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At Amoco Production, we realize that people are the key to a bright energy future. With supplies becoming critical, we are aware that it will take a super effort on our part to keep the mines and of service to alumni. Even with this progress, many areas remain in which the Association needs to make further improvement and to become an even more vital force at Mines.

The objectives and programs of the Association have been published during the past two years in a brochure, "What Your Association Is All About," mailed to all alumni. The information is also published annually in the MINES Directory, which you recently received. Those objectives and programs which result were developed after extensive consultation and discussion with alumni and the Association Board of Directors. The broad consensus is that the first priority objective is the maintenance of the relationship between the alumni and the School and mobilizing alumni in support of Mines. A second priority is providing service to alumni for professional and personal development.

The interest Mines alumni have in the School's planning involvement and student service to alumni for professional and personal development.

Whether it be offshore drilling, exploration or production, the challenge is there for you at Amoco. Although the days of the Old West are gone forever, the pioneering spirit is still alive and thriving at Amoco Production.

Our frontiers haven't vanished, they're just harder to find.

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We also realize that risks must be taken to locate adequate fuel supplies. That's why Amoco Production has been the nation's most active wildcarder, and an industry leader in the total number of wells drilled.
That's the challenge - the great search for oil and gas reserves. This country is not running out of reserves, but they certainly are getting harder to find.

At Amoco Production, we realize that people are the key to a bright energy future. With supplies becoming critical, we are aware that it will take a super effort on our part to keep our nation alive and thriving at Amoco Production.

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Our frontiers haven't vanished, they're just harder to find.

Whether it be offshore drilling, exploration or production, the challenge is there for you at Amoco. Although the days of the Old West are gone forever, the pioneering spirit is still alive and thriving at Amoco Production.

As many of you know, I recently resigned from the position of Executive Director of the CSM Alumni Association to accept a position in the mining industry.

My four and one-half years at Mines have been exciting ones. I think it is safe to say that the combined efforts of the Board of Directors, many, many hard working volunteer alumni, and a dedicated staff have resulted in significant progress in the development of the Association.

Association membership is now over 4,000, larger than ever before, and close to 50% of all living alumni.

Association revenues have increased from $100,000 to $250,000 per year, with our financial results solidly in the black.

The Association has expanded and intensified its efforts to alumni and their families, with continuing education programs, an effective placement service, a widely read MINES Magazine, a range of student services and local section support.

The Association has taken an active role in supporting Mines by providing support to the development program, by maintaining records on alumni and by participating in the planning process for Mines.

This period has also been among the most satisfying of my professional life. The opportunity to work closely with so many alumni and the faculty and administration at Mines has been a stimulating experience. The progress has been significant and I think we can all feel good about the effective role that the Association is playing in being of support to Mines and to service to alumni.

Even with this progress, many areas remain in which the Association needs to make further improvement and to become an even more vital force at Mines.

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The broad consensus is that the first priority objective is the maintenance of the relationship between the alumni and the School and mobilizing alumni in support of Mines. A second priority is providing service to alumni for professional and personal development.

The interest Mines alumni have in supporting their school is illustrated by the way in which so many alumni have followed to the banner of The Resource Fund, the major development program. Alumni are making significant contributions by their volunteer effort and their financial commitments. Of the $25.0 million now committed to the Fund, over $9.0 million has come from alumni.

We have made good progress in serving each of these objectives in the past four and one-half years. In my judgment, however, the Association should be doing a great deal more in our top priority area, support of the School. At present the requirements for financial independence established by the CSMAA Board of Directors necessitates that the Association staff focus the major share of its attention on programs which generate revenue for the sale of services: advertising, placement, continuing education and the like. As a result there is little time available for service in the areas defined as our top priority, but which do not produce revenues directly: local section support, alumni meeting organization, development support, School planning involvement and student services.

I have urged the Board to seek financial support from the School and the CSM Foundation to enable the Association to expand its activities in these vital areas. Even with a substantial degree of support, our Association will still be far more financially self-sufficient than any other alumni association. The situation nationally is that almost all alumni associations are supported completely or in large measure by their institutions. With additional support, the Association can be more active while maintaining broad coverage and financial results.

