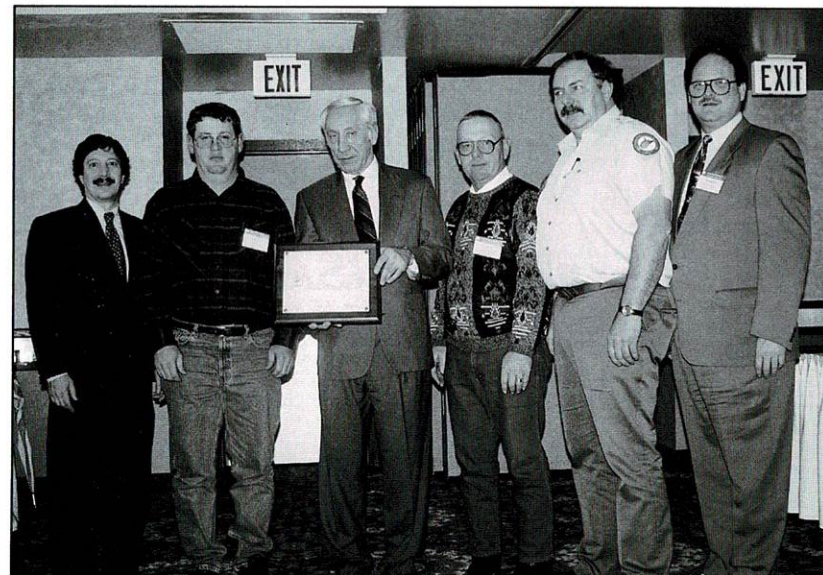


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C. J. Coal Corporation

In Upshur County, for excellence in contemporaneous reclamation in steep slope haulback mining. With less than 500 feet of open pit at any one time, this operation was kept current beyond any standard, while maintaining positive drainage control and excellent seasonal revegetation.



Director Uram, Jack Taylor, Director Callaghan, John Taylor, Inspector Joe Altieri, Chairman Young.



Cannelton Industries, Inc.

In Kanawha County, for innovative planning and execution of dragline remining to eliminate old highwalls, create usable, rolling terrain and provide more than 1000 acres of well stabilized and productive real estate for future use. The attention to regrading drainage control to complement natural topography is outstanding.



Director Uram, Chuck Kurzyna, Director Callaghan, Inspector Mark Foley, Kevin Whipkey, Chairman Young.



Coaltrain Corporation

In Preston County, for innovative and unique blending of overburden materials to eliminate an existing acid mine drainage source, creating nearly 100 acres of highly productive cropland while retaining four farm ponds with excellent post mining water quality, thus reestablishing a valuable local resource.



Director Uram, Glen Larew, Director Callaghan, Inspector Paul Dixon, Chairman Young.



Cumberland River Coal Company

In Mingo County, for the voluntary cleanup of an abandoned refuse area locally known as "Number Twenty-Six Fines Area," a principal source of black water runoff to Rockhouse Fork and Pigeon Creek. All refuse was covered with non-toxic material, proper drainage control has been reestablished and the total area revegetated in an exemplary manner.



Director Uram, Mike Rowlands, Gary Bennett, Director Callaghan, Rick Adams, Inspector Darrell O'Brien, Chairman Young.



Evergreen Mining Company

In Webster County, for outstanding planning, design and construction of a "state-of-the-art" 8800 foot long loadout facility, including a 10,000 ton storage silo. The conveyor system is aesthetically blended to complement the rural landscape, and the company has implemented a thorough maintenance program as a means of cooperation with the local community.



Director Uram, Inspector Keith Evans, Director Callaghan, Bill Young, Skip Roberts, Greg Honish, Chairman Young.





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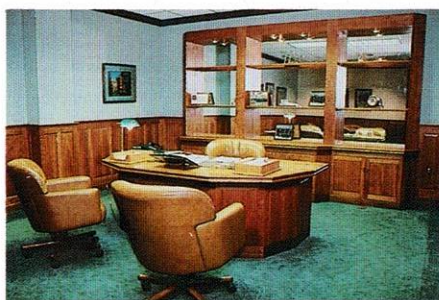


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High Power Energy



Standing - Director Uram, Greg Harper, Steve Chapman, Fred Miller, Director Callaghan, Inspector Bill Little, Chairman Young. Kneeling - Carl Mills, Charlie Singleton, Jim Singleton.

In Nicholas County, for the reclamation of "Area F," a long, steep and narrow ridge now returned to a pleasing plateau of concurrent contemporaneous reclamation. This multiple seam operation exhibits positive drainage control with sediment cell technology and a dense cover of grasses and legumes interplanted with special wildlife shrubs.



Juliana Mining Company, Inc.

In Webster County, for the successful installation of eight "doughnut refuse disposal cells," in conjunction with ongoing mountaintop removal operations. This unique design encapsulates the coal refuse with more than 40 feet of alkaline overburden surrounding each cell. Contemporaneous revegetation has assured an excellent cover and provides effluent discharge that meets or exceeds all water quality standards.



