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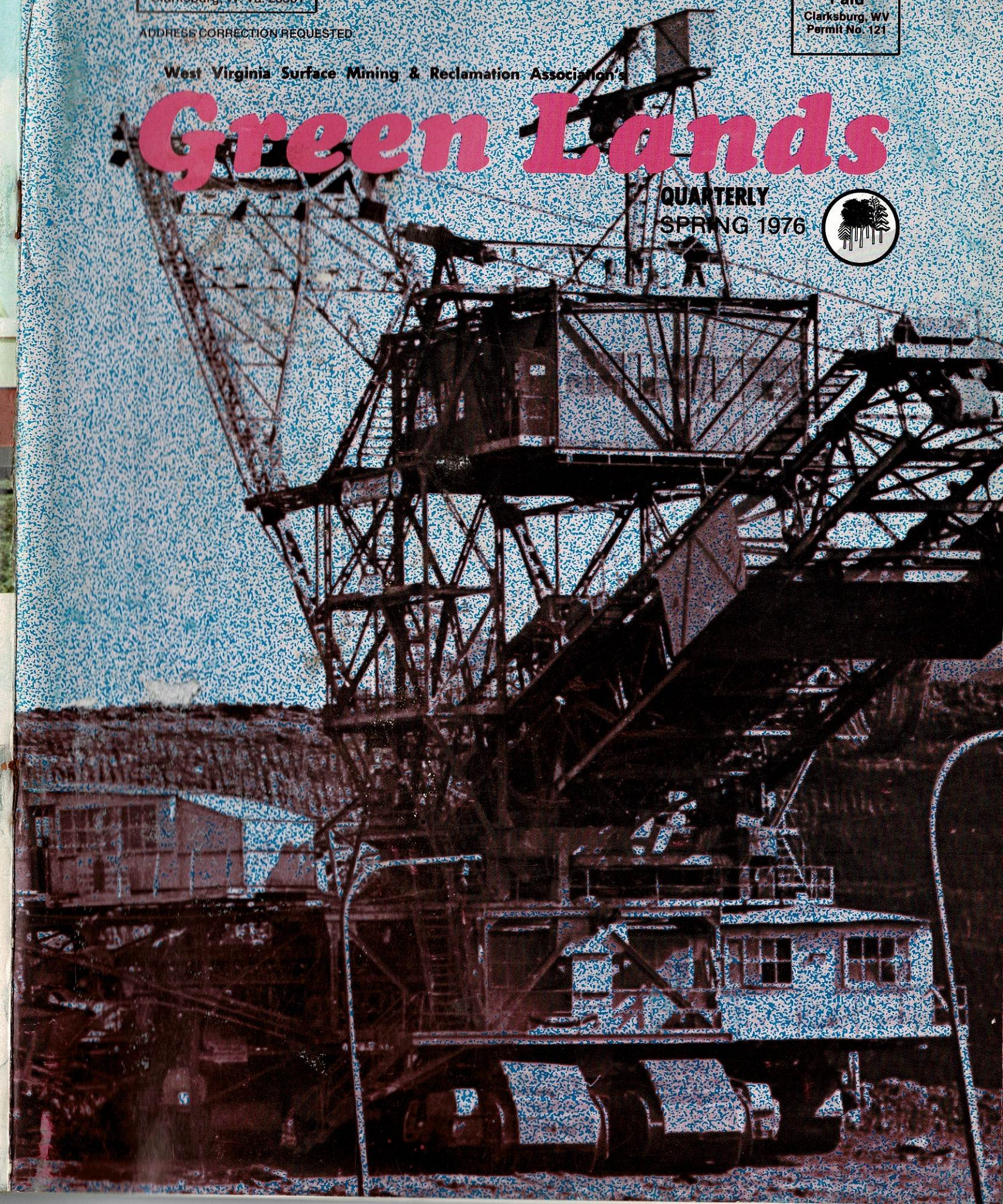

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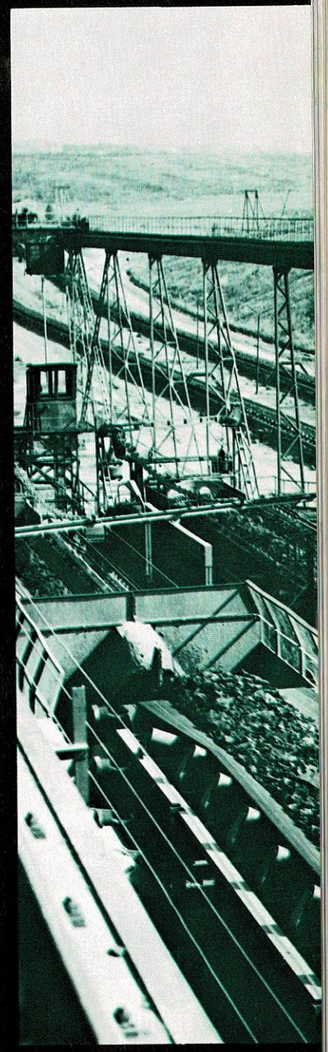
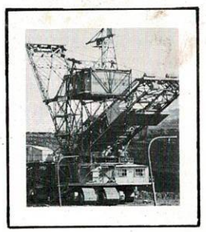
Contents





ABOUT THE COVER

Nearly one hundred coal industry representatives attended the second International Mining and Reclamation Conference in Warsaw, Poland, April 3-10, 1976. The insert section of Green Lands highlights this most successful conference through photos and reprints of papers given at the technical session.

Lawmakers Refuse Proposed Changes In State Surface Mining Law

A record 1600 bills were introduced during the 62nd session of the West Virginia Legislature, however surface mining escaped the potential wrath of the state's lawmakers. As many as fifty separate pieces of legislation were aimed directly or indirectly at the surface mining industry, but none had proved successful when the legislature adjourned in mid-March.

However, the lawmakers voted to reconvene following the primary election on May 14th, with two important bills remaining on the agenda. *HB-1065,* the UMWA's mine safety bill, was on the active calendar, amendment stage, when the legislature adjourned. The bill, which would have made sweeping changes in the state's mine safety law, was finally killed by the lawmakers after a marathon 10 hour debate on the final day of the extended session.

Also of extreme interest was *SB-177,* which would have prohibited surface mining within one mile of the centerline of the New River Gorge in southern West Virginia. The bill did not receive consideration during the May meeting.

All other bills of major concern to the surface mining industry were debated in a public hearing before the Senate Natural Resources Committee on February 26th. These bills included measures to totally abolish the industry, require return to the original contour, restricting mining in specified areas, strengthening the drainage requirements and adopting the provisions of the proposed federal bill into the state surface mining code.

Appearing first on behalf of the industry was WVSMRA President Ben E. Lusk, who decried the declining state of surface mining in West Virginia.

"Gentlemen, as we all know, the coal boom of 1974 is over. The market for West Virginia coal is at its lowest point in several years and relief is not yet in sight," he said. "Many surface mining operations are shut down or being cut back to two or three days per week simply because West Virginia coal cannot compete with coal from surrounding states."

Lusk blamed wildcat strikes, the Clean Air Act, federal and state safety standards and overzealous enforcement of West Virginia's tough surface mining law for the Mountain State's competitive disadvantage with other states.

He concluded, "The present law is fully adequate, it is being uniformly enforced and most important, it has satisfied the criteria set forth by the people and the legislature of West Virginia. We are not asking for more time to gauge if the current law is working—we know it is working. The record and achievement of the industry in recent years prove the law has been successful. We are nearing the delicate balance of continued surface mine production and environmental protection. Unnecessary revisions of current law at this time will only hinder us from reaching that goal."

Technical Services Director John Sturm appeared next, outlining detailed objections to the proposed legislation. Sturm told the committee that with few exceptions, the proposed changes would not benefit our reclamation methods or environmental protection.

Sturm's testimony centered around objections to *SB-347,* which would have required return to the approximate original contour on all surface mined areas.

He said, "First of all, it is important to note that there is a great deal of difference between the terminology highwall elimination and regrading to the approximate original contour. The basic concept of legislation to achieve this goal is admirable, but in reality, to require this in every case would be unsound from both a technical and environmental standpoint," Sturm said.

He explained the geologic and hydrologic conditions in many areas of West Virginia dictate that such requirements would be detrimental to the overall reclamation program. Contour regrading on steep slopes will increase the erosion hazard, leading to offsite damage through sedimentation.

Sturm also critized the bill because it would eliminate the level bench area, which has proven a great benefit to landowners throughout the state.

"After mining, in many cases, the landowner has been able to add vast acreages of level productive land, which is being utilized as pasture, building sites, water retention and other farm uses," according to Sturm.

Sturm also strongly opposed the New River Gorge bill saying, "It would eliminate surface mining in an area two miles wide, approximately 100 miles long through some of the highest quality coal reserves in the world." He explained that under present law, the Director of the Department of Natural Resources has full authority to prohibit mining in such areas, therefore legislation is not necessary.

Also speaking for the WVSMRA was Dick Walker of C. I. Walker Machinery, who revealed the depressed nature of the coal industry from a supplier's standpoint. David Batson, executive director of the Ruffed Grouse Society of North America, surprised the committee when he revealed that surface mining had been a great benefit to wildlife in many areas and that his organization opposed further curtailment of the industry.

"Surface mining could very well be the answer to our dwindling wildlife habitate problems," Batson said. "The majority of our wildlife are dependent upon periodic disturbance in their habitate which sets back forest succession."

Of course, consideration of the mine safety bill was of the utmost importance and consisted of several meetings and many long hours of debate between union and industry representatives. After passing the House of Delegate unanimously the bill was sent to the Senate Mines Committee for consideration late in the session. At the public hearing on March 8th, industry representatives argued that the bill overlapped many federal requirements, the union was trying to renegociate the 1974 contract and that it was impractical and too costly. Association Health and Safety Committee Chairman Ted Hillman testified on behalf of the surface mining industry.

In the final days of the session, under heavy pressure from the UMWA the Mines Committee took the bill up for consideration, amended it on two different occasions, then passed it on to the full Senate. Following several heated debates on the Senate floor on the final day of the session, the bill remained unacted upon when the lawmakers adjourned following the regular session. During the extended session the Mines and Mining Committee met again and decided to submit one large amendment containing 26 points that had been agreed upon between sessions. The amendment excluded 12 additional points considered a high priority by the U.M.W. The motion passed in the Senate after hours of debate and discussion and was sent on for approval in the House, which had passed the bill earlier.

However, in a surprise move the House rejected the Senate's version at the request of U.M.W. officials and also refused even to name a conference committee to seek a compromise. In view of these developments, the Senate had no other alternative but to adjourn, with the bill officially killed.

Testimony by
Ben E. Lusk, President
West Virginia Surface Mining and Reclamation Association
and
Ted Hillman, Chairman
Health and Safety Committee

Mr. Chairman, members of the committee, my name is Ben E. Lusk, President of the West Virginia Surface Mining and Reclamation Association, which represents over 250 companies involved directly and indirectly in surface coal mining in West Virginia. I am also a member of the Board of Miner Training, Education and Certification, which was established by the legislature a year and one half ago. The Board has developed and initiated an 80-hour pre-employment training program for underground coal miners. The 40-hour program for surface miners will be completed later this year.

I am here today in support of safety in our coal mines, because we are, of course, concerned with the welfare of our employees and secondly, a safe mine is an efficient productive mine. Safety is efficiency, in so much as a proper program defines the obstacles or hazards and either eliminates them or develops procedures to control them. In other words, a good safety program eliminates those things that interrupt the smooth flow of men, materials and machines.

Unfortunately, the bill before this committee, like earlier proposals, will do little to enhance safety in our coal mines. Moreover, we fear it was specifically designed to enhance the union's position on matters it did not win at the bargaining table in 1974.

For years, the industry has preached the negative impact of continually changing laws that duplicate the efforts of both state and federal government. Too often, laws are passed simply for the sake of passing laws, with the coal industry suffering the consequences.

I do not need to repeat to this committee the deteriorating state of coal production in West Virginia. You have heard the statistics of declining productivity for the past five years. Let me just remind you that we are mining approximately 40 million tons a year less now than we were mining in 1970.

Representing companies that are involved in both underground and surface mining, we find particular objection to committee substitute for HB-1065. The West Virginia Coal Association has adequately discussed problems from the deep mine standpoint. We will now discuss some specific points of concern. However, I would ask this committee to keep several important points in mind. First of all, the past safety record of surface coal mining dictates that present regulations are fully adequate. Secondly, measures that provide safety underground do not necessarily improve safety on surface mines. In other words, surface mining must be separated from deep mining when safety matters are being considered. Thirdly, we feel the legislature is not the proper arena for the union to try to renegotiate the present contract. And finally, if coal mining is to expand to realize its full energy potential, we must guard against passage of legislation that is designed to harass the industry rather than fairly regulate it.

Reclamation Enhances Production For DLM Coal Company

Frank Madison serves on the Board of Directors of DLM's parent company, the General Energy Corporation.

"Production and reclamation go hand in hand," according to Frank Madison, chairman of the board of DLM Coal Company.

Madison is quick to point to his 1975 production statistics as proof. In 1975 DLM worked three permits, on approximately 160 acres, yielding the largest production total ever for DLM and making them the leading coal producer in Upshur County.

Madison stated, "Our reclamation efforts often exceed state and federal rules and regulations because we spend whatever is necessary to do an excellent job reclaiming the property owners land." He added that DLM has found it easier to acquire additional leases in the surrounding area because local residents are familiar with the quality of work they have done in the past. "Last year alone, we planted over 50,000 pine trees which was approximately 17,000 more than was required by our permit specifications.

Madison first came to West Virginia in May 1974. A graduate of Case Western Reserve, he has been manager of a major oil company, built a steel mill in Montera, Mexico, and an iron pellet plant in Lima, Peru. He also patented, designed and helped construct the world's largest downhill conveyor in 1959. He is presently on the board of directors of DLM's parent company, the General Energy Corporation.

His son, Jim, who is general manager, graduated from the Air Force Academy in 1970. He is a veteran of southeast Asia and has the distinction of being the youngest flight leader in Europe. After finishing his tour of duty he came to West Virginia.

An important phase of Madison's production-reclamation philosophy is haulroad maintenance. "Good roads have been the key to our success," he said. "You can ruin a lot of equipment because of poor roads. We have 17 pieces of major equipment here to keep in operation."

Both Frank and Jim believe that the better the reclamation the higher degree of success for the overall operation. Good reclamation makes it easier to sell coal (According to Jim.) Jim added, "Most buyers are concerned with reclamation because they cannot afford to have a supplier producing one month and not the next because of poor reclamation practices. The Department of Natural Resources, which regulates the industry in West Virginia, has the full authority to shut down surface mine operations that are not in compliance with reclamation requirements.

Madison considers himself an environmentalist. "Just because I'm a coal operator doesn't mean that I'm not concerned about the environment," he said. "We're environmentalists because we want to be and not because of force."

To explain his point, Madison related his early experiences in Upshur County.

"When we first came here the people were complaining about the water in Panther Fork, blaming the problems on surface mining," he said. "But now the pH of the stream has been greatly improved because the water leaving our job is of a higher quality than the natural stream."

According to Madison, the stream is affected by several abandoned deep mines that are continually draining acid water into Panther Fork.

The Madison's concern for the industry doesn't stop with their own operation. They have been active members of the WVSMRA since they joined in December 1974, in addition to having 100 percent employee participation in the Association's special membership drive.

Working to stay current with reclamation, a dozer operator spreads topsoil over the outer slopes just behind the on-going mining operation.

Madison's operation is located near Alton, West Virginia, in Upshur County, where he and his son Jim are well-known and respected for their outstanding reclamation efforts.

Madison's operation is presently working three active permits, involving 160 acres of land. Last year was the biggest production year for DLM, which also had the largest total production figure for Upshur County.

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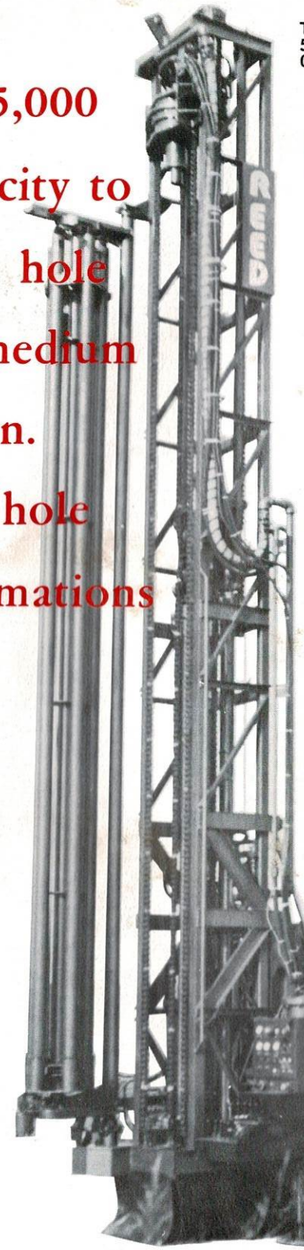

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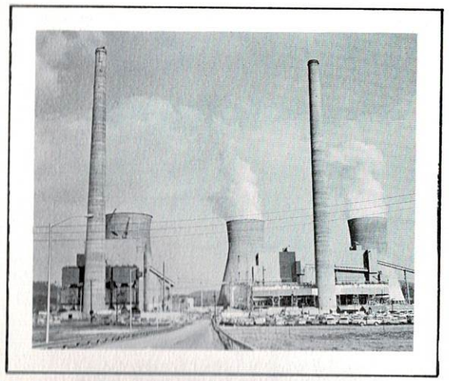
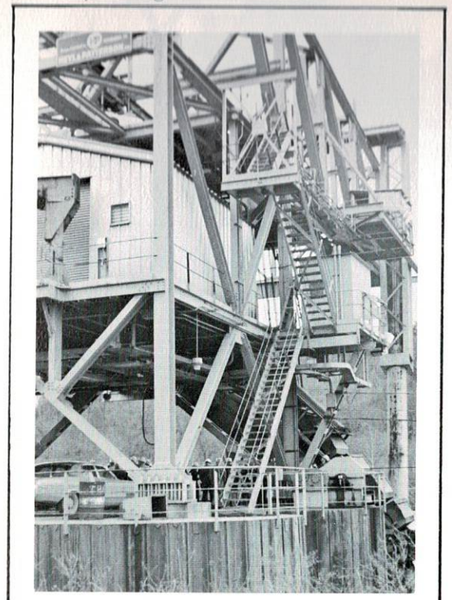


An overall view of the John Amos Electric Power Plant located on the Kanawha River near Winfield, West Virginia. The $600 million plant is one of the largest investor-owned generating plants in the world, in addition to being the state's leading coal consumer.

About one third of the 25,000 tons of coal John Amos burns a day arrives by river barge. This sophisticated equipment unloads a full barge in 25 minutes.



How many times have you picked up the newspaper and read that the electric company is trying to increase its rates again. If you can't understand why your rates are higher than they used to be, then you should visit the John Amos power plant near Winfield, West Virginia.