With the resources to be more effective in these vital, top priority areas, our Association can further develop as a vital force at CSM and be able to do its part in making sure that our School continues to grow in stature as the world's foremost college of mineral engineering.

A Review and Recommendation
by George W. Mitchell, Jr., '53

George W. Mitchell Jr.
trolled test we wouldn't want our R & D engineers to withstand punishment without leaking. It was an uncon­
This was an extraordinary test of the MESABI Core Radiator take. MESABI Cores are so tight that L & M Radiator
caused by leaking radiator seams or punctures. MESABI Core relieves the threat of equipment downtime
warrants them against leaking for 18 months.
seals which hold individual cooling tubes in radiator headers. The seals absorb stresses soldered joints can't
headers. The seals absorb stresses soldered joints can't
Punctured cores can be repaired on site because cooling
tubes are individually replaceable. Damaged tubes can be
replaced without special tools or skills to bring the core
back to 100 percent cooling efficiency. If new tubes aren't
available, tube holes can be plugged for replacement later.
No great cost to convert to MESABI Core Radiators. Over 300 core configurations interchange with any bolt-on type
core and fit existing frameworks. Call or write today for core
catalog and price list.

Although bent into a figure "S" as a result of a truck rollover, this MESABI Core Radiator refuses to leak. At the only workable compartment salvaged from the truck, the core has been fitted with an electric water pump and makes a regular circuit of trade shows to demonstrate the reliability of the MESABI Core Radiator.

A 22-ton truck tested the MESABI Core Radiator with a rollover
Score: MESABI Core — no leaks. Truck — scrapped

This was an extraordinary test of the MESABI Core Radiator to withstand punishment without leaking. It was an uncontrolled test we wouldn't want our R & D engineers to duplicate. The point here is to show how the design of the MESABI Core relieves the threat of equipment downtime caused by leaking radiator seams or punctures. The leaking radiator problem is overcome with rubber seals which hold individual cooling tubes in radiator headers. The seals absorb stresses soldered joints can't take. MESABI Cores are so tight that L & M Radiator warrants them against leaking for 18 months. Punctured cores can be repaired on site because cooling tubes are individually replaceable. Damaged tubes can be replaced without special tools or skills to bring the core back to 100 percent cooling efficiency. If new tubes aren't available, tube holes can be plugged for replacement later. No great cost to convert to MESABI Core Radiators. Over 300 core configurations interchange with any bolt-on type core and fit existing frameworks. Call or write today for core catalog and price list.

Fast Track Design and Construct
by Dennis McInerny, '66

In early 1977, Morton Salt Company was informed of the U.S. Government's desire to acquire the Weeks Island, Louisiana, salt mine for conversion to a Strategic Petroleum Reserve. The scheduled acquisition date of this producing property did not allow time for the completion of an entirely new facility without a curtailment of production for a period of approximately two years. In order to preserve a marketing position in the salt industry, Morton Salt Company conceived a plan whereby temporary production could be achieved for the length of time necessary to complete a new mine. This plan was dependent on several factors. (1) Government approval was necessary, as the temporary mine was to be located at a higher elevation in the salt dome than the oil storage and would require common use of the existing shaft. (2) Complete evacuation of the lower levels of the mine was necessary by a certain date to allow placement of the necessary vapor and explosion seals. (3) A new material-handling system was required to assure a smooth transition of production from the lower to the upper level. The new mine had to be designed and constructed as soon as possible since the salt reserves at the higher elevation were limited.

Assuming government approval of the temporary mine, Morton Salt Company engaged Frontier-Kemper Constructors in May of 1977 to act as the construction manager for the fast track design and construct of both the temporary Mine and the new mine. Excavation of the incline in the existing mine leading to the upper level was scheduled to begin on July 15. 1977. Design and mobilization for this new mine were to begin immediately.