Director Uram, Doug Morris, Larry Grogg, Director Callaghan, Paul Goad, Chairman Young.

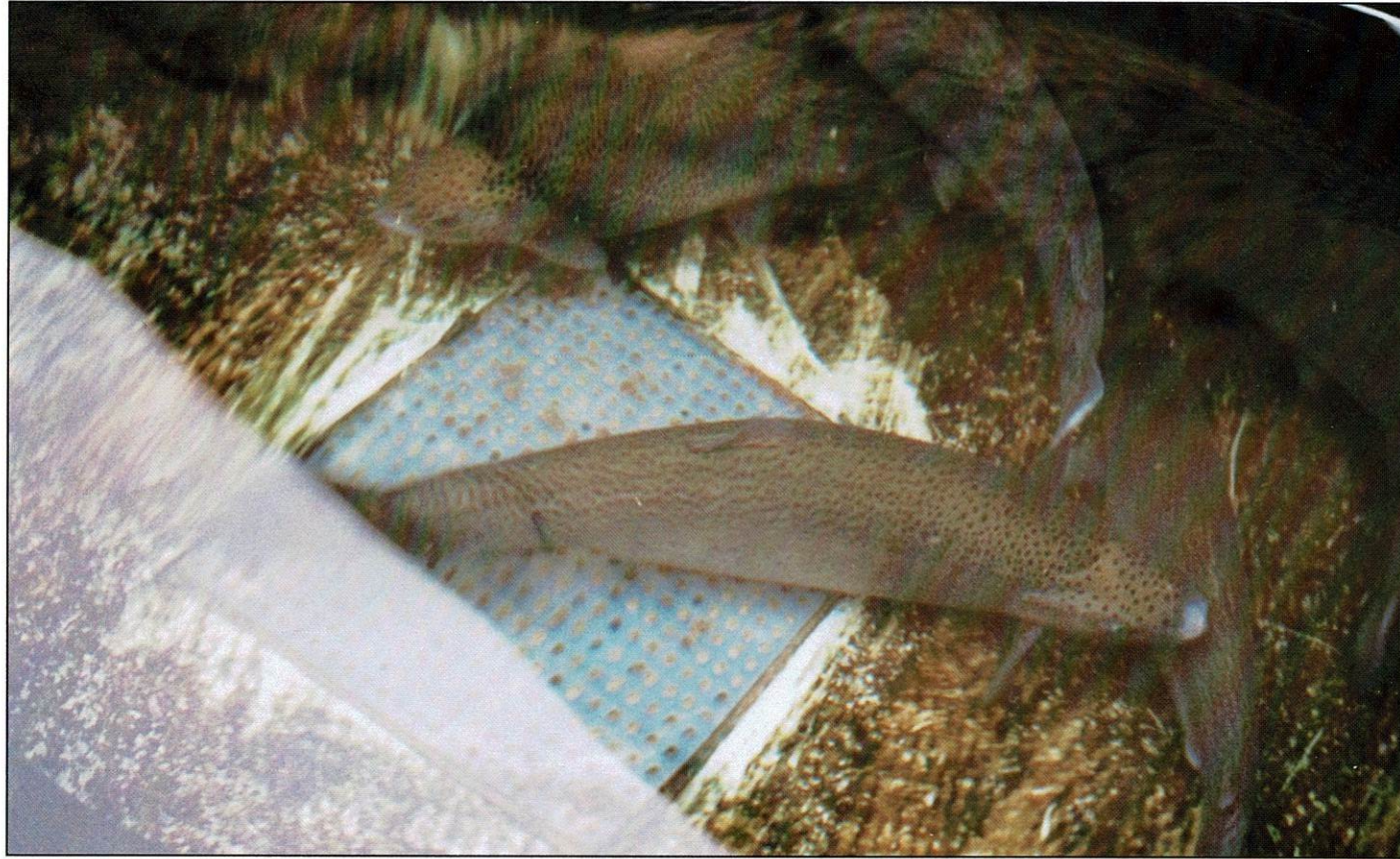


Mary Ruth Corporation

In Preston County, for the complete transformation of a rocky, thornbush covered hillside to excellent pasture land and a highly productive 40 acre meadow. All three large sediment control ponds remain in place, providing the landowner with ample water and a sizable fish population for future recreational enjoyment.



Inspector Paul Dixon, Milford Jenkins, Director Uram, Director Callaghan, Mike Jenkins, Chairman Young.



Meadow River Coal Company

In Fayette County, for innovative thinking and opportunism in utilizing an "underground mine discharge" to turn trout fingerlings into trophy size fish. Utilizing oxygen rich water at optimum constant temperature, this cooperative effort with the West Virginia Extension Service holds great promise for a new industry utilizing a previously neglected resource.



Director Uram, Ken Job, Bob Billups, Director Callaghan, Inspector Bill Hauer, Chairman Young.