The Amos Plant is just one of the many like it owned directly by the Appalachian Power Company. The plant, which is located just twenty minutes from Charleston along the banks of the Kanawha River, generates power for southern West Virginia, parts of Ohio, Virginia and occasionally sends its surplus capacity as far away as Tennessee. Appalachian Power Company is only one of the seven operating companies that make up the American Electric Power System, which is the world's largest utility system.

It is virtually impossible to describe the plant's physical size, but it helps if you consider that it was built at a cost of over $600 million. The structure consists of three generating units with a combined generating capacity of 2,900,000 kilowatts; three boilers, two of which are 20 stories high and the other 25 stories; two 900 foot tall emission stacks; and three hyperbolic cooling towers. In addition, it boasts having the nation's highest voltage lines, carrying 765,000 volts. All of this contributes to making John Amos one of the largest investor-owned generating stations in the world.

Construction of the plant began in 1968, with the third and final generating unit completed in late 1973. The third unit is the largest of the three, producing 1,300,000 kilowatts. Its capacity is equal to three of Appalachian's existing power plants combined; Cabin Creek, Kanawha River near Charleston and Clinch River of Carto, Virginia.

Size isn't the only area in which John Amos is the leader. It is the state's leading consumer of coal. The Amos Plant burns approximately 25,000 tons of coal per day or around 7.5 million tons per year and has the potential to store over 3.5 million tons of coal, or a 60 to 90 day supply. Two thirds of the plant's coal arrives by rail, one third by barge.

According to Plant Manager, Al Moore, seventy five percent of this coal is from West Virginia, twenty percent from Eastern Kentucky and the remaining portion comes from Virginia. Moore added that most of the West Virginia coal comes from the southern portion of the state, and approximately twenty percent is surface mined.

Tom Ingram, coal procurement supervisor for Appalachian Power, expressed disappointment that all of the coal his department purchases cannot come from West Virginia. Ingram said, "We would certainly like to have all our coal come from West Virginia. If we could purchase one hundred percent West Virginia coal we definitely would, but so far we have been unable to secure contracts from West Virginia operators."

Ingram explained that the Amos plant burns coal with a sulfur content of one percent or less. He said that when the plant was first built and put in operation the electrostatic precipitators serving the generating units removed 98.5 percent of particulate matter leaving the boiler furnace. Now, in order to comply with the stringent requirements of the Clean Air Act and rulings from the Environmental Protection Agency they now remove 99.7 percent of the particulate matter.

Not only did this mean that higher sulfur coal could not be used but it cost Appalachian $69 million dollars to meet the new requirements.

When asked about the price John Amos pays for its low sulfur coal Ingram replied, "John Amos is currently paying $18 a ton for its coal contracts ranging from one to 15 years. Spot orders are one month to one year in length," he said.

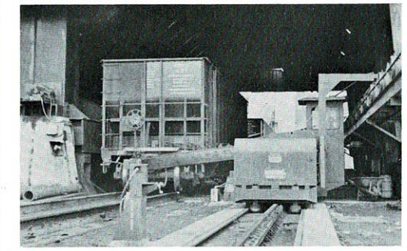
"Another thing I would like to add," Ingram continued, "is that some people seem to be concerned about our burning western coal at John Amos. At one time we did burn some western produced coal. This was done for test purposes only. We wanted to find out how the coal would burn in a plant similar to John Amos."

Ingram emphasized western coal would never be used in the Amos or any other Appalachian plant in West Virginia, but it would be used in American Electric's plants in Ohio and Illinois.

Of course there are numerous problems that arise in operating a plant of John Amos magnitude. Disposing of plant ash has been a growing problem for all coal-burning utilities. Dry bottom ash, boiler slag, and fly ash are all produced when coal is burned. But, John Amos has taken this liability and turned it into an asset. They have worked with the West Virginia Department of Highways, mixing boiler slag and asphalt to pave highways. This mixture has proven to be more durable than other blacktop materials and provides exceptional resistance to skidding.

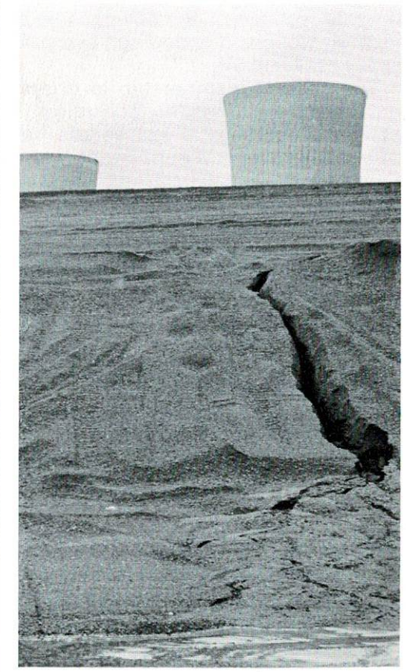
In addition, the ash can be made into bricks, concrete asphalt roofing shingles and various other products. Furthermore, it has been discovered that the fly ash contains several elements that are essential to plant growth and therefore has been used in the reclamation of some surface mined lands.

There are many additional points of interest within the awesome confines of an APC generating station, however several important factors stand out. These complex structures cost hundreds of millions of dollars to build, millions of dollars to maintain each year, and they are the largest single consumer of West Virginia coal.



The remaining two thirds of the coal arrives by rail. John Amos receives 250 rail cars a day. The car above can be pulled into the stall, unloaded, and sent down the track empty in only 45 seconds.

Part of 3.5 million tons of coal John Amos keeps stockpiled at their plant. Rising above the coal are the tops of the three hyperbolic cooling towers.



Special Membership Goal: 10,000

"Ten thousand special members to kick off the tenth anniversary of the West Virginia Surface Mining and Reclamation Association," is the goal the Association has set for the special membership drive it is currently conducting. According to WVSMRA president Ben Lusk, "We want to include and make active every individual who is involved directly or indirectly in the surface mine industry. Surface mining is especially important to our country's energy needs and there are thousands of people employed in our industry. By becoming active in our organization they are securing an interest in their future."

The additional membership will expand and strengthen the scope of the Association which is already the largest state trade organization of its kind. From its beginning in 1966 when it had only 10 members, the Association has grown and now represents over 250 companies involved in one way or another with the surface mining industry.

"This will not only prove to be a tremendous asset to the Association, but will greatly benefit every operator, employee, their wives and children, and anybody connected with this industry," said Mike Kennedy, chairman of the board of directors of the WVSMRA. Kennedy added, "The special membership will strengthen the Association's position within the legislature, the news media and the state. I sincerely hope and encourage everyone to become a part of the team effort."

The special membership is offered to all persons employed in the surface mine industry. The cost of membership is ten dollars per year. Each member will receive a subscription to *Green Lands Quarterly,* a WVSMRA license plate, a hard hat decal and a special membership certificate.

A brochure has been sent to all members to distribute to their employees and others sincerely interested in the future of the surface mining industry. Several Association members have already responded by purchasing a special membership for all of their employees.

"With a membership of ten thousand, this Association will effectively deal with the daily challenges we face in order to continue making this a stable and growing industry. I think it is important that everybody in the Association realize the strength in numbers," Lusk said. "Every member has a common bond and that is to effectively prohibit any act or event that would be detrimental to their livelihood. Industry wide cooperation in this drive will not only help ensure a secure future, but will give the Association recognition responsive to our needs," Lusk concluded.

Nine Companies Receive Reclamation Awards

The Annual Awards Banquet highlighted the Third Annual West Virginia Surface Mining Symposium, held January 14-15, at the Daniel Boone Hotel, Charleston. Sponsored by the West Virginia Surface Mining and Reclamation Association, the two-day meeting followed the theme "Expanding Technology to Meet Industry Needs."

Nearly 400 Association members, mining and reclamation personnel, legislators and members of the news media turned out for Wednesday evening's awards banquet. Featured at the banquet was the presentation of awards to nine state companies for outstanding achievement in mining and reclamation. Ira S. Latimer, Jr., director, Department of Natural Resources, made the presentation to the following companies:

— Bridgeport Mining Company, Clarksburg, "for outstanding cooperation with adjacent landowner and overall performance throughout surface mining activities;"
— Capitol Coals, Inc., Buckhannon, "for excellence in final reclamation with total elimination of the highwall;"
— Davis Trucking Company, Inc., Davis, "for displaying excellence of operation in abandoned and poorly reclaimed mining areas adjacent to Blackwater Falls State Park;"
— Dippel and Dippel Coal Company, Morgantown, "for outstanding cooperation with reclamation standards, which aid in blending mined areas with existing surroundings.
— Eagle Coal and Dock Company, Charleston, "for excellent valley fill construction and revegetation on extremely steep slopes;"
— Energy Development Corporation, Wharncliffe, "for outstanding development for lateral movement with small hollow fills on extremely steep slopes;"
— Piney Creek Coal Company, Beckley, "for outstanding performance in all phases of mining through the mountain-top removal method of surface mining;"
— Stanley Industries, Inc., Bridgeport, "for operating in an abandoned surface mined area and displaying excellent efforts in all facets of surface mining and reclamation;"
— Tamroy Mining, Inc., Mount Hope, "for total elimination of highwalls through re-mining of old areas and showing excellent haulroads and drainage maintenance and construction."

The technical portion of the symposium opened Wednesday morning with a presentation on western coal development by Robert Stiles, vice-president of Genge Environmental Consultants. Stiles explained a case study conducted on the Star Lake Mine in New Mexico, outlining the background, problems confronted, and the state and federal agencies involved. He also stressed the importance of coal production in the west during this time of national energy crisis.

Following this was a film presentation of the Dent's Run Clean-up project, by Don Caldwell of the Department of Natural Resources. Caldwell detailed the five years of planning that backed this major reclamation project, sponsored jointly by Consol, the Department of Natural Resources and the Environmental Protection Agency. The $2 million demonstration involved the clean-up of both land and water in 14-square-mile watershed located near Morgantown, West Virginia.

Summing up the success of the unique program, he noted, "This project represents one of the most comprehensive clean-up efforts ever attempted by the coal industry. It is an ideal example of what can be done with government-industry cooperation," he said.

In the afternoon session, Dr. Michael Zabetakis, acting superintendent of the National Mine Health and Safety Academy, discussed the progress of the new Academy, slated to open this April in Beckley. He noted that the curriculum offered would be divided into two categories: the basic or core courses and the advanced coal, metal and nonmetal courses. He concluded that in one year, the Academy would be able to handle 600 students, and facilities would include 175 two-person dormitory rooms, 14 classrooms, seven laboratories, an auditorium, cafeteria and gymnasium, as well as a swimming pool and playing fields. The construction of an above-ground simulated mine and a ventilation tunnel is also planned for the future.

Ted Hillman, chairman of the Association's Health and Safety Committee followed this with a presentation of the upcoming 40-hour training requirement program for surface miners. He explained that the program was still in the planning steps and would not be implemented until this summer.

The topic "Bureau of Mine Research and Development—Surface Mining and Reclamation was discussed next by William B. Schmidt, chief, Division Mining Research—Resources. He outlined current research on material handling, including continuous conveyor systems and the haulback method.

Wrapping up the afternoon session was a progress report on longwall stripping. William L. Piper, project engineer for WVSMRA, outlined progress on the Association's longwall stripping project located near Julian, Boone County. Longwall stripping, explained Piper, is a relatively new surface mining method that will minimize environmental disturbance by recovering shallow covered coal, utilizing a modified longwall system. Piper noted that the bench was recently opened and surface coal has been removed. He added that the longwall face was established and approximately 1,000 tons of coal has been run.

Thursday morning's session opened with a presentation by William T. Plass, principal plant ecologist for the U. S. Forest Service. Plass discussed the impact of surface mining on state watersheds. He recently concluded a case study of the changes in water chemistry on four experimental watersheds in southern West Virginia.

Next on the agenda was a presentation by Frank Glover, who summarized results of the statewide Interagency Evaluation of Surface Mining in the state last July. Glover is a state resource conservationalist with the Soil Conservation Service.

Concluding the program was a progress report on a second EPA grant now being conducted by the Association. John W. Sturm, director of technical services for the WVSMRA, explained this project, which determines the impact of haulback mining methods on steep slopes in southern West Virginia.

According to Association President Ben E. Lusk, this year's symposium was the largest in the past three years. "We are extremely pleased the Symposium has expanded so much in so little time," he said. "I was also glad that so many industry representatives and operating personnel were able to benefit from this year's outstanding presentations."

Don Caldwell, of the Department of Natural Resources, gave a film presentation of the Dent's Run Clean-up project. The $2 million demonstration involved the clean-up of both land and water in a 14-square mile area located near Morgantown, West Virginia.

Robert Stiles, vice-president of Genge Environmental Consultants, discussed the development of western coal production. Stiles explained a case study conducted on the Star Lake Mine in New Mexico, outlining the background, problems and state and federal agencies involved.

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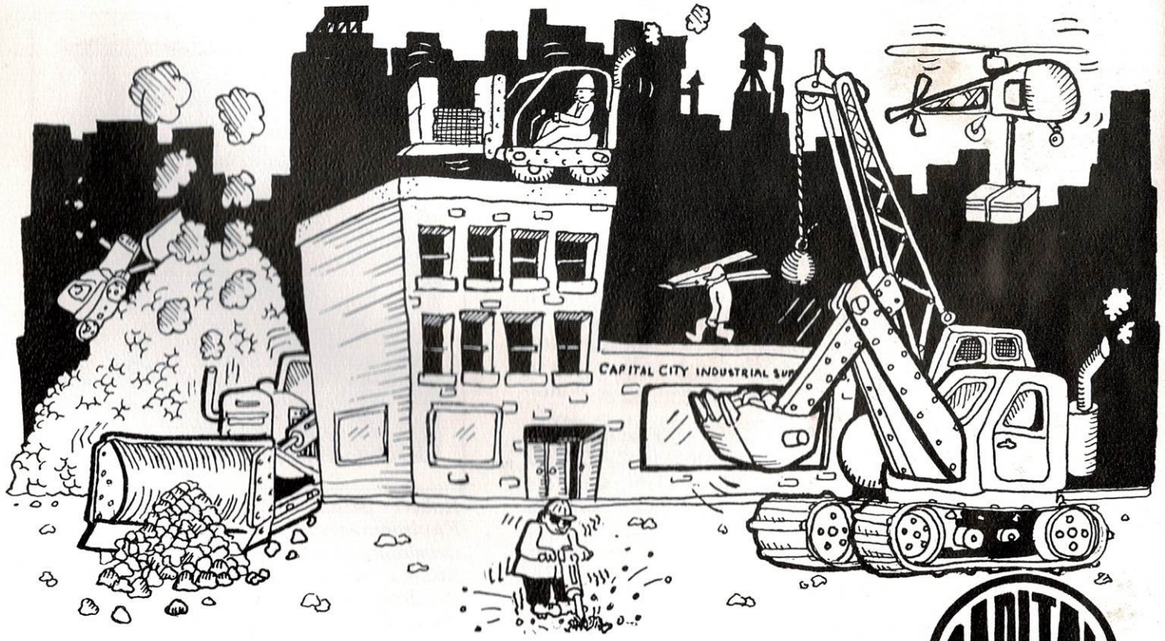

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"Serving the West Virginia Coal Industry for well over a half century"

The West Virginia Surface Mining and Reclamation Association

The West Virginia Surface Mining and Reclamation Association is the largest trade organization of its kind in the nation, representing over 250 companies and nearly 3,000 individual members involved directly or indirectly in the surface mining industry. The organization was formulated in 1966 for the purpose of initiating various research projects to help member companies comply with the state's stringent and rapidly changing reclamation laws.

Membership in the Association falls under three categories of General, Associate and Special. General membership consists of surface mining operators engaged in the production of coal. The Associate membership includes companies that do business or have an interest in the surface mining industry and special membership consists of individuals concerned with the future of mining and help with its continued progress.

The Association has grown considerably since its inception nearly 10 years ago. The original two-member staff has grown to include 24 people, and is headed by Ben E. Lusk, who serves as president, and Daniel R. Gerkin, vice-president. Both men joined the staff in 1971 and are responsible for initiating and coordinating all activities, which are governed by the officers and a 21 member Board of Directors. H. L. "Mike" Kennedy is currently serving as Chairman of the Board, with his one-year term expiring July, 1976 at the Association's annual meeting.

Realizing the importance of keeping the members abreast of state and federal legislation, advancements in technology and methodology, and just general news of interest concerning the industry, the Association sponsors two major publications. *Green Lands Quarterly Magazine* is published four times a year and boasts a circulation of over 6,000, which includes all Congressional members, West Virginia legislators, news media, as well as many national organizations. This publication is unique in that it is the only trade magazine of its kind in the world featuring exclusive coverage of the surface mining and reclamation industries. In addition, a weekly newsletter is sent to members to keep them up-to-date on the state, national and international levels of the ever-changing coal industry.

Another method the WVSMRA utilizes to disseminate the most current information available on improved reclamation and mining methodology is through one-day technical sessions and the Association's annual West Virginia Surface Mining Symposium. These sessions are held every two months in different parts of the state, in addition to the one held every spring in Miami at the Association's semi-annual meeting. Presentations from state and federal agencies, as well as industry representatives are given at these sessions.

The Association also serves to educate the public about the industry. This is accomplished through news releases and the numerous public appearances made state-wide before educational, civic and various other organizations. They also publish pamphlets on surface mining and reclamation which are sent in response to the many requests for information on the industry.

Another major function of the WVSMRA is to act as spokesman for the industry, both in Washington and the state Capitol in Charleston. Association members and representatives often testify on behalf of the industry at various public hearings. Government relations is crucial to this still-controversial industry especially in a state which fathered a major abolition battle five years ago which would have totally eliminated the industry in West Virginia. Today, West Virginia has virtually outgrown its earlier status as an emotional issue.

In April 1975, the Association sponsored the first International Mining and Reclamation Conference in order to give representatives of the coal industry the opportunity to explore mining in other parts of the world. This Conference was held in Dusseldorf, West Germany, an area known for its advanced mining technology. Nearly 200 people, including many WVSMRA's members and other industry representatives, attended the week-long Conference. Technical sessions and field trips to mining and manufacturing sites were featured and the Conference delegates were able to observe the many differences between Germany and United States mining techniques. Since the first Conference was such a success, a second one has been slated for April 3-11, 1976, and will be held in Warsaw, Poland.

In the fall of 1974, the WVSMRA received a federal grant to study "longwall surface mining," a method utilizing a modified longwall system to recover coal at shallow depths with minimum environmental disturbance and economically justified costs. The experiment, under the direction of the Association's Project Engineer, William L. Piper, has proved very successful, with the first cut of coal made in December, 1975.

The Association also received a federal grant to study the "Environmental Impact of Steep Slope Mining." The grant, funded by the Environmental Protection Agency, will monitor the environmental impact of a relatively new surface mining technique now being utilized on steep slope mining operations in West Virginia. The primary objective of the project is to evaluate the effectiveness of the haulback or lateral movement method in minimizing the environmental impact to the area surrounding the mining operation.