Markel Mine Development
Prior to the start of incline excavation, several pieces of equipment had to be procured, disassembled, lowered down a 5' x 7' shaft and reassembled on the lower level. Two Cat 950 B front end loaders, one Joy twin-boom (jumbo) and several smaller pieces of equipment were so handled. Ventilation of the incline presented several possible problems for the mine as this work was off the intake air entry. Use of catalytic scrubbers on all equipment and explosives with good fume characteristics alleviated any problem until later in the project. Excavation methods were conventional drill and blast with LHD mucking using the Cat front-end load­ers. No undercutter was in use at this time. Excavated salt was spotted into existing rooms in the mine. Excavation was started on the incline July 25, 1977 and proceeded for 2800 LF by mid-November, 1977. At this point, a water inflow problem was encountered due to the proximity of the drift to the top of the dome. Grouting and exploratory drilling proceeded for two months in an effort to not only seal off the water, but to find a path around it to allow the temporary mine develop­ment to continue.

Concurrent with the probing and grouting, a crosscut drift was driven and a 4' diameter raise was bored to allow mucking to proceed without the existing 3,000 GPM per five-day week were common at this time. Concurrent with the final stages of excavation, a bulk materials-handling system was installed; a crushing and screening plant, 1500 LF of rope con­

Since 1979, a minority interest in Frontier-Kemper has been held by Döllmann-Hönel GmbH, Dortmund, Germany. The more than 100 years of shaft-sinking and tunneling technology of the German firm is being assimilated and put into practice at FKC. This experience covers many countries and a variety of techniques and equipment design.

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Geologic Background

Salt domes occur in the Gulf Coast region of the United States in many sizes, shapes and at many different elevations. The earliest known salt dome was discovered in the early nineteenth century. Quarrying produced 10,000 to 30,000 tons of salt at the Avery Island Mine during the Civil War. Underground mining development was delayed due to the problems of penetrating and sealing the saturated soils overlying the domes. The existing Wells Island Mine, coveted by the U.S. Government, has been in continuous operation since 1902 and consists of two levels with an open pit and pillar development of 83 million barrels volume. The salt structure at Wells Island is actually a domelike sandstone body with a thick overburden of sandstone. The salt structure at Weeks Island is actually a stock heaved upward through the overburden sediments to form a dome two miles in diameter and extending more than 30,000 feet below ground level. The dome is entirely salt with occasional bands of bituminous material in the annular space. The temperature concrete lining was carried only 30' into the salt as below that it was unsatisfactory. The final concrete lining was excavated by hand and shovel and poured continuously over an approximate ten-day period.

New Mine Development

The salt contact at Weeks Island is 150' below ground level. The water table roughly coincides with mean sea level at a 60' depth. Overburden consists mainly of a dense sandy sand. Freezing was selected as the most economical method of temporary ground support and water control during the excavation and sealing of the mine shafts.

Two 18' diameter, 300' deep shafts were decided upon with a concrete lining extending only 150' into the salt dome itself. One shaft was designed for production and the other for men and equipment freezing. Designing was as quickly as possible after receipt of soils information. Construction of the freezing cells was begun in August 1977, and freeze-hole drilling was initiated immediately following cell completion. Thirty-seven freeze holes along with three temperature-monitoring holes were used.

The distance between shafts was 540 ft, and a central freeze plant location was chosen intending to freeze the shafts, one at a time. Subsequently, both shafts were frozen simultaneously which led to some interesting problems. Con 1 was used as the freezing medium and brine temperatures of plus 32 degrees Fahrenheit were monitored by a multiplex unit and printed on a chart recorder from the thermistors placed at predetermined elevations in the temperature control holes.

Penetration of the black sand layer and the initial salt excavations were done on a round-the-clock basis to reduce any chance of freeze wall. The temporary concrete lining was carried only 30' into the salt as below that it was unsatisfactory. The final concrete lining was excavated by hand and shovel and poured continuously over an approximate ten-day period.

The drilling operations presented some interesting logistical problems. Due to the double wall design, a yoke and concretor, both were required for a single crew to enter and exit the cave. This yoke case with the form as it was pulled to the surface and prepared for transport of the form in the truck was used below the frozen zone and above the main foundation (approximately 100'). The main foundation area for the freeze collar was excavated by hand and shovel and poured continuously over an approximate ten-day period.

The freezing was discontinued when the brine temperature was below minus 40 degrees Fahrenheit, Excavation proceeded as required 5 months to reach ground temperature of plus 30 degrees Fahrenheit. Freeze holes were groused and abandoned at a later date.