Mepco, Inc.

In Monongalia County, for extraordinary materials handling and the utilization of fluidized bed ash as a soils amendment to create more than 40 acres of usable pasture. Originally marginal in use, this area is now covered with abundant forage, providing an aesthetically pleasing view from Interstate 79.



Director Uram, James Laurita, Jr, George Charnoplosky, Director Callaghan, Inspector Roger Henry, Chairman Young.



Peabody Coal Company
Black Diamond Construction, Inc. - Contractor

In Raleigh County, for meticulous attention to regrading detail in completing a durable rockfill and attendant drainage control structure for the "Pettry Fork" operation. After several years of inactivity, this area now exceeds reclamation performance standards with future land use superior to that prior to mining.



Director Uram, Inspector Jerry Stover, Contractor Bill Casto, Bobby Burton, Director Callaghan, Ron Hull, Chairman Young.



Pen Coal Corporation

In Wayne, Lincoln and Mingo counties, for the complete transformation of more than 800 acres of surface mining lands to excellence in wildlife and wetlands diversity. Mature grass and legume cover interplanted with shrubs and trees provide food, cover and shelter with five ponds and several miles of wetland sediment ditches benefiting aquatic needs. A truly outstanding area.



Standing - Director Uram, Robert Marsh, Randy Maggard, Director Callaghan, Chairman Young. Kneeling - Bryan Petrosky, Inspector Scott Eggerud



Pioneer Fuel Corporation

In Wyoming County, for the innovative design and concurrent operation of a refuse disposal area. This active operation is highlighted by concrete ditches and lush revegetation to create a pleasing vista from State Route 85.



Director Uram, Inspector Steve Sizemore, Randy Hansford, Curtis Weittenhiller, Director Callaghan, Chairman Young.



Rawl Sales & Processing Company

In Mingo County, for the wisdom and foresight to construct a multi-million dollar bridge spanning the Tug Fork River, which eliminated more than 15 miles of local hazardous travel. More than 20 government agencies in both West Virginia and Kentucky cooperated to approve the project. In addition, a well equipped playground now benefits the community of Sprigg, demonstrating the highest level of corporate responsibility.



Standing - Director Uram, Inspector Tim Justice, Director Callaghan, Jim Gay, Chairman Young. Kneeling - Dwayne Francisco, Jim Mullins.



Split Fork Mining Company, Inc.

In McDowell County, for excellent attention to detail in a multiple seam mining operation, demonstrating contemporaneous reclamation of three durable rock fills and all overburden areas. A managed yellow poplar timber forest is being established to provide a positive benefit to the local landowners.



Inspector Bill Thomason, Gary Bowen, Director Uram, Director Callaghan, Chairman Young.



Walter Green, Inc.

In Preston County, for outstanding design and construction of a drainage system and subsequent maintenance of the same on the waters of environmentally sensitive Big Sandy Creek. Special attention to regrading drainage control has effectively prevented any post mining erosion. This excellent area now provides more than 42 acres of highly productive hay and forage for the local landowner.



Joseph Green, Director Uram, Director Callaghan, Chairman Young.



AML SOUTH AWARD

Pioneer Construction Company

In McDowell County, for the steep slope restoration of the Kimball Refuse Pile, and the simultaneous preservation of the water supply for the town of Kimball, and in Mercer County, for the successful effort in extinguishing the Red Hollow Burning Refuse Pile, involving more than 1.5 million cubic yards of material covering 65 acres.



Director Uram, Harlis Mitchell, Ann Wardwell, Director Callaghan, Jay Wardwell, DEP Supervisor Claude Straight, Chairman Young.



AML NORTH AWARD

Grafton Coal Company

In Randolph County, for the timely and efficient completion of the Weaver Highwall Project, in which the company sealed several abandoned underground mine openings, eliminated thousands of feet of highwall and constructed two wetland areas to eliminate acid mine drainage.



Standing - Director Uram, Larry Bush, Inspector David Smith, George Hefner, Director Callaghan, Chairman Young. Kneeling - Mike Townsend, Jerry Righman.