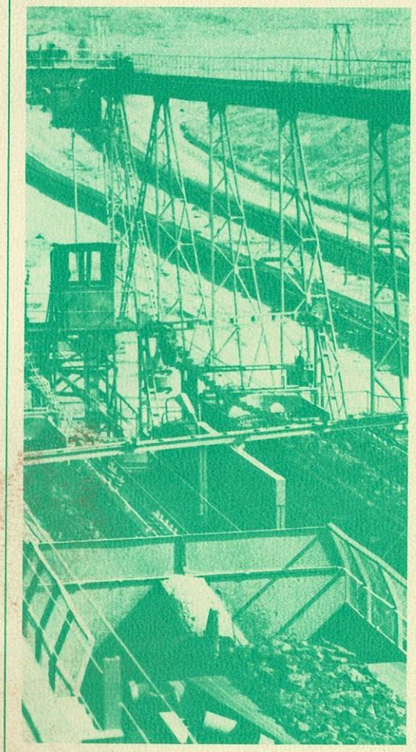
Since 1969, the WVSMRA has worked with the U.S. Forest Service and the West Virginia Department of Natural Resources in establishing revegetation research on areas disturbed by surface mining. Recently, the WVSMRA has also joined with the Department of Natural Resources and the Ruffed Grouse Society of North America to form a triparte agreement for reclamation and conservation research. The Jim Wilkinson Memorial Triparte Research and Development Project will research effective woodland and wildlife reclamation procedures and techniques.

In continuing efforts toward the expansion of research, the Association initiated a Technical Services Division to assist member companies with the surface mining permits required by the Department of Natural Resources and the state. John W. Sturm was named technical services director and has authored and published the booklet, "Procedure for Obtaining a Surface Mining Permit in West Virginia," for the members. Also through this new division, an Environmental Quality Control Lab was established and this new facility is being operated as a service to the member companies, to run the water analyses, required by both state and federal agencies. The lab utilizes the most recent methodologies as per ASTM standard methods. It also has a Perken Elmer Atomic Absorption unit which is used for the analyses of heavy metals. Future plans for the lab include the use of soil analysis in order to make valid recommendations for fertilizer requirements on mine soils.

Because of its great expansion in recent years, the Association has, in addition to their headquarters (located at 1624 Kanawha Boulevard, East, Charleston), a northern office (Suite 760, Empire Bank Building, Clarksburg); the water analysis lab in Beckley, West Virginia and a field office in Julian, West Virginia. As the largest state surface mining organization in the United States, the WVSMRA is looking forward to celebrating its tenth year of service to the surface coal mining industry at their annual meeting, held at the Greenbrier Hotel, White Sulphur Springs in July.

EDITOR'S NOTE: This article is reprinted with permission of Coal Mining and Processing Magazine.

Conference Impressive



In continuation of the theme "Explore the World of Mining," the West Virginia Surface Mining and Reclamation Association sponsored a second International Mining and Reclamation Conference that traveled to Warsaw, Poland, April 3-11, 1976.

As the fourth largest coal producer in the world, Poland's advanced mining technology includes totally automated deep mines, as well as the second largest surface mine in the world. The country's progressive reclamation techniques and the utilization of wheel excavators in surface mining proved to be of great interest to industry representatives attending the conference.

Nearly 100 delegates checked into John F. Kennedy Airport, New York, Saturday evening, April 3. Following a special cocktail party at the airport, the group departed for Frankfurt, Germany on a Lufthansa's Boeing 747 jumbo jet. There was a brief layover at Frankfurt International Airport Sunday morning and then the delegates departed for Poland.

Upon arrival at Warsaw, the group was transported by bus to the Forum Hotel where lunch was provided. A sightseeing tour of the city, which is the capitol of Poland, was held that afternoon. Warsaw, which is called the symbol of Polish persistence, optimism and national pride, was completely rebuilt in the last 30 years, following the destruction of World War II. As Poland's largest scientific and cultural center, this city boasts 26 museums, 19 theaters and is a combination of old world charm and modern day architecture.

The first day of the Conference was wrapped up that evening with a welcoming banquet, held at the Europejski Hotel.

Monday morning, after breakfast, the men departed by bus for Wroclaw, and stopping enroute to tour surface mines located in Konin. The ladies visited Zelazowa Wola, the birthplace of Frederick Chopin. This former home of Poland's greatest composer, has been converted into a museum, displaying Chopin's manuscripts and correspondence. The ladies enjoyed listening to Chopin's music at a concert given by famous Polish and other foreign pianists. They also stopped at Nieborrow and toured the Weautyule Polish palace there. They then met the men at the Novotel Hotel, Wroclaw, where dinner was served.

Tuesday morning, the men sat in on the first technical session of the conference. Dr. Benon Stranz, Vice-Minister of Mining, gave a presentation entitled "Surface Mining and Reclamation." Lunch was followed by Technical Session No. 2, "Overview of Poland Mining Methods," presented by a representative of the Polish government.

That afternoon, the ladies toured the city of Wroclaw, known as the capitol of Polish electronic industry. It is interesting to note that over half the population of this city was born after the war and is known for being a city of young inhabitants. It is also famous for its schools of higher learning. Its many educational facilities include the University of Wroclaw and the Technical University, which has an enrollment of over 41 thousand students. This city is also the domain of the famous Pantomine Theatre of Henryk Tomaszewski, well known in Poland and abroad. Overnight accommodations that evening were provided by the Wroclaw Novotel Hotel.

Wednesday morning, the men toured the mining combine at Turow and the third technical session "Environmental Con-

Some of the delegates of the second International Mining and Reclamation Conference stand before the Administration Building of the Turow Mine. The petrified log at at right, which was extracted from the mine, is several million years old.

sideration for the Polish Mining Industry" was held. The women were given a tour of the Polish countryside. After dinner, a Georgian Chante concert was held for the delegates at a historic cathedral in Wroclaw.

Thursday, the group departed for Cracow via Katowice. While the men toured a modern Polish deep mine, the ladies visited the Culture and Recreational Park in Chorzow. The afternoon program included a tour of Auschwitz, the largest concentration camp during World War II. Delegates stayed at the Cracovia Hotel in Cracow that evening.

A sightseeing tour of Cracow was first on the agenda for Friday. Archeologists have found remains dating back as far as 100,000 years in this city, called the ancient capital of Poland. Over two million tourists visit Cracow each year, which has over 700 historical monuments. Included on the tour was a visit to Vavel Castle, in which the tombs of Polish kings can be found.

The group also visited Wieliczka, an 1,100-year-old salt mine, still producing salt today. The oldest part of this mine has been converted to a museum and tells the chronological story of mining techniques, beginning with the medieval period, up to today. Tourists may ride down in a shaft through the mine.

Dinner was held at the Pieskowa Skala Castle, where a Polish group entertained the delegates with a folk ensemble performance.

The last day in Poland began with a shopping tour for the ladies. The group then traveled back to Warsaw, where a farewell banquet was held at the exclusive Jablonna Palace. Overnight accommodations were again provided by the Forum Hotel.

The conference ended Sunday when the delegates departed Warsaw on Lot Flight No. 273. After a two-hour layover at Frankfurt International Airport, they boarded Lufthansa Flight No. 404, arriving at JFK Airport in New York at 3:55 p.m.

"As the fourth largest coal producer in the world and with its advanced mining and reclamation techniques, we feel Poland was an excellent choice for the second International Mining and Reclamation Conference," stated Ben Lusk, president of the WVSMRA. "Not only did industry representatives benefit from the technical sessions and visitations to mine sites, they had the opportunity to tour a beautiful, modern country, extremely rich in historical value. We believe that the success of this conference even surpassed that of last year's," he said.

The first International Mining and Reclamation Conference was held in April 1975 when delegates traveled to Dusseldorf, West Germany. Nearly 200 participants attended the week-long conference which included field trips to mines and manufacturing sites, as well as several technical sessions.

Openpit Mining of Lignite in Poland

Zdzislaw Zajac
Former President, Lignite Mines Corporation

Introduction

The world production of all raw materials for the power industry from primary sources, such as hard coal, lignite, crude oil, natural gas, electric energy from hydro-power stations, atomic and geothermal stations attained in 1973, equals, in terms of hard coal, 7,920 million tons. Utilized in the calculations were the statistical data contained in the "World Energy Supplies, 1968-71" U.N.O. Report, New York, 1973. Conversion factors for one ton of lignite in Czechslovakia and in France correspond to 0.6 for Poland and Italy, the Soviet Union 0.5, and for the remaining countries 0.3 tons of hard coal. In comparison, one ton of crude oil corresponds to 1.3 tons of hard coal.

The real worldwide extraction of hard coal in 1973 was 2,155 million tons, crude oil 2,675 million tons, natural gas 1,245 billions meters 3, and lignite 816 million tons.

Poland's share in the production of power industry raw materials was 177 million tons, representing 2.2 percent of the world total. Of this, hard coal plays the greatest role, achieving 157.0 million tons, or 7.3 percent of the world production - actually fourth place in the world. Production of lignite for the same period came up to 39.2 millions tons, i.e., 4.8 percent of the total world production of this raw material, and with this production, Poland actually occupied fifth place among the nations producting lignite, preceded only by East Germany, the Soviet Union, West Germany, and Czechoslovakia.

Before World War II, lignite was not very popular as a fuel. Its extraction was concentrated chiefly in Central Europe, mainly in Germany, which produced 80 percent of the world's supply. After World War II, with the world shortage (especially in Europe) of raw materials for the power industry, a greatly increased interest in lignite as a complementary basic fuel emerged - a role that until then was held by hard coal.

Under the pressure and necessity for significant and rapid increases in extraction, a program was launched to construct modern machinery with large output, to facilitate and accelerate openpit exploitation. Marked progress also has taken place in the technology of the movement, and stacking of large masses of materials, and in techniques of draining, reclamation, and auxiliary work mechanization. The economic advantages gained through openpit technology, especially in the light of the changing economic situation in relation to the prices for crude oil, argue an additional case toward development of it.

To support this proposition one can consider Poland as an example.

In the period between the two World Wars, Poland, with regard to lignite exploitation, did not exist in the world statistics, and its significance in the national economy was negligible. Small primitive mines were being shut, one after another, as a result of exhaustion of existing resources. The period of economic depression did not encourage further prospecting or exploitation. And because of the slowly growing requirements of the power industry and the monopoly of hard coal during the thirties, industrial exploitation of lignite was not considered as profitable. In the years 1920-1938, its exploitation decreased from 270 to 20 thousand tons annually.

The needs of the rapidly developing Polish economy after World War II imposed the necessity of prospecting for relatively cheap, easily accessible and abundant sources of prime energy. The lack of resources of crude oil and natural gas and the small possibility of hydropower utilization focused particular attention on lignite which, as a raw material for large power units, could compete with hard coal. Faster development of underground mining of hard coal - which, in addition to being a valuable export item, was also indispensable as a coking raw material - was for various reasons impeded.

Facing an energy shortage situation, a decision was taken in 1956 to develop lignite openpit as the source of fuel for big power plants.

The following propositions favored this development:

- The possibility of a wholly mechanized exploitation process enabling the attainment of high productivity per employee.
- A comparatively short cycle of construction to extraction, i.e., a short period for investment return.
- Greater safety and better working conditions in openpit mines than in underground mines.
- Lower cost of extraction as calculated in terms of standard B.T.U. fuel, in comparison to other power industry raw materials.

Intensive geological prospecting enabled us to discover new lignite deposits and to construct new open pits. This dynamic development led to a quantity of extracted lignite of about 40.0 million tons and of removed overburden to 128 million meters 3 in the seventies. Both the existing mines and the ones under construction are subordinated to the Lignite Mines Corporation located in Wroclaw.

All the research and project work for this area of the coal industry and also for the openpit mining of other minerals is controlled from Wroclaw by the Central Research and Design Institute for the Opencast Mining, "Poltegor", which cooperates on a broad basis with other countries, i.e., with E.P.A.

1. The Geological Conditions of the Polish Deposits

Polish lignite deposits of industrial significance occur mainly in southwestern and central Poland, and are of the Tertiary period, and more exactly of the Miocene age. They are characterized by - depending on the region of occurrence - a marked diversification in their geological structure. Such a diversification expresses itself both in the different geometry of the deposits and in a different lithology and tectonics. Owing, however, to their difference from American conditions and the necessity to use different mining techniques, a description of our situation is necessary.

In the Turow region (Figure 1), lignite occurs in the form of two main seams with a thickness of 20-40 meters each, and a third bed in the shape of several thin benches with lignite of thicknesses two-10 meters, occurring in the overburden. The overburden and the band layers between the seams are composed of 80 percent clays and about 20 percent sands formed in the shape of closed lenses. The deposit is formed in an outline of a basin causing an increase in the thickness of the overburden from 30-70 meters on its edges to over 200 meters in its center. The layers underlying the bottom seam constitute, similarly as in the overburden, Tertiary clays.

In the region of Konin and Adamow (Figure 2), there is only one seam of lignite with a thickness of 10-15 meters deposited horizontally, covered with an overburden 40-50 meters thick. The overburden is clays, containing sand lenses constituting about 20 percent of its thickness. The lignite seam underlies a layer of water saturated sands that are several meters thick.

In the region of Belchatow (Figure 3) where a new mine is being constructed, the seam of lignite is 50-100 meters thick, covered with a 20 percent clay and 80 percent sand overburden 100-200 meters thick. Lignites petrographically belong to soft coals with a significant humidity content, about 50 percent, and a certain admixture of xylites. The caloric value fluctuates from 1700 to 2400 k.cal(kg, with a low sulphur content, 0.5-1.0 percent, and low ash from 6-20 percent. The industrial ratio of the overburden versus lignite fluctuates within the 2 m^3 /1 t-9 m^3/1 t limits and offers conditions for economic exploitation.

Working in the deposits described above are:

- One open pit with an output of about 22 million tons of lignite annually.
- Four open pits with a production of three-five million tons of lignite annually.

Under construction is an open pit with a planned production of 40 million tons of lignite per year, and on the drawing boards are two other open pits with outputs each of 25 million tons of lignite annually.

2. Hydrogeological Conditions and Drainage Problems

All the lignite deposits in Poland are situated in conditions of strong waterlogging. The initial ground water table occurs everywhere at a depth of from zero to five meters below the terrain's surface.

Depending on the local conditions, waters are the free water table or subartesian water table waters. In the overburden of the pits in the Turow and Konin regions, the dominant waters are in closed lenses characterized by pressures dependent on the depth, and which fluctuate from one to 20 atmospheres. The sands underlying the lignite bed in the Konin region have waters under a pressure of up to six atmospheres, and the spreading of this horizon is practically unlimited. Sands in the Belchatow area, which compose the overburden and underlie the coal bed, are saturated with water coming from the surface of the terrain to the full depth, i.e., to about 300 meters.

To permit mining, a deep draining system is built approximately two years in advance of the mining operation to draw the ground water table down below the bed floor level. The depth of this water lowering from 50 to 300 meters is being achieved with the aid of batteries of wells equipped with submersible pumps, or galleries with draining holes. The quantities of water inflow to particular pits fluctuate within 30 to 300 meters 3 per minute per pit, and the range of the depression cones made by these draw-downs reaches 10 and more kilometers.

3. Excavating, Transporting and Stacking

The equipping of the Polish lignite open pits with excavating machinery consists exclusively of bucket wheel excavators running on caterpillar undercarriages, and of chain excavators working on rail running gears.

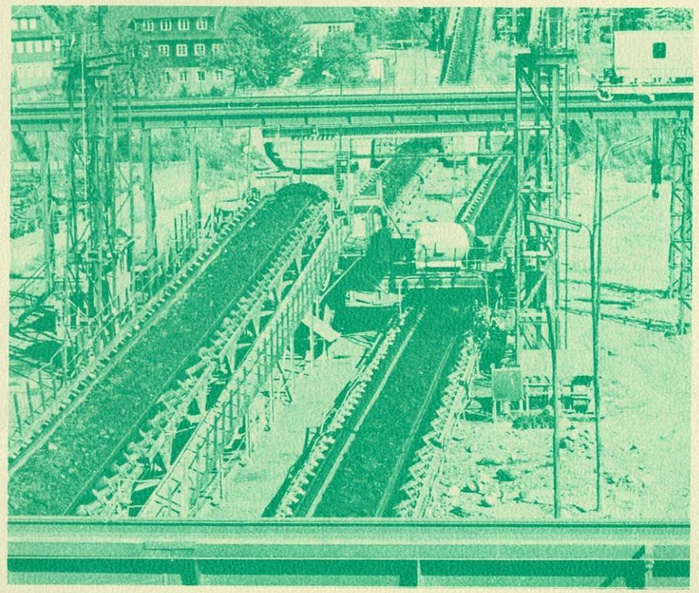
As regards the scope of excavation, the machines are being adopted to the undershot work (mainly by the chain excavators) and to the overshot work (as a rule by the wheel machines).

Presently, in our strip mines we employ excavators of outputs ranging from 700-3450 meters 3 per hour. The quantities and types of excavators used were subject to the technology and, also, partly to the production capacity of the manufacturer of such equipment. Characterization of the utilized excavators and stackers is illustrated by Table 1.

A fundamental output capacity of our open pits is based on 25 overburden excavators in four types, 11 stackers in three types, and nine lignite excavators in three types. The above mentioned machines represent the so-called first generation of openpit machines used in the Polish lignite strip mines with an output capacity from 6.000-40.000 meters 3 per day.

In the strip mines under construction, Belchatow and Szczercow, machines of the second generation will be used with an output of 110.000 meters 3 per day, and in the "drawing board" technology of the Legnica deposit, the use of third generation machines with an output of up to 200.000 meters 3 per day is being considered.

Complex convey systems keep coal and overburden continually moving out of the pit. Open cast mining is the only method feasible in the huge mineral deposits of southwestern Poland.



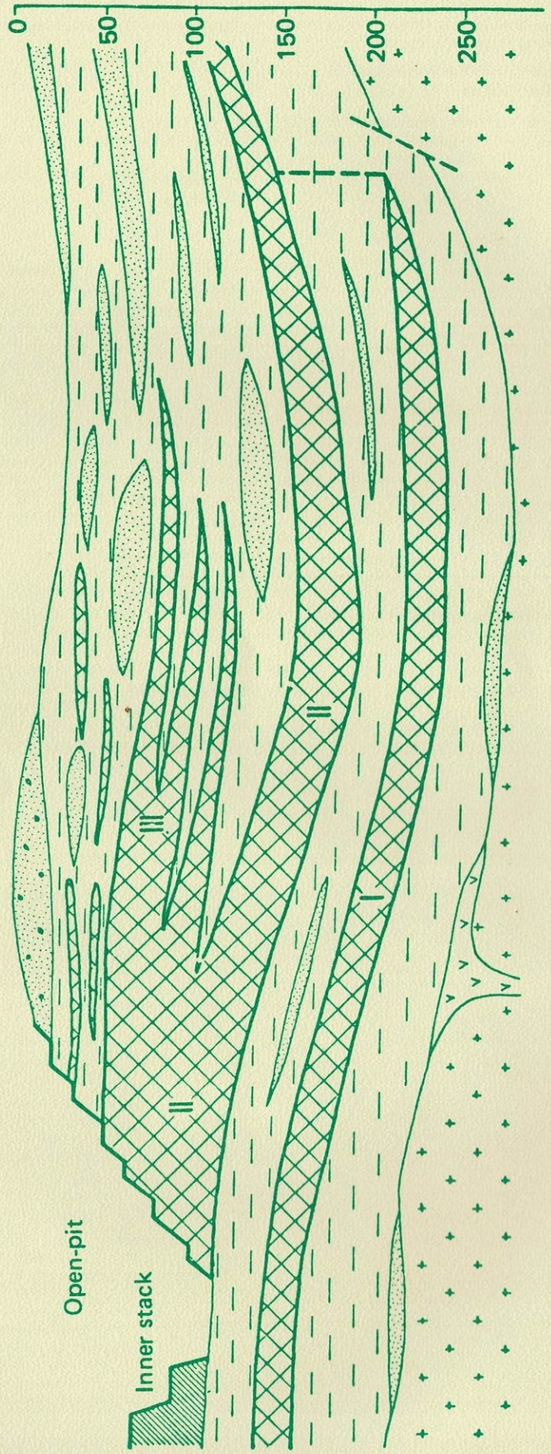


Figure 1. Schematic N-S Section of Turów Lignite Basin.