Shaft sinking in the salt proceeded immediately after brine placement. Using hand-hugers and 6/30 EMCO's, advance rates of 120' per week were achieved. No concrete lining was installed, and after initial scaling, the salt ribs held up very well.

Development consisted of large shaft stations again unsupported with no concrete or large rectangular entries (23' x 23'). An approximate bottom development volume of 50,000 CY was initially envisioned, but with hold changes should approach 85,000 CY.

After connecting the shafts at the mining level, one shaft was used to hoist bottom development salt and one shaft was equipped. Hoisting of development salt was by the use of a larger shaft bucket and hoisting hopper. The hopper was charged by a 945 Flat-Alls from-end loader and filled one bucket's storage. Salt hoisted at this time was dumped at the surface, conveyed over a nearby hill and disposed of by means of hydraulic monitors. The natural climatic conditions of Southwest Louisiana also helped in this dissolution effort.

Shaft equipping for the Weeks Island Mine consisted of an entirely timber system. Bruntons and guides were Kari guided by the use of a GSWR requiring the retardant treatment. Bruntons were installed in pockets drilled in the salt on 15' centers and the guides attached with an adjustable bracket. The production shaft will carry two 1 6 ton skips along with some utility lines. The

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the mines magazine • september 1980
Constitution and Philosophy

by Patricia Curtis Petty

Recent news releases this summer concerning the United States' nuclear power plant deployments—new ones just beginning, and a record-breaking achievement at the other. Both these projects, although separated by many miles, concerned the same company, Denver-based Hamiltron.

This is not the first time Hamilton Western has been involved in a record breaking activity—in fact, the record broken in the Ambrosia Lake District of New Mexico was the company's own, set on a previous project in that same area. Nor is it unusual to see this construction firm is beginning a new project, that is the reason for existence for such companies—finish off a job here, work to break records on shaft excavation there—this move on to the next big challenge.

The noteworthy thing about Hamilton Western Corporation these days is the philosophy held by its new owner, Allan G. Provost, E.M. 1962. Associated with the company since the late 1950's, Provost recently joined the F.J.C. Lilly Company, Glasgow, Scotland, to purchase the firm. The partnership places Provost in the presidency of the organization, and gives him the opportunity to move into an international arena with the Lilly group.

F.J.C. Lilly is a large firm, best-known in the construction world for its civil engineering projects and development of the world. A long history of successful tunnel excavation projects, such as underground railway systems, large cable conduits and water and sewage systems around the world is a hallmark of one of the divisions of the company. These projects have proven to be another large area of operations for Lilly, and the company's successes have allowed the firm's engineering and construction in the Arabian Gulf. Although the company is conservative, many worldwide activities of the firm lend an exotic flavor.

It is this world-wide aspect that excites the new president of Hamilton Western. With his own experience in mining operations and engineering in the U.S. and the expertise and advice of his predecessor, he is anxious to expand his market in as many foreign areas as possible.

There is a technical philosophy behind this ambition of Allan Provost which is intriguing in today's world situation. He says, "If the United States system of government is not continually explained and pushed in the developing Third World countries, the vacuum will be filled by Communist nations or others immoral to the U.S." It is his conviction that the developing nations must be given large amounts of technical assistance, and facilities to enable them to take advantage of their own natural resources, must be constructed. He feels that most American firms have the technical expertise to accomplish these ends, plus, in most cases, a sincere desire to become involved.

On the other hand, he argues, many of the Communist countries lack the ability to follow up on projects begun, or the equipment or materials to maintain an activity once it is completed. Provost sees a number of factors as being important in the development of his ideas. The primary responsibility for recognizing American firms to engage in more development in the Third World must lie, he feels, with the government of this country. The current tax structure, particularly those personal income taxes which have been imposed so heavily on Americans working overseas, needs to be examined. The legendary American engineer, able to solve many problems as he navigated across the world, is a vanishing figure. A great number of the American firms which would work advantageously in the solutions to the Third World dilemma, are unwilling to work overseas, paying what amounts to double taxation—to the U.S. and to the host country. Some companies are assisting their foreign-based personnel with this burden, but more and more Americans are being forced to stay in the U.S. to avoid the problems of this situation.