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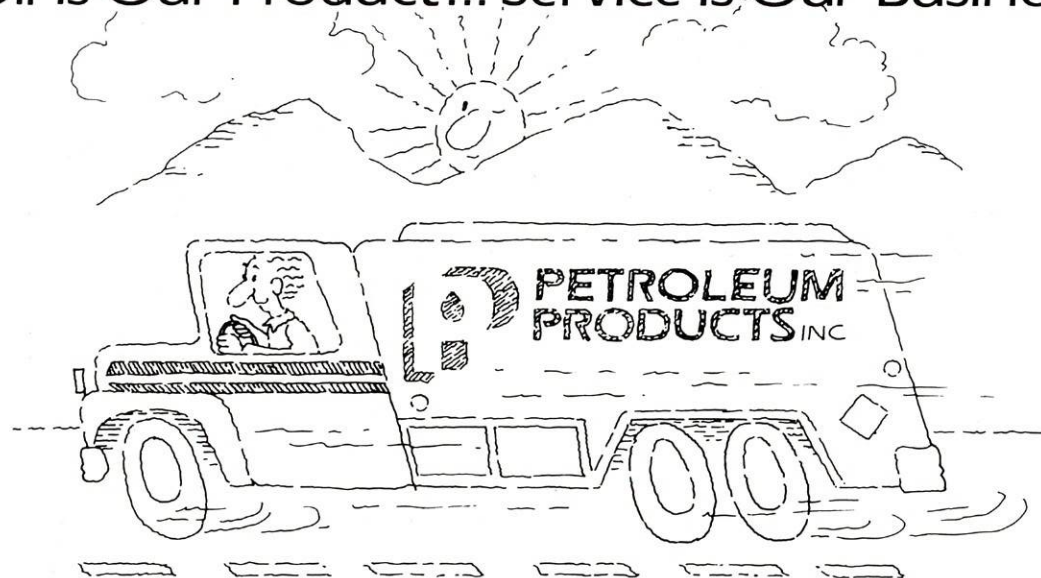
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Acid Mine Drainage

Jeff Skousen
West Virginia University

Formation

Acid mine drainage (AMD) forms when sulfide minerals in rocks are exposed to oxidizing conditions. Much of the AMD worldwide is commonly thought to be associated solely with coal mining but AMD is also a large problem where sulfides in geologic materials are exposed in highway construction, metal mines, and other deep excavations. There are many types of sulfide minerals. Iron sulfides common in coal regions are predominately pyrite and marcasite (FeS_2), but other metals may be complexed with sulfides (Table 1). These other metal sulfides cause AMD where copper, lead, nickel, and zinc are mined.

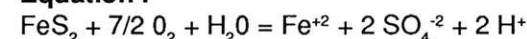
Table 1. Some important metal sulfides which form sulfuric acid upon exposure to oxidizing conditions.

FeS_2	-	pyrite
FeS_2	-	marcasite
Fe_3S_4	-	pyrrhotite
Cu_2S	-	chalcocite
CuS	-	covellite
CuFeS_2	-	chalcopyrite
MoS_2	-	molybdenite
NiS	-	millerite
PbS	-	galena
ZnS	-	sphalerite

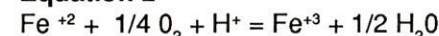
Upon exposure to oxidizing conditions, the sulfide minerals oxidize in the presence of water and oxygen to form highly acidic, sulfate-rich drainage. Metal composition depends on the type of sulfide mineral oxidized, and concentrations in AMD depend on the amount present. In the Appalachian coal fields, the oxidation of iron disulfides and subsequent conversion to acidity occur through several reactions.

The following four chemical equations explain the processes.

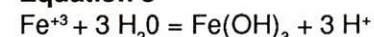
Equation 1



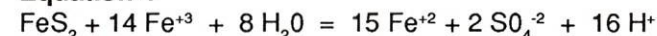
Equation 2



Equation 3



Equation 4



In equation 1, iron disulfide is oxidized thereby releasing ferrous iron (the reduced form of iron), sulfate, and acidity. Ferrous iron in equation 2 can be oxidized to form ferric iron. Ferric iron can then either be hydrolyzed and form ferric hydroxide and acidity (equation 3), or it can directly attack pyrite and act as an oxidant in generating much greater amounts of ferrous iron, sulfate, and acidity (equation 4).

If any of the processes represented by the equations were slowed or altogether stopped, the generation of AMD would also slow or cease. Removal of air and/or water from the system, two of the three principal reactants, would stop pyrite from oxidizing. This occurs in nature. When pyrite is found in geologic materials beneath the water table where oxidizing conditions are limited, the pyrite remains unreacted. Only very small amounts of pyrite are oxidized through natural weathering thereby generating only small amounts of acidity. This small amount of acid is naturally diluted or neutralized by surrounding rocks so that it is not seen or noticed. However, when large volumes of pyritic material are exposed to oxidizing conditions, which occurs in mining or other disturbances, the pyrite reacts and water moves the reaction products (iron, sulfate, and acidity) into underground and surface water sources.

Equation 2 is known to be the rate-limiting step because ferrous iron conversion to ferric iron is rather slow under abiotic (or strictly chemical) conditions. But iron-oxidizing bacteria, namely *Thiobacillus ferrooxidans*, greatly enhance and accelerate iron oxidation which, in turn, greatly speeds acid generation (Waksman 1922). Under these biotic conditions, acid generation is increased up to a million times (Leathen et al. 1953).

Forms of Sulfur in Rock

Coal is a sedimentary rock formed by the accumulation, alteration, and compaction of plant remains in a reducing environment like that found in swamps. The thick sequence of coal-bearing rocks in the Appalachian bituminous coal basin represents a slow accumulation of clay, silt, sand, and plant material throughout most of the Pennsylvanian geologic time period.