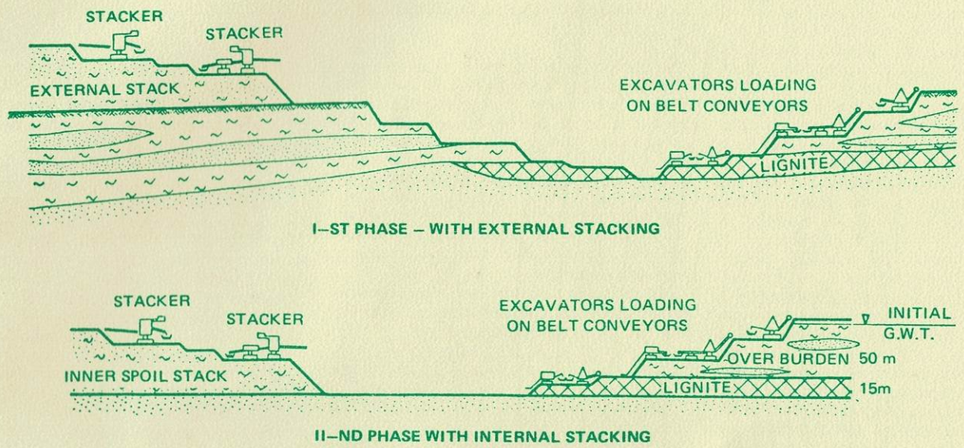


Figure 2. Scheme of Lignite Extraction in the Konin Basin.

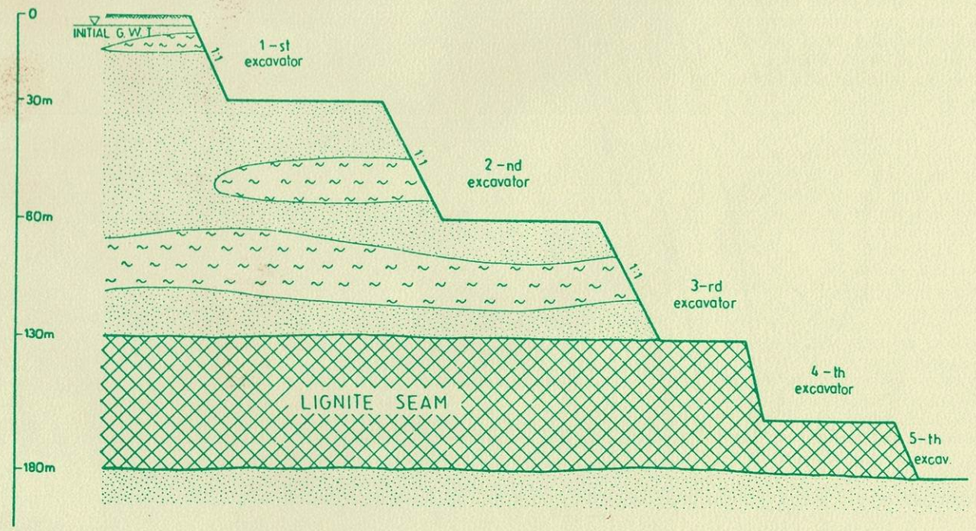


Figure 3. Schematic Longitudinal Section of Lignite Extraction in Bełchatów Basin.

The number of machines, with a three-fold capacity increase in lignite output, will in the near future amount to 90 pieces, and the length of the conveyor belts will grow from the present one of 120 kilometers to one of 400 kilometers. Progress in the construction of the stackers is also evident. Their efficiency grew from 1.200 meters 3 per hour to 8.800 meters 3 in the present strip mines and will grow to 15.600 meters 3 per hour for the new strip mine, Belchatow. Transport plays an essential role in the open pit mining of minerals - being an essential technological link in the extraction process.

A systematic increase of extracted lignite and overburden quantities and the continuously growing depth of the strip mines have produced the change from the rail to a more economic conveyor belt transport. The use of conveyor belts in the Polish mines amounts at present to 80 percent and in 1985, this will come up to 90 percent.

In rail transport, one employs electric locomotives, 75 and 100 tons, and the self-tipping wagons of a capacity 25-65 meters 3. The present conveyor belts have the width of the belts 1,200-2,250 millimeters, speeds 3.15-5.85 meters per second. The theoretical outputs of these conveyors are up to 2,500-13,000 meters 3 per hour. The lengths of individual conveyors approach two kilometers. In the strip mine, Belchatow, under construction, belts of a width from 1,800 to 2,250 millimeters with an overburden output to 13,000 meters 3 per hour will be used.

In the projected strip mines in the future, we anticipate using belts 3,000 millimeters wide and with a 20,000 meters 3 per hour output. The power of main transmission amounts to 40-3780 kilowatts. One employs fabric-rubber belts with a transmission strength coming to 420 kilograms per centimeter of the width (average 250). The employed belts have steel cords and have a strength of up to 3.150 kilograms per centimeter of their width. The transmission stations are mobile (on wheels) and on caterpillar under-carriages, are self-driven, or moved on pontoons, and are also stationary on foundations.

In the strip mine, Belchatow, caterpillar transmissions will be adapted also to the possibility of walking transmissions application. The power feeds will be 4 x 1,000 kilowatts. The belts are of a strength to over 5,000 kilograms per centimeter.

In its final destination, a transition to the transmission stations of a 4 x 1,5000 kilowatt power is planned. The application of belt conveyor transportation enabled a full mechanization of the technological process. An automatic remote control of this process with the application of computers is also being introduced currently.

Economic effects of the strip mines depend to a large degree on correct solutions for planned transportation. The share of investments in conveyor belt transport represents in Polish circumstances about 22 percent of the total investments assigned for the construction of a mine. The exploitation costs of this transport are coming up to as much as 35 percent of the costs of the basic technological system. The application of this modern belt conveyor transportation allowed us in the period of the last 15 years to halve the costs of mass conveyance in our mining.

To carry out numerous auxiliary tasks, accompanying the technological process such as terrain leveling, the execution of roads, shifting of belt conveyors, draining ditches, construction, transport, elevator and overhaul operations, adapted building equipment is employed and is adequately instrumented to meet the requirements of openpit mining.

4. Advantages of Openpit Exploitation of Lignite

The outlined existing state of affairs and the direction of development of the lignite strip mines confirm the correctness of our decisions especially when we consider the comparative effects of the construction of these mines with the construction of analogous underground mines of hard coal for power uses. In the production of electric energy, a deciding factor is the fuel cost. The cost of power plant construction and the cost of using either hard coal or lignite is as a rule identical.

As a result of particular technical-economic analyses, one can draw conclusions that can be summarized as follows:

1. Cost of investment, computed per ton of production, of a "standard fuel" of a defined caloric value, for a lignite and for a hard coal mine is almost the same.
2. Investments made to maintain the production capacities in the hard coal mines are 2.4 times higher than is the case with lignite mines.
3. The start-up of production as far as the planned full economic production is concerned is much faster in the case of openpit mines.
4. The exploitation costs are two-fold lower, the staff costs are three times lower, the costs of materials in the lignite strip mines are four times lower, and the labor productivity is two and one-half times lower.
5. The number of hazards occurring in the openpit lignite mines is far smaller and the casualty of work is more than two times lower.

Based on the Polish experiences in the construction of lignite strip mines and taking into account the modern technological solutions that optimally suit the conditions of our minerals deposition, one can say that development of lignite strip mining was a correct decision.

One has to take into account here, also, the advantageous localization of these deposits, enabling the achievement of a large concentration of production, and an opportunity to eliminate long distance rail transportation through a situation of power plants fired with this coal, located in the immediate neighborhood of these mines.

There was a good turnout at the technical session, as well as all other conference functions. The all-day session in Wroclaw included papers, movies, slides and questions and answers.

Environmental Protection Requirements

Henryk Turala
General Director, Poltegor

Poland, with her considerable resources of mineral raw materials, is developing her mining industry more intensely. Plans made for the immediate future years and the development perspective show a continuing rise in the excavation of minerals, among which the lignite, as the power industry raw material, occupies one of the front positions. Enough to mention, that the presently realized construction of the mining - power industry complex, Belchatow, constitutes one of the largest industrial investments in our country. Thanks to it, the openpit excavation of lignite, amounting now to roughly 40 million tons per year, will be double in 1985. In a further still perspective it is expected that this amount will exceed the 100 million ton limit by 1990.

The more favorable good points from the point of view of social-economic development requirements of the country's surface mining activity inevitably accompanies a number of negative influences, occasioning many - directional transformations of natural environment. Also, in the conditions of lignite surface mining - although the majority of exploited deposits occurs on agricultural land areas of low land valuation class and on forest - lands of average economic importance and a relatively small investment (these terrains are mainly rural) - direct impact of mining activity onto the environment is considerable. This, on one hand is the result of natural conditions, determining the localization of the mining operations with its entire technical - servicing background and on the other hand is due to the specificity of surface mining operations connected with a necessity of constructing the dewatering systems and displacing huge masses of earth. Besides the changes induced by direct influences - typical as they are for any industry i.e., aiding development of industrial objects of long term use with its entire infrastructure - the transformations caused by the lignite surface mining, consist of:

- — the entire reconstruction of the surface economic development of significant areas occupied and remaining in possession of the mining industry for a time length of few to several years.
- — the landscape transformations coming into effect of translocation of large earth masses, and furthermore caused by the erection of spoil heaps (over the ground surface, the relocation of beds of rivers and flows, the felling of trees and the liquidation of dwelling settlements.)
- — changes in the hydrogeological conditions, having their expression in drainage of considerable areas of arable and forest lands, causing losses in crops and cultures, and a lasting damage to soils, and also in the disappearance of water in commercial water intakes,
- — changes of a geo-mechanical type, such as subsidence and deformation of terrains effected by deep drainage.

Less significant, however, are the indirect effects on the environment, including the pollution of atmospheric air, pollution of waters and the noises. The scale of intensity by which these occur, as a rule, does not cause a defined kind of environment transformation.

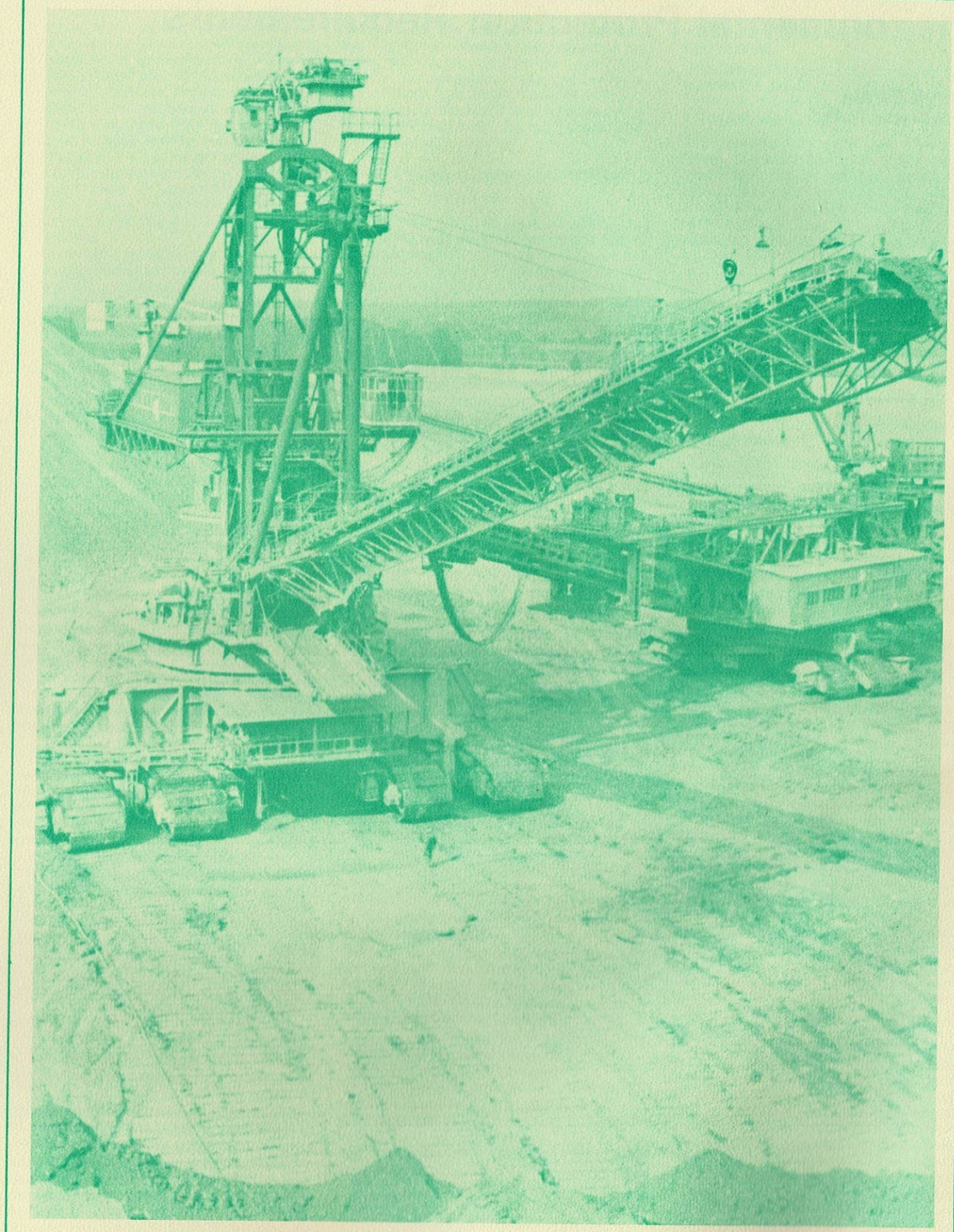
The lignite openpit mining for a number of years now devotes its attention, in its basic activity, to the problems of negative effects diminution it exerts on the environment. At the beginning of the sixties, during a period of realization of serious program of development and construction of new mines, it undertook a number of performed scientific-research investigations of a fundamental significance for the environmental protection on terrains remaining in the zone of detrimental influence of surface mining.

These investigations were being carried out in two main directions — the reclaiming activity direction relevant to the ever increasing areas being taken over, and the activity to redress the damages caused by the mining and in due measure to prevent their occurrence. In the consequence of investigations and tests, both field and laboratory, performed for a number of years, large data material was acquired.

- — technology of construction and formation of the spoil disposals in the aspect of reclamation requirements, determination of suitability of overburden rocks, for the reclamation and recultivation.
- — reproduction of soils with biological methods.
- — selection of the most suitable species of vegetation for purposes of reclamation and recultivation, and
- — influence of water condition changes on the fertility of soils, and on the extent of harm done to the crops and cultivations.

To some extent in coincidence with the commencement of the above mentioned research a law was issued, forbidding the leaving of mining terrains in a form of wastelands.

The law of November 16, 1960, regarding the change in the existing mining law, obligates the company exploiting mineral



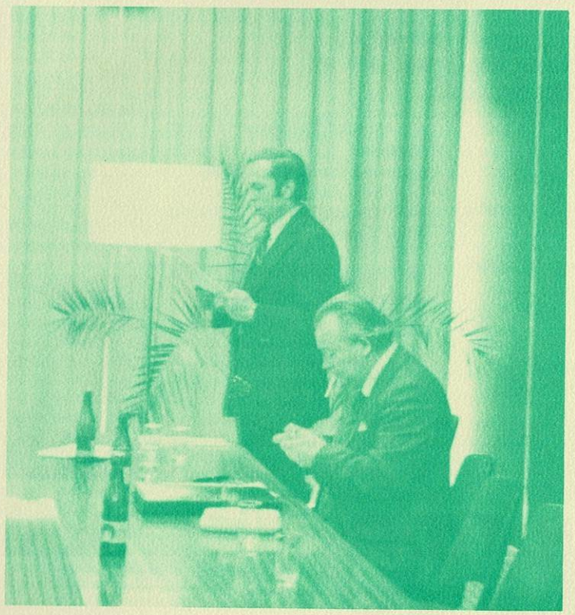
At the opposite end of the complex excavator-conveyor system, overburden material is evenly deposited by an automatic stacking machine. The reclaimed outdump is later reseeded and stabilized for future use.

deposits to do a gradual liquidation of openpits with the progressing exploitation in them, which should find a reflection in the plans of mining operations or in plans for liquidation of old openpits in instances of completed exploitation of mineral deposit. The worked out excavations prepared for recultivation in accordance with specified regulations, should be handed over to appropriate organs relevant to the anticipated terrain cultivation, i.e. in accordance with the assignments of the site planning. There was a lack, however, of rules and standards determining the manner and the extent of the preparation of the mined-out terrains for the recultivation. Thanks to the experiences and also to the more widely implemented methods of reclamation in the lignite and filling sands surface mining branch the existing gap in the regulations, the law, No. 301, of the Council of Ministers of September 6, 1966, has been filled as regards the reclamation and recultivation of areas transformed in connection with the prospecting and exploitation of mineral deposits. Based on the experiences of open-pit mining law No. 301, the Council of Ministers has estimated precisely reclamation as the restoration of a productive or utilizable capacity to the soils transformed in effect of exploitation, and connected with the construction and development of mining facilities as well, through the execution of appropriate technical and biological, treatments and employment of all available means limiting to only unavoidable extents the land transformation. This concerned first of all, the protection and regeneration of fertile soils, and the regulation of the water conditions.

Moreover, this law defined for the reclamation and the restoration a detailed sphere of obligations of company, that has caused by its activity the transformation of soils, the principles of plans and designs preparation, rules of organization and supervision, and criteria and routine of estimation of given operations as completed. It specified also the guidelines for the localization and formation of active and planned spoilbanks, commending to special attention, the restriction necessity of their negative effects on the natural environment, i.e. on the rivers, lakes, on arable and forest lands, and on the state of the terrain's investment. Taking into account the requirements of the sphere of terrain relief formation the law prohibited the erection of cone-shaped spoilbanks. This above described law was replaced with new law of October 26, 1971, regarding the protection of agricultural and forest lands and land reclamation — which continuing its principal proposition, comprised in a complex manner the whole of problems of changes taking place in the ways of using the terrains of agricultural or forest origin, and their (after exploitation for industrial purpose) renewed adaptation to the social-economic needs of the country. To compare with the previous rule, it regulates the problems of the occupied lands transformed by all branches of industry. Its main imperative is protection of arable and forest lands, as much as possible, which ought to be realized first of all through a restriction in changes in productive lands utilization relevant to their quality, area and localization. For the greater effectiveness of these restrictions planned

The staff of Poltegor, the Central Research and Design Institute for Open-cast Mining, prepared a complete conference package for the delegates to take back home. Poltegor is located in Wroclaw.