Provost feels that this project will serve as an example of a successful use of the fast track design-construction method, primarily due to the knowledge of the owner, who has selected the designer and personnel of the contractor. Kenneth C. Stimson, E.M. 1966, has more than fourteen years of experience in heavy construction with an emphasis on underground work. He has worked in many capacities, from civil engineer to project manager. He served as the latter on the project described here, the Ambrosia Lake Dam project. His professional affiliations include ASCE and AIME, and he is a registered professional engineer in New York State. As an undergraduate at MIT, he received an award as the recipient of numerous awards for scholarship and ability.
these nations to allow exercise of their full potential in the world arena.

In June of this year, Provost joined others from his firm and from Colorado to travel to China, where he presented a technical paper on shaft sinking and tunneling at the Mining Exchange Seminar in Beijing. The conference was designed as an information forum and was arranged, in part, by the Governor of Colorado, Richard D. Lamm. Prior to the trip, Provost noted, "We may see a considerable amount of trade between our mining industry and China's over the next few years."

He returned with a great deal of admiration for the Chinese applications of mining technology which he heard about at the conference and was able to visit in person while traveling about the country. He cited one mine, the Right-Through-the-Mountain copper mine, which is, in his opinion, one of the most labor-effective mines operating. The underground activity provides a living for 3,000 people, a figure which includes a whole community, since teachers, office personnel, and others are considered to be directly related to the project.

Other examples of advances and applications of Chinese technological enhancement noted by the group were the shaft freezing techniques and the large number of such shafts existing in China.

Provost points out that the Chinese have a strong emphasis on the conservation of equipment and the proper maintenance of all working installations. He said that the visitors were surprised at the range of equipment in use, very old engines to the most modern, limited machinery adapted for wider purposes and meeting of modern and old-fashioned technology. He cites this conservation theme as being contrary to that practiced in the United States, and gives it as one possible reason for the good look at possible joint venture projects between the two countries. "We have a lot to learn from this idea of conserving resources," he states.

It is Provost's belief that U.S. industry has begun to understand and react to the differences in methods of doing business between this country and others--particularly Third World nations. The "fact of foreign development and competition," he says, has seldom been in evidence in the mining and construction businesses overseas. These industries are, therefore, in a better position to cope with the aforementioned problems of laws and customs in the developing nations.

Government bears a heavy responsibility in bringing about a positive effect in the world market position of the construction companies, according to Provost. There must be a recognition of the cultural influences at work on the American company working on foreign soil, with some change in current laws which restrict the ability of the company to negotiate contracts and bids. In addition, he says, this free market concept advocated in some quarters must not be adopted. Its usefulness in today's world is very questionable. Instead, he advocates a study of laws pertaining to corporations doing business overseas, with the intent of changing some of the structures to make them more nearly conform to the facts of foreign development and competition.

If tax restraints were reduced, both corporate and individual and other restrictions amended, Provost feels that the United States businessman functioning abroad could not only expand the country's economic base, but could serve as a valuable information and cultural conduit for the United States.

Acquaintance with the area of overseas construction qualifies Mr. Provost in drafting his beliefs. Born and reared in Colorado, he was for many years associated with Patrick Harrison, legendary construction entrepreneur in Canada, who managed a widely scattered business with projects in many countries.

Like many immigrants and naturalized citizens, Provost is extremely loyal to his adopted country, and vividly interested in its progress. He has been involved with a number of foreign construction projects throughout his years in the industry, such as an interesting project undertaken in Kuwait.

In contrast to the Western bid on and received a contract from the Kuwait government to construct large hydropower-generating facilities offshore in the range of equipment in use; very old engines to the most modern, limited machinery adapted for wider purposes and meeting of modern and old-fashioned technology. He cites this conservation theme as being contrary to that practiced in the United States, and gives it as one possible reason for the good look at possible joint venture projects between the two countries. "We have a lot to learn from this idea of conserving resources," he states.

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Fred Fox '54
Bill Thornley '48 Ex.
Rick Weber '65
Regan Heath '74
Don Taylor '77
houses in that arid land. The company designed these installations, meant to produce garden vegetables and animal feed, and installed a pilot project. The cooling systems presented enormous difficulties, but were eventually solved with an evaporative system, modification of a fairly standard technique. The systems are still in use, primarily for the production, on a relatively significant basis, of grass feed for livestock.