Sulfur in coal and coal-bearing rocks can occur as organic sulfur, sulfate sulfur, and pyritic sulfur. Some sulfur appears to have been introduced into the coal seam after the peat had been converted to coal, as is evidenced by pyrite coatings on vertical fracture surfaces, in the seam. Much of the pyrite present in coal-bearing rocks and overburdens occurs as very small crystalline grains intimately mixed with the organic constituents of coal. Pyrite may also be disseminated in nearby layers of sandstone and shale (Temple and Koehler 1954). The origin of sulfur in large concretions, nodules, lenses, bands, and fillings in porous fusain layers of coal, is less well understood (U.S. Geological Survey 1968). But the relation between high sulfur content of coals deposited in a marine environment and associated strata immediately overlying the coals strongly suggests that seawater was the source of much of the sulfur found in coal.

Organic sulfur is believed to be complexed and combined with organic constituents of coal and organically bound within the coal. This form is only found in appreciable quantities in coal beds and in other carbonaceous rocks. Generally, the organic sulfur component is not chemically reactive and has little to no effect on acid-producing potential. The organic sulfur content of coal and other organic soils can be as high as 0.5% (w:w basis).

Sulfate sulfur is usually found in minor quantities in fresh coal and associated rocks, and is commonly the result of weathering and recent oxidation of sulfide sulfur. Sulfate is a reaction product of pyrite oxidation and therefore is not an acid producer.

Pyritic or sulfide sulfur is the predominant sulfur species in the majority of coal and associated rocks and is the sulfur form of greatest concern. Of all the sulfide minerals that may be present, iron disulfides predominate and are the major acid-producers. Accordingly, the maximum potential acidity (MPA) of an overburden sample correlates closely with the pyritic sulfur content. Studies have shown that variations in total sulfur contents of overburdens reflect similar variations in pyritic sulfur content. Several types of pyritic sulfur are known, based on physical appearance. They are classed into six groups:

1. Primary massive
2. Plant replacement pyrite
3. Primary euhedral pyrite
4. Secondary cleat (joint) coats
5. Mossy pitted
6. Framboidal pyrite

Caruccio et al. (1988) provide an extensive review of the different forms, morphologies, and reactivity of pyritic materials.

The equations for pyrite oxidation show that a material containing 1% sulfur, all as pyrite, would yield upon complete reaction an amount of sulfuric acid that requires 31.25 tons of CaCO_3 to neutralize 1000 tons of the material. When sulfur in the overburden rock or coal is exclusively pyrite, the total sulfur content of the rock accurately quantifies the acid-producing potential (if it were all to react). When organic and/or sulfate sulfur are present in significant amounts, total sulfur measurements overestimate the amount of acid that will be formed upon oxidation. Therefore, removal of sulfates and organic sulfur naturally present in some overburdens or resulting from significant weathering of pyritic materials may be necessary to increase accuracy in predicting the acid-producing potential of materials containing mixed sulfur species.

The rate of pyrite oxidation depends on numerous variables such as reactive surface area of pyrite (Singer and Stumm 1968), form of pyritic sulfur (Caruccio et al. 1988), oxygen concentrations (Smith and Shumate 1970), solution pH (Smith and Shumate 1970), catalytic agents (Caruccio et al. 1988), flushing frequencies (Caruccio et al. 1988), and the presence of *Thiobacillus* bacteria (U.S. Environmental Protection Agency 1971). The possibility of identifying and quantifying the effects of these and other controlling factors with all the various rock types in a field setting is unlikely. Further, precise knowledge regarding the oxidation rates is not needed for most real world situations when the acid-producing potential has been accurately measured from total sulfur (Smith and Sobek 1978).

Alkalinity in Rocks

The natural base content of overburden materials (alkali and alkaline earth cations, commonly present as carbonates or exchangeable cations on clays) is important in evaluating the future chemical producing potential of the materials. The amount of alkaline material in unweathered overburden may be sufficient to equal or overwhelm the acid-producing potential of the material. Of the many types of alkaline compounds present in rocks, carbonates are the only alkaline compounds which occur in sufficient quantities to be considered as effective deterrents to AMD generation.

In overburden containing alkaline and pyritic material, the alkaline material may be sufficient to neutralize the acid formed from pyrite. Higher alkalinities also help control bacteria and restrict ferric iron activity which are both known to accelerate acid generation. A balance of the acid-producing potential and neutralizing capacity of an overburden sample will indicate the ultimate acidity or alkalinity that might be expected in the material upon complete weathering.

Acid Mine Drainage

Acid mine drainage (AMD) is an acidic, iron and sulfate containing water that forms under natural conditions when certain coal seams or other associated rocks containing pyrite are exposed to the atmosphere or oxidizing environments. The drainage quality emanating from underground mines or backfills of surface mines is dependent on the acid (pyrite) and alkaline (carbonate material) minerals contained in the disturbed geologic material. In general, sulfide-rich and carbonate-poor materials are expected to produce acidic drainage. In contrast, alkaline-rich materials, even with significant sulfide concentrations, often produce alkaline conditions in water.