Jacek Libicki delivers his presentation on "The Influence of Surface Mining on the Groundwater Environment." Libicki accompanied the group during its three-day look at open-cast mining, acting as tour guide and interpreter.



in respect of acquisition and utilization of agricultural or forest lands, are high payments, as recompense for the advantages lost in the effect of exclusion of certain areas from agricultural or forest production.

Apart from the discussed law, together with the edited on its principles, executive standards, and standards for the mining, building and water law, the problems of reclamation and restoration for lands remaining in the possession of lignite mining industry regulate the "Detailed rules of the operation and of the resource management in lignite surface mining companies", put into force with the Disposition No. 1 of the Mining and Power Minister, on January 2, 1975.

In the light of the above-cited regulations, the reclaiming activity of the lignite openpit mining companies consists of:

- mined out terrain's relief formation corresponding to the requirement of the assigned recultivation direction,
- readjustment of hydrogeological conditions,
- reproduction of soil conditions suitable for the plant vegetation.
- introduction of vegetation pioneering and partially of final destination character and technical-biological consolidation of slopes to ensure their stability and also to preserve against erosion effects.
- construction of necessary approach roads.

The executed research and implementation work, and also the close cooperation with the Central Research and Design Institute for Opencast Mining, "Poltegor" in Wroclaw, with its staff, highly qualified in the scope of environmental protection planning, brought to elaboration on our own of a pattern of reclamation activity adapted to the geological-soil conditions, and to the technology of operations in lignite openpit mining-pattern, realized the advantageous results on ever greater areas of the mined out lands.

The reclaiming operations are preceded each time by the determination of recultivation direction by the relevant territorially state's administrative authorities. Elaborated for this purpose was a number of investigating and designing work determining the conception of reclamation and recultivation with the operational program up to the completion of deposit excavations in active mines and in ones under construction. Up-dating of the plans is being made, in the governmental periodical five-year development plans, of the technical-economic projects for the maintenance of production capacities of mines, development or construction of new mines.

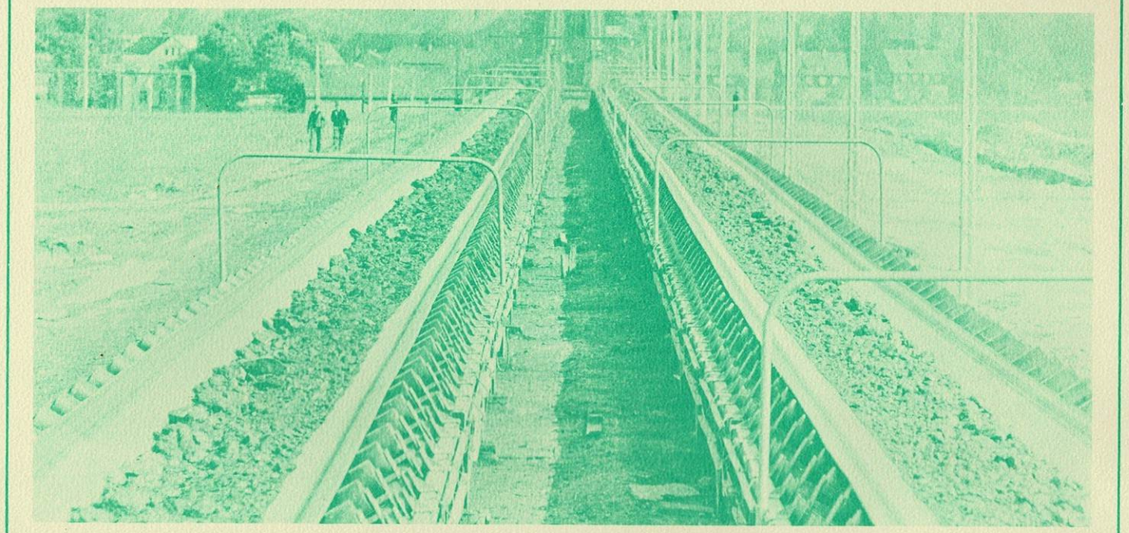
The main recultivation direction in the up-to-date reclaiming activity is the forest direction. This was dictated by various considerations. The recultivation in a form of afforestations was planned chiefly for the external spoilbanks, where prevailing areas of slopes make very difficult their utilization for the farming. One was guided here also by the region afforestation level in relation to the country's average. Agricultural recultivation is planned and executed to an ever-increasing extent on the nontoxic soils of internal spoilbanks, mainly constructed to the height of the surrounding terrain. This direction as an example becomes a rule for all internal spoilbanks of openpits in Konin in the five-year period, 1976-1980. Also in the openpit Adamow is planning to take up in the nearest future, a research work for the determination of a possibility of adaptation in those places where internal spoilbanks exist for the farming requirements. The reclamation work is carried out on the basis of project-cost calculation reports prepared by the Central Reserach and Design Institute of Opencast Mining "Poltegor". The phase of detailed reclamation is always preceded by detailed investigations and laboratory analyses, realized by cooperating with lignite mining industry, specialized laboratories of the Polish Academy of Sciences, and the Mining-Metallurgical Academy of Cracow. As a result, the mines obtain thorough guidelines, regarding the manner and the kind of indispensable agro-technical treatments, fertilization application, neutralization of toxic soils, species of herbaceous and tree vegetation and nursing treatments. The requirement to carry out temporarily additional investigations arises from a considerable lithology variability of the spoilbank rocks, occurring both in the horizontal and the vertical configuration.

The second field of lignite mining activity, not less important as per the scope in the problems of protection and formation of environment, is the activity that has for its goal the redressing of damages caused by mining and the prevention against their appearance.

The drawing down of the ground water table, in the effect of deep draining, causes damages on the terrains adjacent to openpits (Adamow and Belchatow) in the shape of:

- losses in crops and cultivations,
- lasting damage to agricultural and forest lands,
- disappearance of water in farm wells,
- subsidence and deformation of terrains.

The losses in crops and cultivations occurring in the region of openpit Adamow (on an area about 4000 hectares [ha] and the forecast ones in the neighborhood of mine Belchatow (on an area about 20.000 ha) constitute a peculiar kind of mining damage. In accordance with the mining law, its correction consists of a compensation payment made for the period up to four years, squaring up the loss of the sufferer, which he bore in connection with mining activity.



Conveyor systems handle millions of tons of sandy overburden each year at the Turow Mine. One hundred per cent of all material handling is done by conveyor.

The damage occurring in the form of losses in crops and cultures after the lapse of four years is considered as a lasting soil impairment. In a given case, the mining company has the duty to restore the damaged field to the state of its previous use, provided the following is of importance:

- the needs of the planned economy (determined in site planing),
- the technical possibilities of restoring the impaired soil to its original state,
- economic profitability of such undertaking.

In cases where the restoration of soil to its initial state for the above reasons is neither possible nor warranted, the redressing of damage made consists of payment of a single recompense, corresponding to the equivalent in decrease of annual income derived from arable or forest land, and incurred in effect of mining damage, in proportion to average yearly income from such land as calculated for the last three years before the damage had occurred. In this way the claim of the person suffering the loss is met in full. There also exists the possibility of redressing difficulty to correct damage on arable or forest land, by way of a supply of land or plot of land of this same type to the proprietor with a corresponding balance in value difference effected. In the existing practice, the redressing of this type of damages is made by a single financial compensation. A number of interesting solutions in the subject of preventing the lasting soil impairment was elaborated for the region of the being under construction "Belchatow" mine, i.e. the application of coming municipal sludges, covering with peat, fertilizing with ash from power plant, construction of sprinkling systems e.t.c. The final program of agricultural and horticultural reclamation of areas subjected to the influence of the entire Mining and Power Combine "Belchatow" is in the course of elaboration.

The next category of mining damages caused by the negative influence of depression cone, is the disappearance of water in the farm wells. In order to estimate the reach of given phenomenon, periodical observation and hydrogeological surveys in wells and piezometers are in progress. On the terrains of ascertained or forecast occurrence of water disappearance in wells, the water-pipe networks are constructed.

In designing the water-pipelines, there is observance of principle to supply the drinking water to all farmsteads without exception, regardless of whether they possessed the water-intake wells of their own. The exception can be single (scattered out) farms, to which the water-pipe network would be too costly. To such steads, water is carted in quantities agreed.

The final damage connected causally with mine deep draining operations is the subsidence and deformation of terrain. This phenomenon until now occurred only occasionally, to the extent not inducing substantial changes in the environment.

It is believed however, that in connection with intensive deep draining of "Belchatow" openpit regions with barriers of wells, (discharge of water 300 meters 3 per minute and draw-down of ground water table about 300 meters the subsidences and deformations of terrains may occur in conditions of a determined lithological composition of overburden layers (sands) with an intensity exert a destructive influence on objects, on cultivation systems, and on forests. This issue now is the subject of observations and geodetic surveying.

A systematic realization of the environmental protection program in the lignite surface mining gives more and more economically and socially felt results. In the course carried out until now, activity, more than 2000 ha of terrains was reclaimed, of which the greater part has already been fully recultivated. Next to the forest and agricultural recultivation, part of it is used as workers' gardening plots and as areas of one-family house construction. In the field of supplying the agriculture and villages with water, more than 400 kilometers of water pipelines were constructed. Even greater tasks are in store in the future of the lignite surface mining. In order to cope with these tasks and the continuously growing demands in the sphere of protection and formation of environment the following is planned:

- maintenance of the held until present rate of reclamation work, to balance out the areas of terrains being taken over with the reclaimed areas given back to proprietors,
- performance of systematic surveys and observations and stock taking of initial states for the estimate and forecast of changes caused by the exploitation effects,
- construction of water-pipelines required for the provision of population of towns and villages with water planned to be ahead of negative influence of deep drainage effected by mining operations.
- continuation of scientific-research in the sphere of protection and formation of environmental problems.

Also necessary is a continuing and consistent realization of the requirement to a most economical take over for the needs of industry the arable and forest lands and also a constant cooperation with the local authorities in undertaking all initiatives of the protection and formation on the environment.

Reclamation of Worked-out Terrains

Kazimierz Bauman
Chief of Reclamation, Poltegor

Introduction

The terrains taken over by the openpit mining are being transformed in various ways. Their main portion (82-87 percent of the total area) undergoes a fundamental transformation in the course of direct mining operations - the displacement of masses of earth. The remaining part representing about 13-18 percent of the total engaged area is being only slightly transformed. Erected on these areas are the objects of concern to mining: industrial, communications, administration - housing welfare, recreational etc., conditioning and accompanying the economic activation of the region.

Owing to the general attitude of sensitiveness and attention concerning the problems connected with natural environment protection, more and more effort and resources are being devoted to the terrains being transformed in the course of direct mining operations in order to restore such terrains to their full natural value.

1. General characteristics of reclamation problems.

The model of reclamation employed in Polish opencast mining of lignite has been determined by three factors:

- the considerable depth of open pits consisting of relatively great thickness of the lignite seams, and of a considerably
- greater than the thickness of overburden; a ratio of the overburden to lignite seam thickness fluctuating from 3:1 to 7:1 value,
- a differentiated geological structure of overburden in which formations occur of fundamentally different physico-mechanical and chemical properties,
- a poor quality and a small thickness of soils occurring on whole terrains of exploited deposits.

The above factors are making it unprofitable to select, strip, transport, and stack these soils for the purpose of covering with them the terrains being reclaimed.

Deep deposition of lignite seams created the need for large machines for the working of overburden, and also large machines for the stacking of overburden. Despite the use of large excavators, the overburden has to be divided into several working levels, which are worked by particular excavators, one on each level. The excavated overburden is transported on the belt conveyors onto the stacks, first onto an external one, later onto an internal spoil stack where particular stacking levels are working stackers. Most often this is made in such a way that one stacker from one stacking level forms two layers on the task (over machine and below machine).

In this effect, exploitation on the terrains of all mines occur on three basic forms of terrain, differing in the respect of their shape, and in water conditions obtained within these configurations:

- external spoil stacks - appreciable uplift over the surrounding natural terrain,
- internal spoil stacks - formed flush with, or slightly raised above the surrounding terrains,
- final excavation - terrains depressed in relation to the adjacent terrains with their greatest depth equalling the depth of the working.

Shaping of the worked out terrains

The stability of slopes and the requirements of reclamation ensuing from a plan for these terrains recultivation directions determine the final geometrical configuration of worked out terrains. Reclamation requirements in relation to the whole system of slopes do not call for more gentle inclines, than the ones derived from geomechanical calculations. In relation to particular slopes in the system of slopes, a requirement may arise from the reclamation point of view, for a gentler incline motivated by the necessity of performance of many ameliorating and cultivating treatments, in the process of slope reclamation and recultivation. The formation of flat portions on top of the internal and external spoil stacks is being determined by the technical conditions as derived from the anticipated economic assignment of these terrains after a completed exploitation of them.

The essential configuration of the terrain is carried out by means of elementary working and stacking machines and based on the instructions of reclamation. Its final shaping is made with auxiliary machines, most often bulldozers. The basic machines on account of their size, have limited possibilities of an accurate formation of slopes and levels. Operating these machines with their maximum output and reach, additionally limitates these possibilities.

So far as the work of stackers is concerned, then with exercised maximum care by their operators doing a precision relief formation of the external spoil stacks, one is able to achieve an approximate shape as the one shown in fig. 1.

The making of an adopted final configuration of a spoil stack is considered as a part

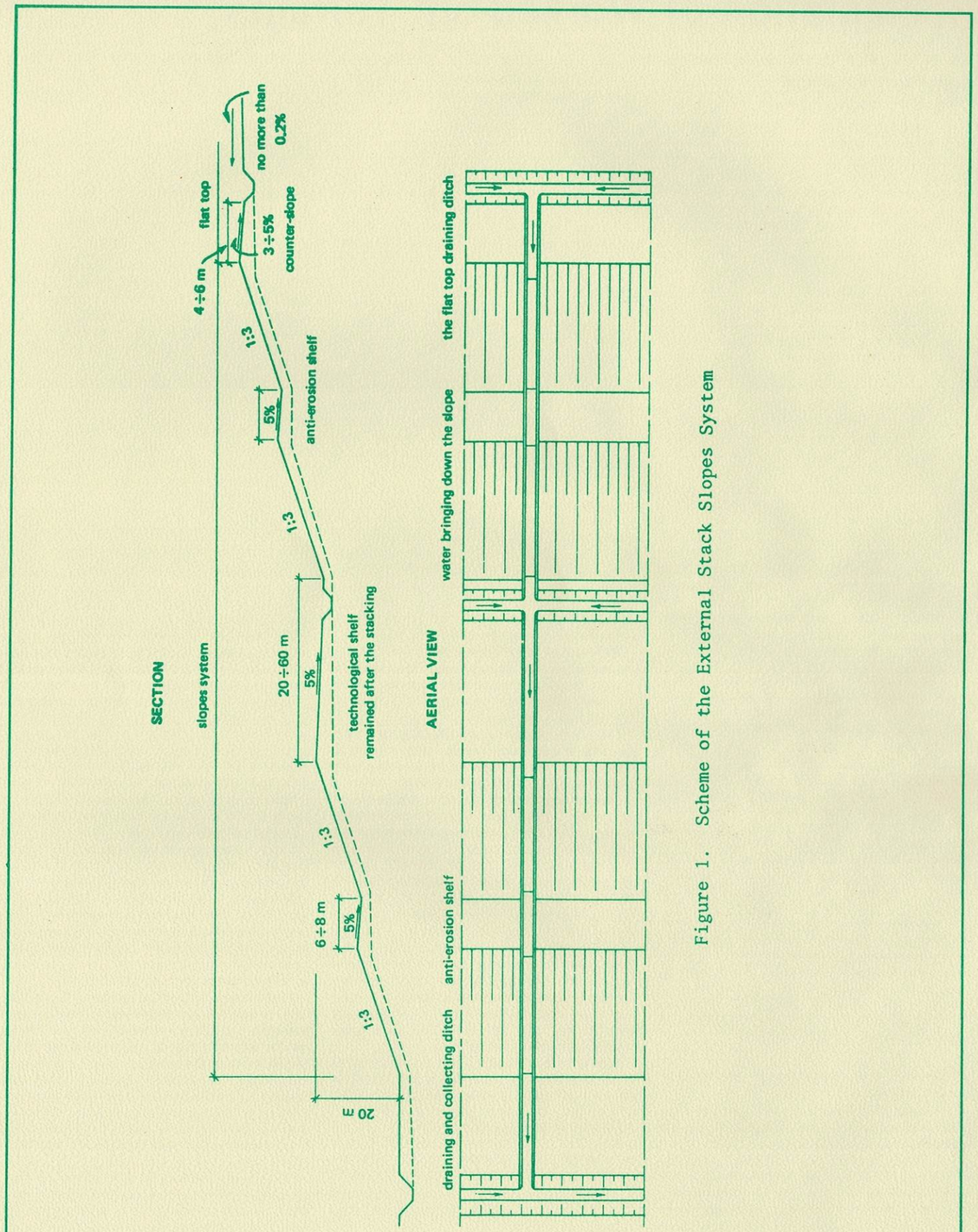


Figure 1. Scheme of the External Stack Slopes System

of reclamation work. The terrain levelling on the top surfaces of the spoil stacks is made in such a way as to achieve surfaces of varying gradients. The directions and the gradients of these delcines are selected so as to secure a possibility of gravitational water run-off from the top by means of draining ditches, taking the water down the slopes, and constructed specially for this purpose. When constructing the spoil stacks of formation with cohesive soils prevalent in them in polish conditions, the surplusses of water occur periodically. The requirement of a fast offtake of water surplusses from the top areas, is dictated by agrotechnical requirements and by the stability of slopes. Heavy soils belong to the so-called momentary soils, in which cultivation is relatively easy when the determined humidity level exists. During the period of excessive humidity, the machines and agricultural equipment sink in a quag, and in a dry weather during the cultivation treatments, too much soil resistance occurs and large solid lumps occur.

On the basis of practical experiments carried out, on the newly formed spoil stacks are inclines not greater than five percent, and on the very small areas of spoil stacks 10 percent maximum is admissible. By larger gradients the water erosion occurs. The shaping of final slopes of spoil stacks and final excavations absorbs most of the attention and effort, as these elements are maximally exposed to long lasting erosion - mainly to water erosion. A very disadvantageous consequence of waters flowing down the slopes of final spoilbanks is the drifting of washed out material onto the adjacent terrains. The liquidation of erosion is therefore an important issue, both for the reclamation and for the protection of adjacent terrains.

Biological consolidation.

The Poland legislature imposes a duty on the enterprises conducting the extraction of lignite, to introduce a vegetation of a pioneering character onto the worked out by mining terrain.

Two kinds of a biological consolidation are employed. Introduced on the flat top portions of the stacks and on the terrains not transformed directly by the mining operations are the grass and papilionaceous vegetation.

But on the slopes of external spoil stacks and portions of slopes of final depressed excavations situated above the water table, introduced is a consolidation consisting of trees and shrubs planted under the cover of grass vegetation, which in this case has the task mainly to stop erosion and fulfill the function of cultivating the seedlings of trees and shrubs.

Neutralization.

Before commencing the treatments of neutralization and fertilization, shortened analyses of soil material, in order to determine the necessary amounts of the neutralizers and fertilizers doses, is performed. Most often used for neutralization, are the agricultural ground burnt limestone, CaO, or ground phosphate rock (30 percent of P_2O_5 and 25-50 percent of CaO - mainly in the form of apatite or calcite). Less often, however, the ammonia water is used due to big losses of neutralizer caused by the easy decomposition of the generated salts. A favorable characteristic of employed neutralization by means of ammonia water is the speed of reaction which enables an earlier introduction of vegetation.

Employed on the mine characterized with strongly acid (pH about three) sandy soils, in the framework of research work performed in cooperation with U.S. Environmental Protection Agency for the neutralization was magnesia (magnesium oxide) lime, which is a waste product derived during the production of zinc. This lime contains large amounts of CaO and MgO, and moreover a number of trace elements. This lime gave good results. Under the program of utilization of industrial waste, materials for the neutralization are being used, in addition to ashes from power plants fired with lignite. In these cases, the ashes are being mixed with overburden in a continuous and controlled manner on the belt conveyors transporting the overburden and are jointly stacked. An additional advantage derived from such a solution is the liquidation of noxious stacks of fly ashes.

Depending on the degree of toxicity, the neutralizers are being used in single or double layers - before and after ploughing. Employed lately on soils acid are the combinations of various neutralizers.

As the research work indicated, the best results for cohesive soils were achieved from use of a mixture of two neutralizers: agricultural burnt limestone in quantity five tons per hector and ground phosphate rock in quantity three tons per hector. In conditions of the sandy soils with lower pH, the best effects were achieved from use of agricultural burnt lime in quantity 45 tons per hector and ground phosphate rock five tons per hector.

Fertilization.

For the enrichment of soils with nourishing components, one employs industrial fertilizers, most frequently the:

- N - urea, ammonium nitrate
- P - superphosphate
- K - potash salt.

The basic doses are being used before spreading in quantities relevant to the type of soil, from 200 to 699 kilograms per hector. Spread outside the roots is the nitrogenous fertilization in a shape of ammonium nitrate in quantitions determined as the occasion arises on the basis of observations of plant development.

In order to improve the chemical composition of toxic soils, an additional fertilization is used to introduce the lacking microelements in the soils, and which deficiencies are causing disturbances in quantities of nourishing components in the plants.

Vegetation of top portions of the stacks.

Introduced in the framework of reclamation, pioneering vegetation is chosen dependent on the terrain configuration, soil mechanical composition, chemical properties, climatic conditions, exposure, etc.

The rule is the introduction on the top areas of grasses and papilionaceous plants and on the slopes, trees and shrubs planted under the cover of grasses and papilionaceous vegetation. The compositions of employed mixtures are very differentiated, both in regard to the quantity of species, and the percent participation of particular species in the mixture.

Trees and shrubs planted on slopes.

With the choice of species composition and quantity of particular species, one considers next the habitat conditions in the composition must be present, species fulfilling the phytomeliorating, the protecting, the biocenotic functions and also the final destination species. The planting is performed at distances 1.5 x 1.5 meters, and the employed material is from nurseries and of high quality.

Conslusion.

The above characteristics of reclamation work for worked out terrains of lignite surface mines concern the routine activity in this respect. Parallel with the activity, research work is realized regarding the reclamation and restoration. Some of these have a character of complex research performed on a technical scale, as for instance, the research carried out in cooperation with EPA, and concerning the reclamation of toxic spoil stacks, and the research regarding agricultural restoration of soils.

These investigations as well as research carried out in other countries, should affect a further progress resulting in a continuing decrease in the periodical negative impact of the surface mining on the agriculture and on forestry.

Surface Mining Influence on Ground Water Environment

Jacek LIbicki
Chief Coordinator, Poltegor

1. Introduction.

Among the many directions in which the surface mining exerts its influence on the environment, its effect on the ground waters makes a large mark. Occurrences of this kind have particular significance, not only in Poland, but also in the whole central Europe, where the mining activity in majority of cases is conducted below the ground water table. The growing shortage of energetic raw materials, the rising prices and the need to prospect for substitute raw materials, force the hand, also in other parts of the world, to reach deeper and deeper with the open pits, where the water saturation of layers is stronger. One has to consider, that such problems will grow in time in the whole world, as on one hand the demand for raw materials will be rising, and on the other hand the resources deposited in favorable conditions, i.e., above the ground water table will be getting exhausted.

From the point of view of influencing on the ground water, the surface mines can be divided into the following groups:

Strip mines in which the activity is conducted above the ground water table:

a) situated above the level of the surrounding terrain - i.e. contour mining.
b) below the surrounding terrain level, but still above the stable ground water table.

Strip mines in which the works are conducted below the stable ground water table and, in which in order to enable the excavations, water was artificially drawn down:

a) through the mine itself, which constitutes a draining element, and within which the water accumulated in its lowest place is pumped away,
b) by means of specially made for this purpose, draining arrangements preventing water from indiscriminate coming into the mines (well systems, special underground galleries, draining holes, etc.).

In Poland the ground water table drawdown in pits included into the group II, fluctuates from few meters to several hundred of meters. In order to secure such a lowering of the water table, regardless of the kind of employed draining system, pumped away quantities of water range from 20 to 100 meters per minute in mines actually working now, and in construction is a strip mine, which shall require a pumping away of about 300 meters per minute of water. A deep draw-down (within the limits of actually 150 meters, and in a near future up to 300) cause around the dewatered areas the depression cones of radi exceeding many kilometers in some cases. Within the limits of these cones, the water table is lowered to a quantity varying from S max. in the center of the cone, to S → O on its boundaries.

The above described, in an abbreviated form phenomenon, leads to disturbances in water conditions of large areas, and such disturbances are finding their expression in water disappearance in wells and in other commercial water intakes, and sometimes also in deterioration in the plants cultivation conditions. This issue forms the first group of problems connected with the environmental impact of the surface mining onto the ground waters and could be generalized as a group of quantitative problems.

After the exploitation of mineral ends, either on account of exhaustion of deposit, or because of loss in profits, the open pit is being abandoned, that can be:

i) a dry pit with permeable bottom when situated above the stable ground water table,
ii) kept in a dry state with the still draining system existing from the exploitation period,
iii) flooded with water when situated below the ground water table and when the draining system working during excavation, was stopped.

Such open pits often located in industrialized areas, attract great interest of various companies, as the potential industrial wastes disposals. In Poland, the coal and power industry having significant amounts of wastes and ashes much in excess of their economically usable possibilities, shows interest in such a utilization of open pits. This apparently rational solution, conceals, however, in itself a potential threat in a form of ground water pollution with the substances leached from the dumped wastes. Such substances in ground water environment can migrate further to places where water is being taken to utilizable purposes. Connected with this phenomenon, issues constitute the second group of problems of surface mining ground water impact which can be termed as the group of qualitative problems.

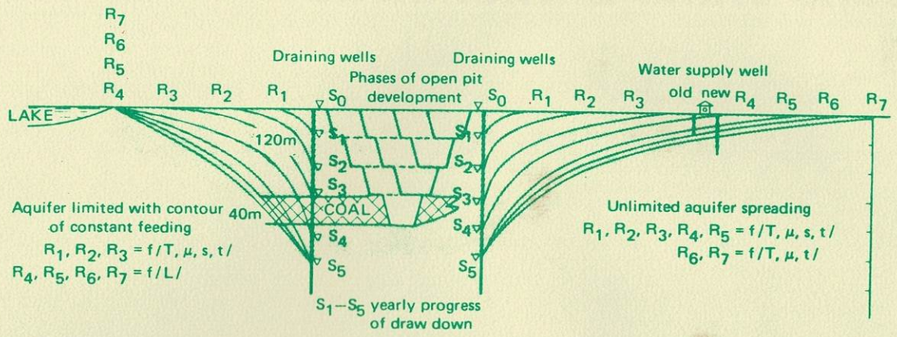


Figure 1. Schematic Section of the Cone of Depression Development/Outside Pit/With the Reference to Deep Drainage Progress and Phases of Openpit Extension.

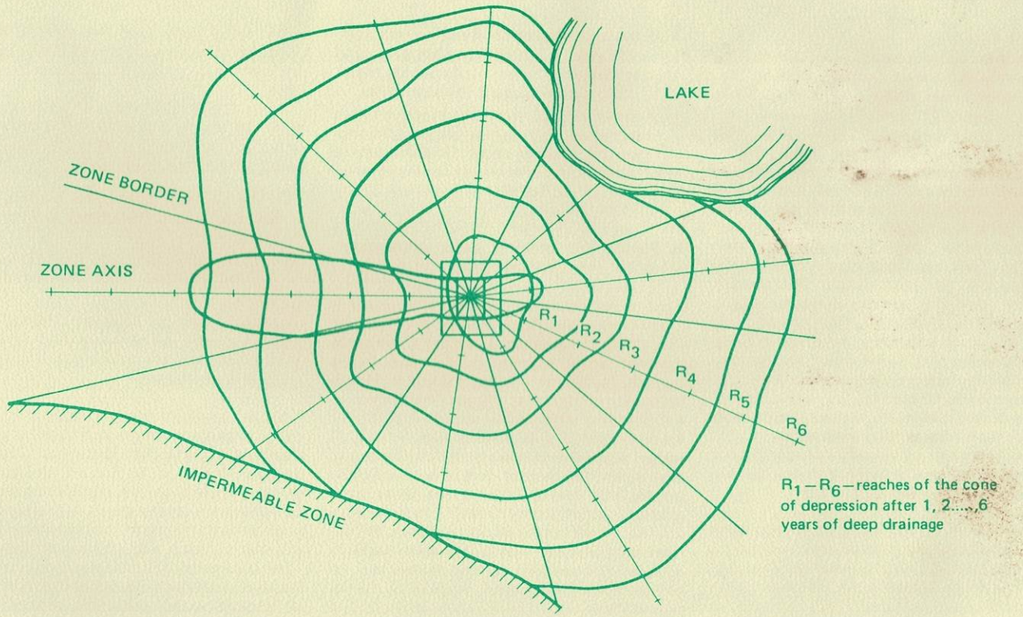


Figure 2. Schematic Map Illustrating the Spreading of the Cone of Depression on the Earth Surface.

2. Influence of the ground water table drawdown, by surface mining, on the surrounding terrains.

Already during the geological investigations and preliminary studies, work commences having as its goal a determination of mining operation influence on the water conditions of the surrounding terrains. The necessity of such work execution and the scope realized in them, assignations are being imposed by relevant regulations. To estimate the range of discussed phenomena on ground waters, first the reconnaissance of hydrogeological conditions, as required initial material to forecast eventual changes, is being carried out.

The hydrogeological investigations should lead to a determination:

- the depth of particular aquifers, their hydraulic relations and also the presence and positions of impermeable interlayers,
- conditions of feeding of particular aquifers, taken into particular consideration, either contours of constant feeding, or impermeable contours,
- parameters of permeability (filtration coefficient, and specific yield of aquifers),
- position of a stable water table and its eventual fluctuations in time.

Owing to the fact that the majority of hydrogeological phenomena associated with a deep dewatering of mines has an unsteady character - the variable in time, magnitude of depression and also phenomena should be examined in majority of cases as an aspect of unsteady flow conditions.

Having at one's disposal, these initial data, the forecast of a depression cone development can be made, dependent on requirements, with a simple analytical computation methods combined with structural analysis, or with methods of analogeous or numerical modeling.

The analytical computation methods are used at early phases of studies in making a general assessment of the influence range of phenomenon, also in cases where there is lack of adequate initial data for effecting more detailed calculations, and also when the hydrogeological conditions are uniform and not complicated, which usually happens with objects of small dimensions. In such cases, methods adopted from a classic water intakes hydrogeology are used. The used computation methods can be dispensed into two groups. The first one subordinates the reach of depression cone to the magnitude of depression, and partly to the amounts of evacuated water. The second group of formulas however, is based on the time aspect. Often in these calculations of advantage, the area around the depressed center is divided into radial sectors. The number of sectors should depend on the degree of hydrogeological conditions variability because the hydrogeological conditions within the range of particular sector, should be uniform, as far as possible. Then, after the computation of the progression of depression cone separately for each sector introducing interpolation, one can obtain a more approximate picture of the depressions cone shape.

For the objects of varying geological structure, and also for the advanced phases designing (when a more detailed assessment is required) methods of numerical and physical modeling are used. Simpler and enabling faster acquisition of results are the numerical methods using special computer programs. For large objects and the most variable spatially hydrogeological conditions, especially when the initial data area seems doubtful, the employment of physical modeling seems to be some times of more advantage. This facilitates an easier adjustment of model to the real conditions. In the framework of physical modeling, the area used is dependent on needs, electric grid, integrators of a resistance type or resistance - capacity type, and hydraulic integrators of the Hele-Shaw type. Physical modeling methods for the discussed purpose is sometimes labor-consuming and expensive in comparison with numerical methods.

The application of the above methods of procedure enables the determination of the depression cone range of a mine $R = f(t)$, and also with more detailed methods, the determination of a ground water head distribution at any given point of the discussed area and at any given moment of time $H = f(x, y, t)$.

Obtained in this way, prognosis of surface mine influence on the water conditions of the surrounding area, should serve the purpose determining:

- decrease in the output of existing water intakes (wells), and the scope of work necessary to amend the water supply in adequate standard,
- the damages in arable and forest lands expressed in diminished crops, and also the determination of change of directions in the manner of use.

The first group of problems is solved in Polish openpit mining by construction of new deep wells designed on the base of the maximal groundwater table drawdown, expected during the time of mining activity and on the base of program of water requirement prepared by local authorities. Therefore, the designing of water intakes takes place in fulfillment of all requirements for the standard communal water intakes, which has to be approved by local geological authorities.

New water intakes are constructed as joint ventures for one or few villages and water is distributed to the recipients by means of water pipelines. In exceptional cases when the quantity of required water is very small, the construction of water intakes, or a special branching off the pipeline is not payable, water is being supplied by means of cisterns. The whole operations are financed by the mining company.

The second group of damages lies on the borderland between the hydrogeology and agriculture and forestry, in investigations performed in Poland by Krajewski and Skawina. They distinguish as the base three types of water conditions prevailing in the soil, dependent on the position of ground water table:

- type I precipitational - retentional, in which the vegetation is supported only by the atmospheric precipitation, stored in the pores of the soil,
- type II intermediate, in which dependent on the seasonal ground water table fluctuations, the vegetation uses either the ground water (in spring), or precipitation water (in summer and in autumn),
- type III ground - water in which the vegetation uses the resources of ground water, the water table of which or the capillary zone, are within reach of the root systems.

3. Possibilities of limitation of the opencast mining negative influence on the ground water environment.

As has been proven in previous chapters, there exists an unquestionably negative influence of surface mining on the ground waters regime. This influence in the meaning both qualitative and quantitative may lead to long time disturbances in the field of life and economy, when utilizing the ground waters resources. Almost all activities having as their goal, improvement in the above described situation have as yet a form of redressing the damages caused, through construction of substituting objects, through change in the way of terrain utilization, or even only through payment of compensations. It is only a half-measure solution to the problem and therefore from now on an emphasis should be placed on an active prevention against these damages. A possibility of effective action in this direction can be seen in a change induced in a desired direction to natural conditions of ground waters flow. This can be achieved through the execution of a vertical impermeable shield, or a zone of a diminished permeability around the area on which the disturbance of natural hydrogeological conditions is occurring or at least on a part of area circumference, where such influence can be greatest. In certain determined cases where the role plays pollution of ground waters induced by a disposal of wastes, such a solution could be also the superficial sealing of the bottom and of the slopes of the fulfilled openpit.

Purification of Waters From Strip Mines

Henryk Janiak
Chief of Water Management, Poltegor

Introduction

The influence of the opencast mining exerted on the water regime adjacent to it terrains is one of its main influences affecting the environment. The mining activity is connected with:

a) the draw-down of the ground water table both on the area of mine, and on the adjacent areas,

b) the change in conditions of the surface waters runoff, in the effect of introduced changes in the cover and the relief formation of the terrain and the changes in characteristic, hydraulic parameters of water flow in these run-offs,

c) the change of hydrographic network on the adjacent terrains consisting in relocating, sealing and relocation of beds of rivers and creeks, executed mainly from the angle of view of future exploitation needs.

d) the change in physio-chemical composition of waters, flows and reservoirs as collectors of waters derived from the mine drainage.

In the framework of the above problems, the report concerns the issues connected with the quality of run off waters from the lignite strip mines, the employed technology in their purification and, the realized and planned studies regarding the new more effective methods of such waters purification. At the start, one would have to explain what the issue looks like of permitted amounts of water pollutions in the flows and reservoirs from the polish regulations point of view. According to these regulations, the waters in all flows and reservoirs were divided into three classes of purity relevant to their planned assignment, and so: to the first class belong flows of water assigned to supply the population with drinking water, also the industry that requires water of a drinking water quality class, and for breeding of salmon fish species.

To the second class belong flows of water assigned for a normal fish breeding, to supply the needs of animal husbandry, for the municipal swimming pools, and for all water sport practices.

To the third class belong waters assigned to supply industries, except the industries that require pure waters, and to irrigate agricultural areas used as horticultures.

One has to emphasize, that the permitted suspended matter level does not apply to periods of sudden water surges. The up-to-date regulations in force do not state precisely the permitted color and turbidity levels of the drained polluted waters and gullies. Basic parameters determining the quality of drained mine waters are most frequently the biochemical oxygen demand, B.O.D., the quantity of suspended solids, and sometimes also the iron, chloride and sulphate content.

The above norms are a subject of continuous up-dating consisting in ever decreasing levels of permitted norms of pollution. These requirements are rigidly observed both for the active and for the plants under construction and the deviations from them are possible only in exceptional, justified cases, and only for a short, limited period of time.

Quality and quantity of waters drained from a lignite opencast mine.

In the process of draining the mines, the drained waters can conventionally be distinguished as pure waters, and as polluted waters called the mine waters or mine sewages. Pure waters are taken normally from a well system of drainage and occasionally from underground gallery draining system during periods, when no mining activity goes on in them. Such waters as a rule are free from suspended matter, colorless, and of chemical composition typical for the underground waters of given area. These waters are identical in their composition with surface water of the first class purity, and are pumped away to the receivers, without any, prior treatment. The polluted waters are coming from the underground galleries, and the open pit excavations proper. The chemical composition of such waters during the periods of no atmospheric precipitation approaches the composition of ground waters, but differs very much when the rainfalls start.