Acidity in AMD is comprised of mineral acidity (iron, aluminum, manganese, and other metals depending on the specific metal sulfide) and hydrogen ion acidity. Other metals in AMD vary widely but most AMD is characterized by low pH, high sulfate and iron. As contaminated streams flow into larger streams or lakes, dilution occurs making the water less toxic. Also, natural chemical and biological reactions cause some neutralization of the acidity and precipitation of metals. Acidity is a measurement of the amount of base needed to neutralize a volume of water. In AMD, acidity can be from 50mg/l to 10,000 mg/l. In uncontaminated water or waters contaminated by "acid rain," water pH may be 3.5 to 4.5, but very little mineral acidity is present. The acidity in streams of West Virginia due to acid rain usually varies from 25 to 100 mg/l.

For AMD, acidity includes hydrogen ion concentration (low pH) but, more importantly, also includes mineral acidity which arises from the presence of dissolved iron, aluminum, and manganese in the water. In drainage from other types of surface or deep mining (metal mines), the water may contain significant amounts of zinc, copper, nickel, lead, etc. However, when dealing with AMD from coal mines in the eastern U.S., the use of pH, iron, aluminum, and manganese usually accounts for the majority of the acidity (Hedin et al. 1988).

As an example, acidity of coal mine drainage can be estimated by using metal concentrations in the following manner:

$$\text{Estimated Acidity} = 50 (2 \text{ Fe}^{+2}/56 + 3 \text{ Fe}^{+3}/56 + 3 \text{ Al}^{+3}/27 + 2 \text{ Mn}^{+2}/55 + 1000(10^{-\text{pH}}))$$

where acidity is expressed as mg/l CaCO_3 equivalent, all metal concentrations are in mg/l, and 50 transforms milliequivalents (meq) of acidity into mg/l CaCO_3 equivalent. For AMD with a pH < 4.5 (no alkalinity present), this equation predicts the actual titrated, laboratory-measured acidity of the water relatively accurately.

For example, a water sample was measured to have an acidity value of 410 mg/l with a pH of 3.1, ferrous iron (Fe^{+2}) content of 14, ferric iron (Fe^{+3}) content of 33, aluminum content of 47, and manganese content of 9. Substituting the ion concentrations into the equation above, the contributions of each ion to acidity are: hydrogen ion = 0.8, ferrous ion is 0.5, ferric ion is 1.77, aluminum is 5.22, and manganese is 0.33. These ions total 8.62. Multiplying by 50 gives 431 mg/l of acidity. This calculated value is close to the laboratory measured value of 410 mg/l. This equation is useful to check laboratory water quality data or to estimate acidity when only metal concentrations are known.

References

Caruccio, F.T., L.R. Hossner, and G. Geidel. 1988. Pyritic materials: acid drainage, soil acidity, and liming. p. 159-190. In *Reclamation of Surface-Mined Lands*. Vol 1. CRC Press, Inc. Boca Raton, FL.

Hedin, R.S., D.H. Dvorak, S.L. Gustafson, D.M. Hyman, P.E. McIntire, R.W. Nairn, R.C. Neupert, A.C. Woods, and H.M. Edenbom. 1991. Final Report: Use of a constructed wetland for the treatment of acid mine drainage at the Friendship Hill National Historic Site, Fayette County, Pennsylvania. U.S. Bureau of Mines, Pittsburgh, PA.

Leathen, W.W., S.A. Braley, and L.D. McIntyre. 1953. The role of bacteria in the formation of acid from certain sulfidic constituents associated with bituminous coal. *Applied Microbiology* 1: 61-68.

Singer, P.C., and W. Stumm. 1968. Kinetics of the oxidation of ferrous iron. p. 12-34. In *2nd Symp. on Coal Mine Drainage Research*. Bituminous Coal Research, Inc., Monroeville, PA.

Smith, E.E., and K.S. Shumate. 1970. Sulfide to sulfate reaction mechanism. *Water Pollution Control Res. Series 14010 FPS*. USDI, FWQA. Washington, D.C.

Smith, R.M., and A.A. Sobek. 1978. Physical and chemical properties of overburdens, spoils, wastes, and new soils. p. 149-172. In *Reclamation of Drastically Disturbed Lands*. American Society of Agronomy, Madison, WI.

Temple, K.L., and W.A. Koehler. 1954. Drainage from bituminous coal mines. *West Virginia University Bulletin. Engineering Experiment Station Research Bull. 25*, Morgantown, Wv.

U.S. Environmental Protection Agency. 1971. Inorganic sulfur oxidation by iron-oxidizing bacteria. *Water Pollution Control Res. Series 14010 DAY*. USDI, FWQA. Washington, D.C.