In order to determine the load carried away with mine waters pollutions, is not sufficient to know the concentrations, there is also required the knowledge of waters drained away from both the underground and the surface drainage system. The inflows of ground waters are determined by means of appropriate hydrogeological calculations. They constitute a continuous average outflow from the openpit.

Waters derived by precipitation are the second element of inflow into the open pit. These inflows characterize significant

fluctuations both in yearly and long term sectors, and constitute a significant percentage of mine waters evacuated from openpits. These quantities are difficult to estimate. It was assumed on the basis of long term observations in the Polish surface mining circumstances, that the authoritative inflow of precipitation water into a pit can be deduced on a basis of outflow determination of daily precipitation, with the occurrence probability of 0-50 percent, taking into account a corresponding coefficient of the outflow of the considered catchment area. The approximate values of an average inflow of polluted waters in particular mines in meters 3 per minute change from 20 to 120 meters 3 per minute.

These values comprise solely quantities of dirty waters, constituting usually 60-100 percent of all waters that are being drained. Drained at the present time from all lignite strip mines is about 150-200 millions of cubic meters of water a year and the resulting from it index of water-logging fluctuates from 1 to 10 meters 3 per ton of the excavated coal, on an average 1:5,0. By the year of 1980 the total quantity of so drained waters may grow as expected to about 400 million meters 3 per year and in this amount the polluted waters will be about 200 million of cubic meters (dependent on the employed technology of draining).

Nowadays the tendency is to use the well system in deep draining which is conducive to a decrease in polluted waters quantity. Waters carried away from the hitherto being excavated mines both pure and polluted are discharged mainly to the superficial collectors. The more and more experienced water deficiency, particularly in extensively industrialized areas, forces to regard the waters drained as a source of water, especially needed for cooling purposes in power plants constructed near the mines. The problem of water purification in this case is connected with a simultaneous treatment to achieve standards required for cooling waters.

Methods used at present in mine waters purification.

Purification of mine waters requires a reduction in particulate matter on an average to within the 60-95 percent limit. An initial suspended matter concentration in mine waters of Adamow and Konin region amounts mostly to 100-300 milligrams per liter during periods without precipitation, and rises to 1000 milligrams per liter and more after the rainfall. The concentrations of suspended matter in waters from Turow mine are higher still. The required concentration of suspended matter in waters evacuated to receivers cannot exceed the 20-50 milligrams per liter rate relevant to the established classes required for the receivers purity level. The reduction in the suspended matter concentration as up to now practiced is taking place in large sedimentation basins of a total area above 60 ha. In the years of 1964-65 tests were performed experimentally on water purification in the strip mine Kazimierz by means of hydrocyclones. The constructed hydrocyclone purification plant worked for about two years. Owing, however, to poor effects of reduction, especially where the turbidity particles were concerned, and to some difficulties with its operation, this technology

Lignite is transported directly out of the mine into the Turow Power Station by belt conveyor. After the mineral is burned the fly ash is transported to the outdumps, where it is mixed with the acidic overburden material before backfilling.

did not find a wider use. Practically, for the purification of mine waters to the requirements contained in the obligating rules, sufficed a process of sedimentation in large field sedimentation basins.

The earliest sedimentation basins constructed before 1960 had considerable volumes and long theoretical times of water retention, amounting sometimes to five days, as calculated from average inflow value. Later the sizes of the sedimentation basins were getting smaller gradually and at the same time their effectiveness was improving. Nowadays the basis for the sedimentation basin dimensioning is a 24-hour time period of retention of average inflow.

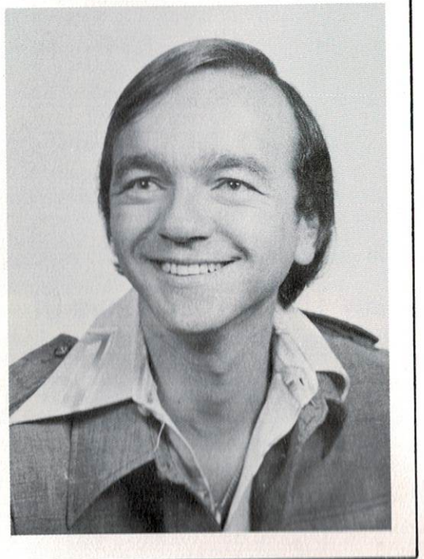
During the latest field observations it was found that the basic sedimentation process of some sedimentation basins was taking place on an area of 30-40 percent of entire area of such sedimentation basin and the actual time of retention was in fact two to four times shorter than the theoretical time. This proves a low basin utilization coefficient and a small proportion of its operative volume. This condition had been caused by several factors, such as the direction and speed of winds, types of in and outflows of water, geometrical dimensions and the shape of sedimentation basin, the configuration of the bed and a number of other factors, which to a greater or smaller extent were disturbing the flow. It was established on the basis of results of these tests, that the effects of water purification to the presently demanded level, can be achieved by employment of sedimentation basins with shorter water retention times, and, what goes with it, with smaller areas, in effecting changes in their contours and dimensions, and in solving the in- and outflows, and in employment of procedures aiming at a limitation to minimum of undulating movement of water as caused by the action of wind.

A practical solution of this problem can be achieved with the use of following applications:

1. Construction of a partitioned sedimentation basin into many chambers, both in series placement and in parallel placement, with the maximum dimensions of a chamber kept to within 50x150-200-meter limits.
2. Implementation of a protection measure against the wind action on the waters in the sedimentation basin. To this end one proposes the establishment of a belt of trees and shrubs both around the sedimentation basin and on the inner dykes separating the chambers.
3. Decrease in active depth of the sedimentation basin to 150 meter maximum, with a simultaneously maintained uniform cross-section on the entire length.
4. Observance of a rule of introducing and evacuating water from particular chambers along the whole width of the sedimentation basin.

The implementation of only some of these recommendations resulting in a construction of a special experimental sedimentation basin allowed to attain an active capacity to within 60-80 percent of its entire volume, i.e. about 15-20 percent higher, than the ones acquired in the sedimentation basins constructed previously.

Study Measures Surface Mining's Impact on Wildlife



David E. Samuel, Associate Professor of Wildlife Biology, Agriculture and Forestry, West Virginia University

The nation's need for energy fuels such as coal and oil is creating much concern — not only in diplomatic circles in Washington but in the forest kingdom as well.

As increased energy demands require mining and drilling in wilderness areas, wildlife habitat is being disturbed. How wildlife is affected by this is of prime concern to David E. Samuel, associate professor of wildlife biology in West Virginia University's College of Agriculture and Forestry.

Since 1972, Samuel has been studying how wildlife adapts to environmental changes in reclaimed coal mining sites in Preston County.

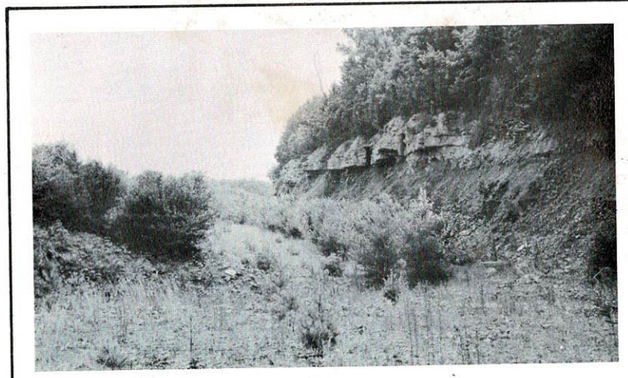
"Our study is concerned with the types of wildlife that live in reclaimed areas, compared with the types that lived there before the areas were mined," Samuel explained.

"We need this information now at a time when we are doing more and more surface mining. If we are to preserve wildlife, we should at least consider ways to reclaim the land in a way that best suits the birds and animals.

"Reclamation usually is aimed toward man's interest," he said. "It is done to make the land look nice. What looks nice isn't always best for wildlife. I'm trying to discover the best way to reclaim land both for man and wildlife."

Samuel's initial study began with an analysis of deer movement in reclaimed surface mined areas. Deer movement, he found, can be restricted by extremely steep highwalls. Highwalls are vertical cuts made in mountains during the mining process and look much like the cuts made where highways pass through mountains. There are 6,000 to 8,000 miles of highwalls in West Virginia, according to Samuel. Now deer don't often fall off the tops of highwalls, as many would believe but Samuel was interested in deer movements around the wall.

He, and a graduate student from Ivy Dale (Ray Knotts) found that in many cases, the vertical drop of highwalls isn't so steep as to prevent deer movement. But deer won't normally attempt to traverse a highwall composed of 20 percent or more rock, according to the study. This is the major problem relative to deer movement. It appears that steep highwalls are not as much a problem as the amount of rock in the highwall.



A typical bench is shown above with the highwall on the area being studied. Autumn Olive has been planted on the bench.

This aerial view of the study area shows the typical highwall in the center of the picture.

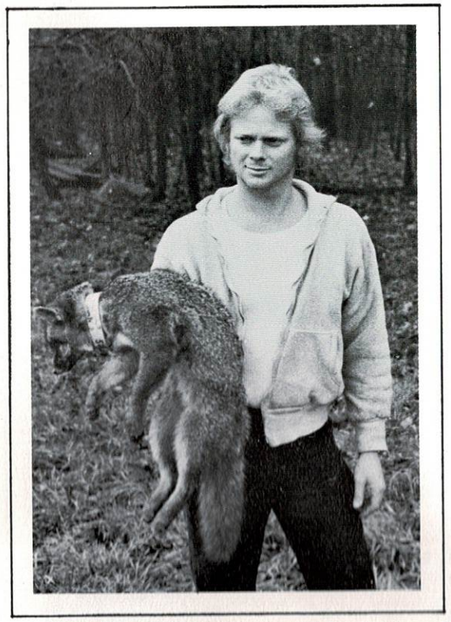
Deer often use land bridges in their travels across the reclaimed areas. These bridges are mounds of earth that span the highwall, acting much like a ramp from bottom to top.

Present reclamation laws require construction of a land bridge every half mile along a highwall. These are designed to provide human access to the land beyond the highwall, but wildlife also use them.

"The idea behind land bridges is a good one," Samuel said. "But they are too far apart." According to his research findings, land bridges should be no more than 484 feet apart along steep or rocky highwalls. "To some degree, deer will avoid areas where there aren't enough land bridges," he said.

Vegetation on land bridges presents another problem in the overall reclamation picture. Researchers found that deer prefer land bridges with vegetation less than three feet high. However, a common procedure in land bridge construction is to plant Autumn Olive trees along the edge of the bridge to hold the soil and to provide an appealing vegetative cover.

"The trouble with Autumn Olive is that it grows rapidly and spreads inward toward the center of the bridge, creating a tunnel through which the deer must walk. If a bridge becomes too overgrown and too tunnel-like, deer simply refuse to use it," Samuel said. "An overgrown bridge isn't safe, it's like a dark alley."



Wearing a radio transmitter collar, this red fox will be released on the reclaimed surface-mined site in Preston County where it was trapped by WVU researchers to study the fox, gathering information about the animals feeding and shelter habits. Earle Yeasley, wildlife management graduate student from Pittsburgh is in charge of the study.

When Samuel expanded his study to include research on fox and grouse in reclaimed areas, Autumn Olive again was involved. Fox, it seems like to feed on Autumn Olive berries so the trees help to bring fox into the area.

"A happy medium must be reached when planting Autumn Olive," he said. "Too much, and the deer will leave, too little, and we may lose some of the fox population."

The reserach being conducted with foxes involves the use of radio transmitters to monitor their movement in the reclaimed areas. Collars with transmitters are fitted on the foxes which are trapped in the area and then released. This type of study, called a telemetry study because it uses transmitters, is the first carried out at WVU.

Earle Yearley of Pittsburgh, a wildlife management graduate student who is in charge of the fox study, has spent countless hours both day and night following the radio-equipped fox. Without transmitters, fox would be virtually impossible to follow because they feed at night and have a fear of man.

By following the fox, Samuel hopes to learn what they eat at different times of the year, where they feed, and what types of cover they prefer. With this information, reclaimers can plant areas with vegetation that suits the diet and shelter of the fox. Since fox are predators, the area can be planted in grasses that will attract mice and other rodents which fox eat. Preliminary results indicate that gray foxes living near reclaimed sites spend one-third of the evening feeding on mines in the spring, about 10 percent of the evening feeding on mines in the summer, 50-60 percent of the evening feeding on mines in the fall, and 30 percent of the evening feeding on mines in the winter.

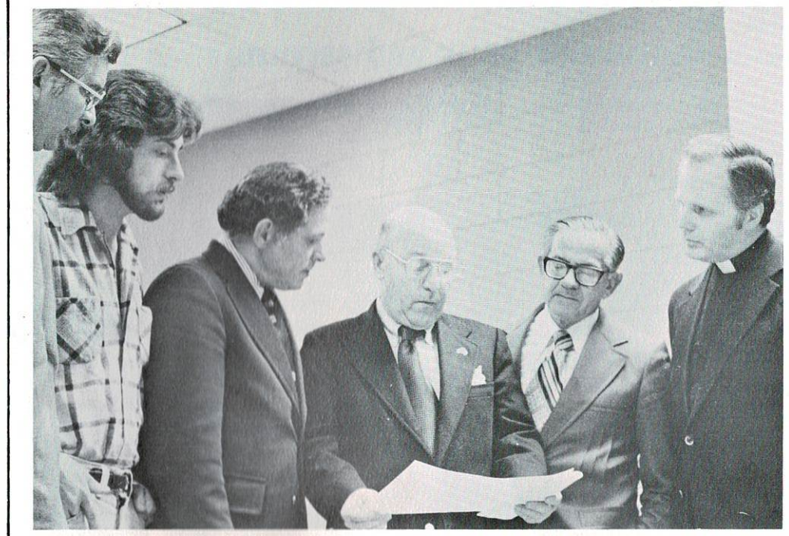
Using a unique method developed by William Healy of WVU, graduate student Richard Kimmel of Morgantown is able to study wild ruffed grouse in the reclaimed area. The method he uses, called imprinting, involves hatching wild ruffed grouse eggs in the presence of a human. The young birds, knowing no natural mother, associate or imprint with Kimmel and consider him their mother.

In the WVU study, Kimmel will lead his flock of birds onto the reclaimed area and observe their behavior without scaring them. The information he collects on grouse feeding and shelter preference can aid in determining the type of replanting that should be done on reclaimed areas.

Surface mine operators have invited Samuel and his group to talk at meetings about the research in W. Va. "Their interest in reclamation is reassuring," he said. "I want to get them to think total reclamation and that includes reclamation for wildlife."

When Samuel finishes his study, he hopes to be able to present the surface mine industry with an overall plan for total reclamation.

"It's not a case of mining or not mining," Samuel said. "That's ridiculous. We need energy fuels. But we don't want to sacrifice wildlife at the expense of fuel. Wildlife deserve proper reclamation".



From left to right John Ashcraft, Director West Virginia Bureau of Mines; Roger Pauley, student; Clarence Burdette, Assistant State Superintendent, of Bureau of Vocational, Technical and Adult Education; Senator Alan Sussman, sponsor of the bill to establish miner training; John Sanack, Kanawha County Superintendent of Schools; and Father Currie, Chairman Board of Miner Training, look over the requirements for completing the 80-Hour Pre-employment Training Program For Underground Miners.

Senator Alan Sussman addresses the first class of the 80-Hour Pre-employment Training Program for Underground Miners at the Carver Career and Technical Center in Kanawha County. Senator Sussman sponsored the bill that set up training classes in counties throughout West Virginia.

State Initiates Pre-Employment Training

The 80-Hour Pre-Employment Training Program for underground miners was officially initiated Monday, March 1. Classes in Kanawha County are being held at Carver Career and Technical Center in Rand.

Plans for the program were initiated in 1974 when the West Virginia Legislature passed a measure requiring pre-employment training of both underground and surface miners. At that time, the legislature appointed seven members to the newly-created Board of Miner Training, Education and Certification, for the purpose of setting up criteria and implementation dates for the pre-training program.

Following several public hearings and extensive work, criteria for prospective underground miners was approved by the Board last August and implementation dates were established. March 1, 1976 was slated as the initiation date of the program. Effective May 1, 1976, no coal company can hire persons to be employed as underground miners in West Virginia coal mines unless that person has earned an apprentice permit or is a certified coal miner.

The Department of Education, Bureau of Vocational, Technical and Adult Education, the West Virginia Bureau of Mines and the Kanawha County School System were instrumental in carrying out the proposed criteria and organizing the classes. In Kanawha County, the class has been limited to 30 students, with a new class beginning the first of each month. The instructions last six hours daily for two and one-half weeks. The time and length of the classes has been left to the discretion of each individual county, as long as the 80-hour requirement is met.

Subjects covered in the class will include: general mine safety and first aid; mining methods and terminology; state and federal laws and regulations; mine and operator rights and responsibilities; and ventilation and mine mapping. Upon completion of the 80 hours of training, an examination will be administered to the students by the Board. A permit of apprenticeship will then be issued to students passing the exam.

Criteria for the pre-employment training for surface miners is presently under consideration by the Board and will be announced this summer.

1976 Coal News Calendar

JUNE 30 — JULY 3
National Coal Association, 59th annual convention, The Broadmoor, Colorado Springs, Colo.

JULY 18-21
West Virginia Surface Mining and Reclamation Association, 10th Annual Meeting, Greenbrier Hotel, White Sulphur Springs, West Virginia

AUGUST 4-6
West Virginia University, Dept. of Electrical Engineering, 3rd conference, Coal Mine Electrotechnology, Lakeview Inn and Country Club, near Morgantown, W. Va.

SEPTEMBER 26-29
American Mining Congress, 1976 mining convention, Denver Hilton, Brown Palace and Cosmopolitan Hotels, Denver

OCTOBER 1-2
West Virginia Coal Association, fall membership meeting, Lakeview Inn and Country Club, near Morgantown, W. Va.

OCTOBER 14-16
Kentucky Coal Association, annual meeting, Holiday Inn North, Lexington, Ky.

OCTOBER 22-23
West Virginia Surface Mining and Reclamation Association Fall Board Meeting, Lakeview Country Club, Morgantown, W. Va.

250 Attend Semi-annual Meeting

This year's semi-annual meeting at the Doral Country Club, Miami, Florida, was the largest ever, with nearly 250 Association members and guests in attendance.

A Board of Director's meeting and the individual committee meetings got things underway Thursday afternoon, February 12. Following this was a poolside welcoming reception and bicentennial skit, held in commemoration of Abraham Lincoln's birthday. Distinguished members of the cast included: George Washington (Jim Justice); Daniel Boone (Gil Frederick); Ben Franklin (Secondo Dalporto); Richard Nixon (Mike Kennedy); and 1776 Continental Army Band (Lawson Hamilton, George Davis and Haven Rollins); and honored guest Abe Lincoln (Charlie Jones).

Friday morning, following the men's breakfast meeting, a special membership meeting was held. Discussion during this meeting focused on the adoption of a new dues structure necessitated by decreasing coal production and inflation. The full membership passed, by unanimous vote, the proposal by the Finance Committee to change the structure to a more equitable situation. Under the new dues structure, associate members will continue paying one (1) mill for each gross dollar sold to the West Virginia surface mining industry. General members, however, will now be paying on the same basis. Rather than paying one cent per ton produced, all general members will be assessed one (1) mill for gross receipts from the sale of surface mined coal in West Virginia. The new dues structure is retroactive January 1, 1976.

The Ladies Open Golf Tournament, chaired by Ginny Frasher and the men's "World Famous WVSMRA Doral Open," chaired by Fil Frasher, were held that afternoon. Winners of the tournaments were:

Men	Ladies
low gross: Louis James	low gross: Jean Snyder
2nd low gross: Jim Justice	2nd low gross: Mildred Johnston
3rd low gross: John Jamison	low net: Shelley Poindexter
low net: Mike Kennedy	low score par 3: Tiz Scalavi
low score par 3: Secondo Dalporto	low putts: Mary Persinger
low putts: Jim White	most fives: Vi Frederick
most fives: Jack Stephens	most sixes: Marian Davis
most sixes: Ed Lucas	most balls in water: Donna Basham
most balls in water: Frank Vigneault	

The men's breakfast meeting, held Saturday morning, was highlighted by a tax symposium presented by Jerry Blank of Bache and Company, New York. Using a model of the average West Virginia surface mine operator, Blake showed the best way to save on taxes, through the use of computerization.

A boat trip to Fort Lauderdale for lunch at the famous Patricia Murphy Restaurant was on the morning agenda for the ladies.

at Doral

The annual tennis tournaments, chaired by Frank Jennings, highlighted the afternoon activities. Tournament winners included:

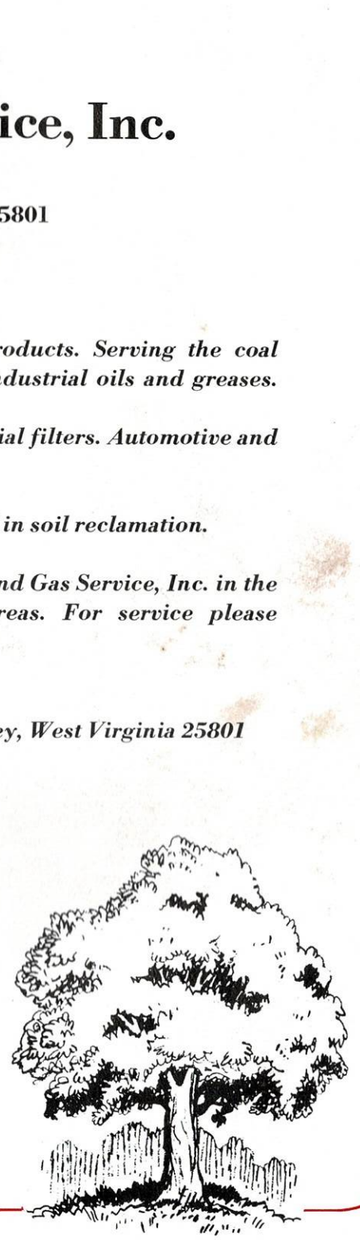
Men's Singles
1st place: Loyd Williams
2nd place: Duayne Snyder

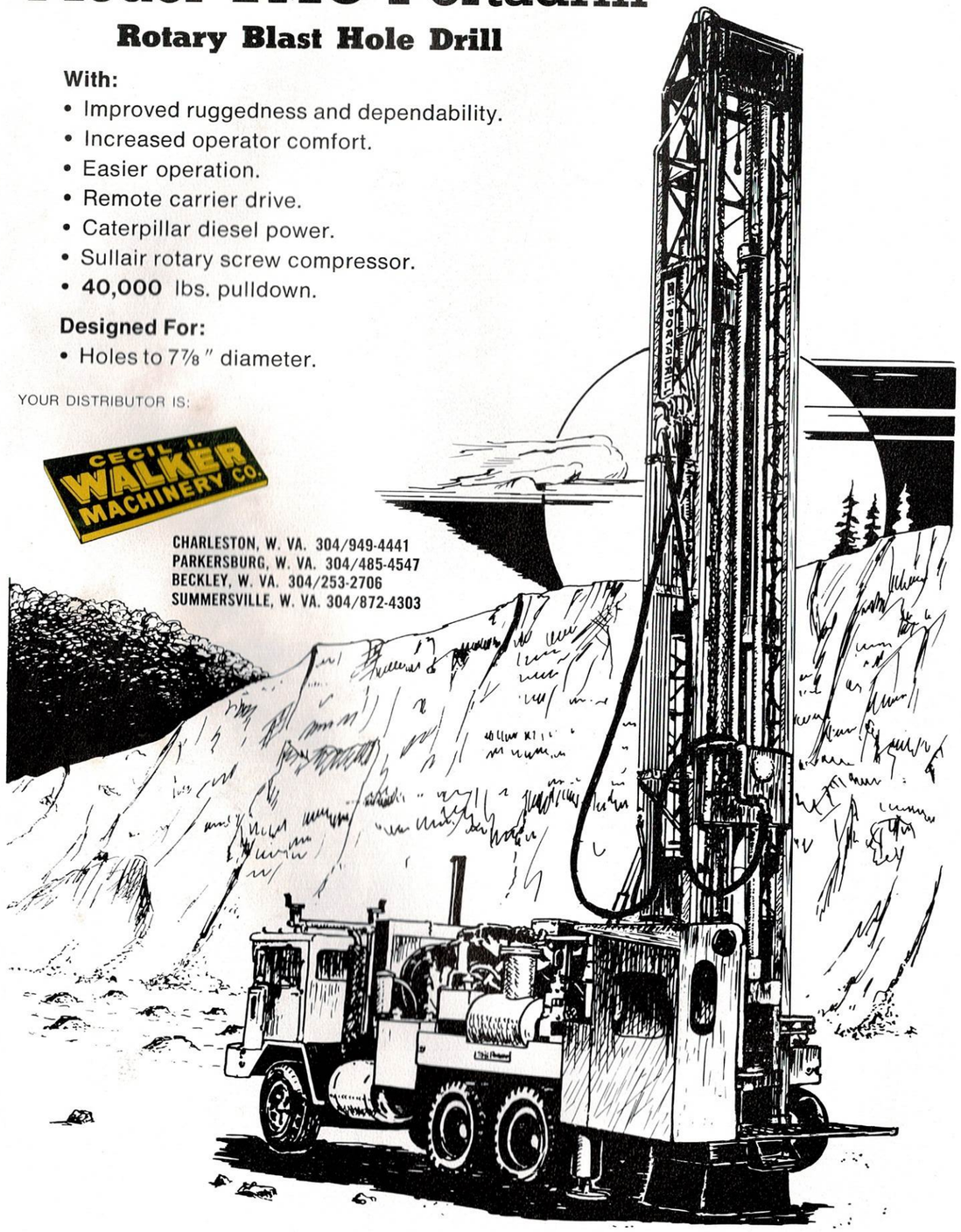
Women's Doubles
Mary Ann Adkins and
Mary Jennings

Mixed Doubles
1st Place: Dottie Williams and
Frank Jennings

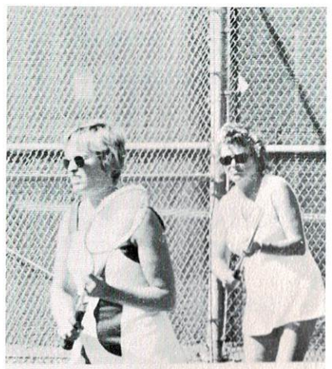
2nd Place: Mary Ann Hamilton and
John Sturm

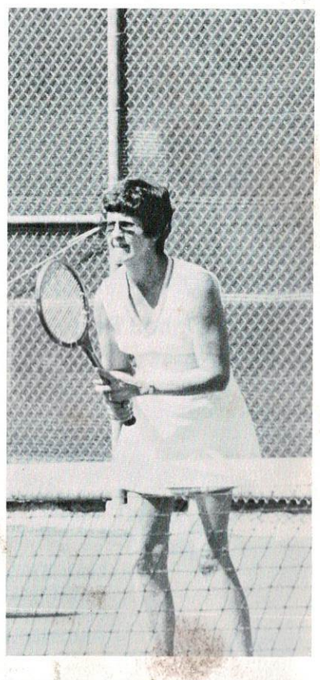
Activities of the three-day meeting were wrapped up Saturday evening with a closing banquet and St. Valentine's Day Dance. Jim Justice, program chairman, was toastmaster for the banquet and Mike Kennedy, chairman of the board, delivered the State of the Association Address. Entertainment was provided by Barry Benton's Orchestra and all ladies in attendance were honored as special guests.

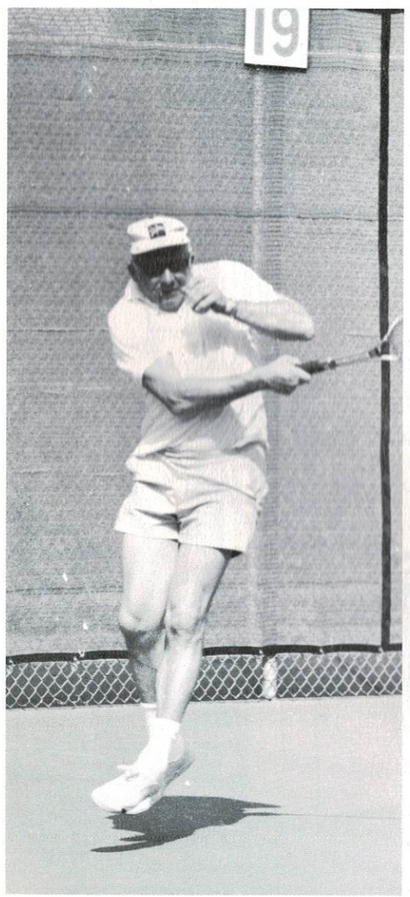


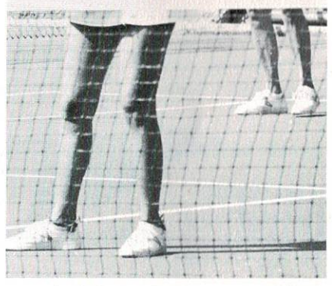


. . . Athletics? Bicentennial

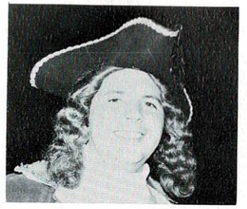


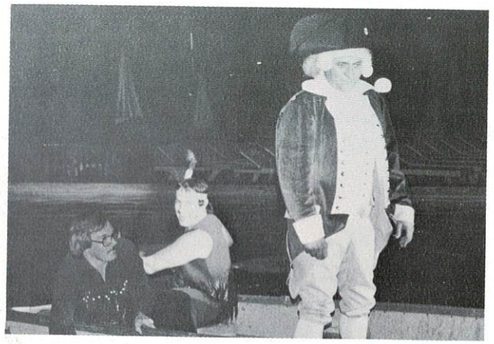


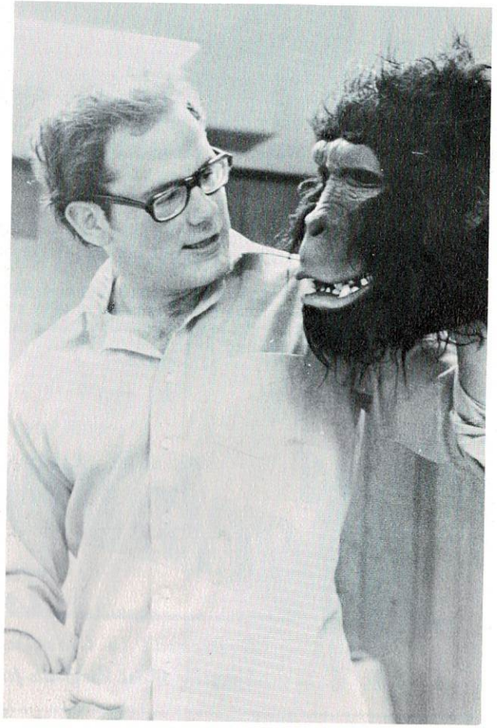




Highlight Social Events







industry in the news

Water Lab Moves To Charleston

The West Virginia Surface Mining and Reclamation Association announced today the relocation of its Environmental Quality Control Laboratory at 1624 Kanawha Boulevard, East, Charleston, West Virginia. The lab was moved to the Association's Charleston headquarters from 1149 Valley Drive, Beckley, West Virginia, where it has been in operation since December, 1974.

Association Technical Services Director John W. Sturm, who oversees the water testing facility, explained that the move was made as part of an effort to consolidate and centralize the various services of the surface mining organization.

"We originally established the lab in Beckley on a test basis, with plans to branch out to other areas of the state," Sturm said. "However, we have found that we can better serve the surface mining industry through one central facility with the capability of dealing with the individual problems of each operator, regardless of his location."

In addition Sturm announced a new state-wide pick-up and delivery program for water samples that will facilitate use of the lab by member companies. The service will be provided in conjunction with Cecil I. Walker Machinery Company of Charleston. Walker is initiating its new "Midnight Flyer" service, which guarantees heavy equipment parts delivery in West Virginia within 12 to 16 hours. Pick-up and delivery points will include Walker Machinery offices in Charleston, Beckley, Summersville, and Logan.

In order to offer blanket coverage of the Mountain State, pick-up points for northern West Virginia will be at Mary Ruth Coal Company at Kingwood and at Mountaineer Euclid, in Clarksburg.

Surface mine operators utilize the lab for analysis of water samples from their operations. This testing is required by both state and federal government in order to maintain the best possible water quality.

Island Creek Opens Western Office

Island Creek Coal Sales Company has established a new sales office in Denver, Colorado, for the procurement and sale of western coal. A subsidiary of Occidental Petroleum Corporation, Island Creek Coal Sales Company is headquartered in Lexington, Kentucky.

Named as western sales manager was Jack Combes who was promoted from a similar position with Island Creek's Detroit sales office. The new Island Creek sales office is located at the Denver Technical Center, 8301 East Prentice Avenue, Englewood, Colorado, 80110, telephone number (303) 770-6021.

Combes has 24 years of experience in coal sales and he joined Island Creek in 1970 as a salesman in the Cincinnati district sales office. In 1972, he was transferred to Detroit as a senior salesman and became district manager of the Detroit sales office in 1973.

He is a native of Cleveland, Ohio, and attended Rollins College in Winter Park, Florida, and the University of Missouri. Combes and his wife Betty will reside in Littleton, Colorado.

Island Creek Coal Sales Company has district sales offices in Cincinnati, Detroit, Chicago, Englewood Cliffs, New Jersey and Greensboro, North Carolina.

Conversion Plant Demonstrated by Conoco

The nation's first integrated and continuous pilot plant conversion of coal to a synthetic gas which has the heat content of natural gas has been successfully demonstrated here by Continental Oil Company. Conoco is the parent firm of Pittsburgh-based Consolidation Coal Company.

In announcing the breakthrough, Conoco reported the Rapid City coal gasification project and the pilot plant it manages has manufactured pipeline quality gas suitable for residential and commercial use from raw lignite coal.

The Rapid City performance exceeds that of any coal gasification pilot plant in the United States to date, Conoco said.

Lignite has a low heating value and is found in abundance in about a dozen Southern and Western states, including the Dakotas. "Pipeline quality" designates gas with the high heating value of increasingly scarce natural gas.

The totally integrated gasification project here is managed by Conoco Coal Development Company, a Conoco subsidiary, under contract to the federal Energy Research and Development Administration (ERDA) and the American Gas Association (AGA). It utilizes a process developed by Conoco at its Library, Pa., research center for the gasification of low sulfur Western lignite and sub-bituminous coals. Lignite mined in North Dakota by Consolidation Coal Company (Consol), another Conoco subsidiary, feeds the pilot plant.

While the basic Conoco CO^2 Acceptor gasification process—which produces an intermediate BTU synthesis gas—had been successfully demonstrated at Rapid City earlier, two recent plant runs included the additional step methanation which upgrades the product to pipeline quality.

All performance criteria established by ERDA-AGA to prove "technical feasibility" of the integrated system were achieved, project officials reported.

One recent run exceeded seven days, achieving full design process conditions while the plant operated at its capacity of gasifying 32 tons of lignite per day.

"The success of the methanation unit and the successful operation of the totally integrated plant are major advancements in coal gasification technology," said Dr. John Sudbury, vice president of Conoco Coal Development Company.

This marks the second major advancement on two coal gasification fronts announced by Conoco during March.

On March 16, Conoco reported that the "slagging" gasifier plant at Westfield, Scotland, for which Conoco is coordinating sponsor, recorded two record production runs. The technology demonstrated at Westfield is included in a proposal submitted to ERDA by a Conoco-led consortium to build a coal gasification demonstration plant in Eastern Ohio that would use high-sulfur Midwestern coal. Conoco announced the bid—one of five submitted to ERDA—last week.

The Rapid City project, in 34 plant runs to date, has reached the technical objectives sought by Conoco of its CO^2 Acceptor process. These include moderate pressure requirements, high thermal efficiency, production of synthesis gas ideal for methanation, and absence of phenol or tar produced.

Other advantages, according to Conoco, are complete carbon utilization, simplified sulfur cleanup, and no need for an oxygen plant.

Project officials said pilot plant testing of the process is nearly complete and that the next step in development would be a large demonstration plant with commercial-size components. A study will begin shortly to investigate the economic feasibility of such a plant.

The $9.3 million pilot plant to Rapid City was built and is operated by Stearns-Roger, Inc. Limestone from a Rapid City company is used as the acceptor material. The $1.8 million methanation unit, recently completed, was built by Dravo Corporation.

Nutter Honored By City of Hope

F. B. "Fil" Nutter, Sr. has received the Spirit of Life Award from the City of Hope, which will establish a medical research fellowship in his name. Nutter, who is the President of Hobet Mining and Construction Company of Charleston, was selected for his enduring dedication and production in the advancement of mankind.

The City of Hope is a national non-sectarian medical research center in California, specializing in treatment of the catastrophic diseases. It's doors are open, at no cost, to those suffering from cancer, leukemia, chest, blood and heart ailments, in addition to respiratory problems, diabetes and other disorders of heredity and metabolism.

Euclid Names New V.P.

Recently named vice president of Mountaineer Euclid, Inc., South Charleston, West Virginia, was H. Whitley Perkins, 1222 Briercliff Road, Bridgeport. The announcement was made by J. M. Poindexter, president, effective January 1, 1976. Perkins has been serving as branch manager for the northern office in Clarksburg, West Virginia since 1969.

A native of Bluefield, West Virginia, Perkins was a salesman in Beckley and Charleston for ten years with Mountaineer Euclid before coming to Clarksburg. He is a graduate of Greenbrier Military School and holds a B.S. degree in industrial management from West Virginia University. Perkins serves as an elder in the Bridgeport United Presbyterian church and is the immediate past president of the Bridgeport Country Club. He is a member of Bluefield Masonic Lodge and Beni Kedem Shrine of Charleston. He and his wife, Pat, have two children.

Perkins will continue to be in charge of operations for the Mountaineer Euclid Clarksburg office which serves northern West Virginia and western Maryland.

WEST VIRGINIA SURFACE MINING AND RECLAMATION ASSOCIATION