U.S. Geological Survey. 1968. Mineral resources of the Appalachian Region. *Geological Survey Professional Paper 580*. U.S. Govt. Printing Office. Washington, D.C.

Waksman, S.A. 1922. Microorganisms concerned in the oxidation of sulfur in the soil IV. A solid medium for the isolation and cultivation of *Thiobacillus thiooxidans*. *J. Bact.* 7:605-608.

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COAL CALENDAR

May

- 5-7 Annual Meeting, West Virginia Coal Association**, Marriott Hotel, Charleston, WV, contact Sandi Davison, WVCA, 1301 Laidley Tower, Charleston, WV 25301, (304) 342-4153, FAX 3427651.
- 10-12 International Coal Testing Conference**, Radisson Plaza Hotel, Lexington, KY, contact Tamra H. Broam, ICTC, P. O. Box 1970, Ashland, KY 41105, (606) 325-1970, FAX 325-2689.
- 11 City of Hope "Spirit of Life" Dinner, Honoring Ike Smith**, Marriott Hotel, Charleston, WV, contact Pete White, Acordia of West Virginia, P.O. Box 1551, Charleston, WV 25326, (304) 346-0611, FAX 346-0697.

June

- 7-9 16th Annual Eastern Mineral Law Institute**, Opryland Hotel and Conference Center, Nashville, TN, contact Eastern Mineral Law Institute, WVU Law Center, P.O. Box 6130, Morgantown, WV 26506, (304) 293-2470, FAX 293-7654.
- 19-21 1995 National Mineral Education Conference**, Regal Riverfront Inn, St. Louis, MO, contact Contact Carolyn Bert, Arch of Illinois, P. O. Box 308, Percy, IL 62272, (618) 497-2141, FAX 497-8001.

July

- 10-12 Short Course, Underground Coal Mine Belt System Design**, COMER Bldg., WVU Evansdale Campus, Morgantown, WV, contact Sherry Strahin, WVU, Department of Mining Engineering, P.O. Box 6070, Morgantown, WV 26506, (304) 293-7680, FAX 293-5708.

August

- 1-3 14th International Conference on Ground Control in Mining**, Lakeview Resort & Congerence Center, Morgantown, WV, contact Sherry Strahin, WVU Department of Mining Engineering, P.O. Box 6070, Morgantown, WV 26506, (304) 293-7680.
- 3-6 WVMRA Annual Meeting**, The Greenbrier, White Sulphur Springs, WV, contact Patty Bruce, WVMRA, 1624 Kanawha Blvd. E, Charleston, WV 25311, (304) 346-5318, FAX 2346-5310.
- 13-16 Training Resources Applied to Mining (TRAM)**, Ogleby Park Wilson Lodge, Wheeling, WV, contact College of Mineral & Energy Resources, WVU, P.O. Box 6070, Morgantown, WV 26505, (304) 293-4211.
- 14-16 Short Course, Recent Developments in Mining Technology**, COMER Bldg., WVU Evansdale Campus, Morgantown, WV, contact Sherry Strahin, WVU Department of Mining Engineering, P.O. Box 6070, Morgantown, WV 26506, (304) 293-7680.

September

- 13-15 Bluefield Coal Show**, Brushfork Armory-Civic Center, Bluefield, WV, contact Greater Bluefield Chamber of Commerce, P.O. Box 4098, Bluefield, WV 24701, (304) 327-7184, FAX 325-3085.

October

- 2-6 Short Course, Engineer Exam Review in Mining/Mineral Engineering**, COMER Bldg., WVU - Evansdale Campus, Morgantown, WV, contact Sherry Strahin, WVU Department of Mining Engineering, P.O. Box 6070, Morgantown, WV 26506, (304) 293-7680, FAX 293-5708.



Association Notebook

Mountain State Coal Classic enjoys success in Beckley

The 6th edition of the industry sponsored Mountain State Coal Classic enjoyed a successful debut in Beckley in January, with over 12,000 coalfield basketball fans packing the Raleigh County Armory to witness the 13-game, four-day event.

Event Chairman Jim Justice of Bluestone Coal Co. went all out and, thanks to an outstanding response from members of WVMRA and the West Virginia Coal Association, his efforts were rewarded.

The week got off to a great start with a pre-tournament banquet in the Armory. The featured speaker was former West Virginia University All-American and Los Angeles Laker "Hot Rod" Hundley. Hundley regaled a near capacity crowd of players, coaches and fans with his repertoire of basketball anecdotes from his playing days and his later career as a broadcaster for the Utah Jazz.

City of Hope honors Ike Smith

I. N. "Ike" Smith, United National Bank President and long-time Association member, will be honored by the "Spirit of Life" Award by the West Virginia Executive Council for the City of Hope National Medical Center & Beckman Research Institute.

Ike's award will be presented at a black tie dinner in his honor, Thursday, May 11, at the Marriott Hotel in Charleston. The proceeds from this event will fund the "I. N. 'Ike' Smith Research Fellowship in Alzheimer's Disease" at the City of Hope in Duarte, CA.

Members who wish to purchase tickets, or otherwise contribute to this worthy cause should contact General Campaign Chairman Pete White, Acordia of West Virginia, (304) 346-0611.

For program advertising, contact Program Manager Charlie Morton at Morton Specialty Insurance Partners, Ltd., (304) 345-1070.

1996 Semi-Annual Meeting

Meeting in Aruba, the Board of Directors voted to convene next year's Semi-Annual Meeting at Marriott's Desert Springs Hotel in Palm Desert, CA, the site of the 1994 gathering. Tentative dates for the event are January 30 - February 4, 1996.

The tournament got underway on Wednesday, with competition in high school AAA, AA and A classes, as well as a college matchup between the College of West Virginia and the University of Charleston.

Competing High School teams from West Virginia included Marsh Fork, Van, Meadow Bridge, Mount Hope, Mullens, Shady Spring, Bluefield, Oceana, Mt. View and Beckley Woodrow Wilson. The AAA field was rounded out by Mt. Zion of Durham, NC and Scott County from Kentucky. The entire tournament was broadcast on radio station WTNJ.

For the record, Woodrow Wilson, Mullens and Marsh Fork won the AAA, AA and A titles, respectively.

More important were the "side benefits." A total of \$11,500 in scholarships was awarded to participating athletes and cheerleaders. A grant of \$5,000 was made to Park Junior High School for its computer lab. Scores of elementary students were showcased and rewarded.

All in all, it was a solid week of positives for the coal industry. This was the third and most successful year of sponsorship for WVMRA and the WVCA. The tournament will return to Beckley next year.

Coal Hall of Fame

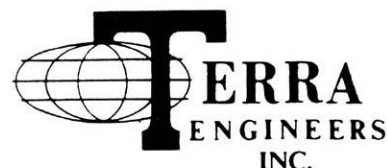
The Association Board of Directors has voted to join the West Virginia Coal Association and the West Virginia Coal Mining Institute in establishing a West Virginia Coal Hall of Fame. The induction ceremony for the first 30 individuals to be honored will be held in the fall, tentatively at the Annual Meeting of WVU's College of Mineral and Energy Resources Alumni Chapter at Lakeview Resort, October 27.

New members

Two companies were approved for membership during the Board of Directors' winter meeting earlier this month, both in the Associate Division.

Welcome to the following new members and their representatives:

Eaton Corp., Charlotte, NC, representative - Jeffrey L. Romig; **PACCAR Financial Corp.**, Horsham, PA, representative - Larry D. Ginsberg.



George A. Hall, Ph. D., P. E. • Ina S. Latimer, Jr., Geologist

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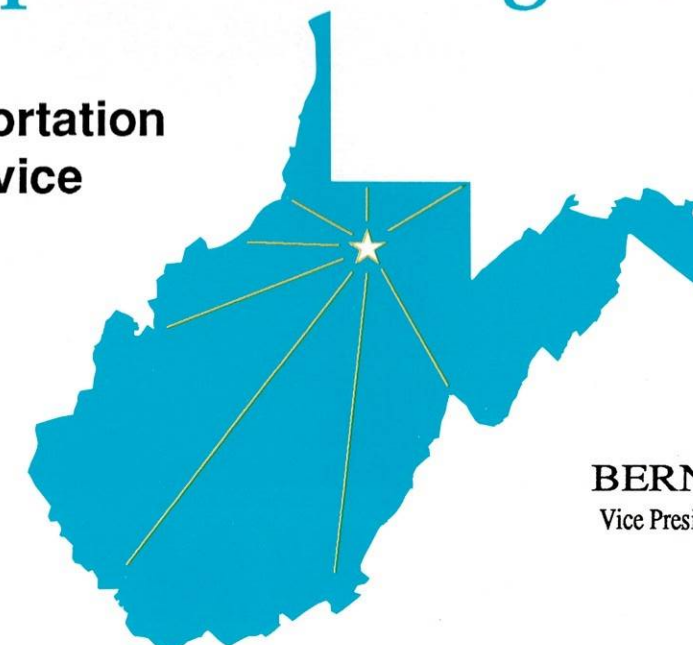
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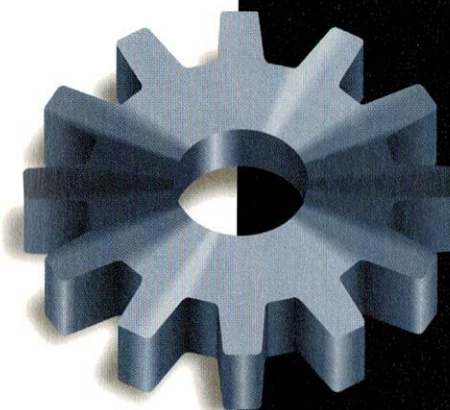
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