Another example of overseas involvement for Harrison Western was the frozen lands construction outside of an underground hydroelectric project—

including tunnels, shafts, turbine generators, electrical switchyard and all service facilities.

One of the more interesting projects completed by Harrison Western is the mining of the Gulf Horizontal Taylor shafts, near Grants, New Mexico. The shafts involved a number of techniques; freezing, ground control, and the notori­ously unstable ground of the Grants mining belt, and the problems with water and heat. The project is currently almost ready to turn over to Gulf, with the successful completion of the shafts, installation of machinery and control of the 125°F and 7,500 gpm water flow. The dewafering process, one of the most extensive in the western United States, also required a 100% capacity back-up pump system, creating some problems in logistics in deploying the pumps.

With three decades in the construc­tion industry behind him, extensive experience in a number of vital areas, and the strong desire to advance the United States influence in the world, Allan Provost is confident that his company's ability to compete in foreign markets.

Alternative Energy Sources

In general, the construction of electric­

ity production. In the past few years, however, there has been a princi­pally dramatic increase in the cost of oil production, thus producing a con­sequent increase in electrical power cost. The economic impacts of these higher prices on existing operations can be substantial and even prohibit con­tinued production. During feasibility studies and the economic evaluation of proposed mining facilities, the power cost can be the "make-or-break" factor in the decision process.

In many instances these power cost increases are further aggravated by the additional, and also increasing, expenses involved in trans­portation of the fuel to remote industrial sites. In such an economic climate, the possibility of constructing on-site generating plants that require only local, inexpen­sive energy sources becomes more attractive, if not mandatory. This might be true even when such a new plant is nearly capital intensive.

Solar Energy

Solar energy, the most commonly pro­

claimed alternate energy source in the public sector, is probably the most difficult to employ in the industrial sector for electrical power generation. This is not to say it cannot be done, but the mining industry requires an active, not passive, solar system which, in turn, im­
mediately drives initial capital costs sig­

ificantly higher.

Ideally, a solar plant, for either photo­

voltaic or thermal conversion would be located in a dry, and region on the equator. Careful design and site selec­tion may still allow the use of such sys­
tems in regions with either few cloud­
days and/or long duration sunlight (as in the very high latitudes). The meteorolog­
ical probabilities cannot be overcome, so periods of insufficient power genera­tion would have to be made up for by auxiliary energy diesel generators.

The auxiliary diesels would also be used to meet requirement until ade­quate storage systems are available. The major problems associated with solar systems are the initial capital cost, possibly the highest per installed kilowatt, and the area of cleared land re­
necessary and used exclusively for the solar collectors.

Wind Power

Wind power, in contrast to solar power, is almost unbounded by location. There are relatively few regions that do not have some type of wind pattern that may be exploited. Still, because of the randomness (or at least uncontrolled) nature of winds, the lack of efficient energy storage devices limit wind-driven plants to a supplemental role. However, it has been shown that over a long run, the "supplemental" power available from the wind may be on the order of 50%-70% of the total system demand, with associa­ted costs nearly the lowest of all the alternative energy sources.

Geothermal Power

Geothermal generation is possibly the most fundamentally attractive alternative. This source is, however,
groundwater, site dependent within today's technology, and costs relatively high. Capital costs to be recouped periodically by re-drilling if not feasible for a first-time, large-volume reservoirs. Utilizing the normal thermal gradient would provide only several months of operation prior to re-drilling under a seepage condition. The regional and local climate, meteorology, topography, and technology available in the vicinity of the site must be evaluated. The simplicity of such systems can now be combined with off-the-shelf technology to provide power at probably the lowest cost per installed kilowatt of any system. The feasibility study, therefore, must thoroughly evaluate the following:

- Site: The regional geographic site of the industry will be a major factor in determining the feasibility of any given type of alternate energy construction. The regional and local climates, technologically, and topographically will influence the outcome of this portion of the feasibility study.
- Design Criteria: All relevant design must be tailored to the particular site and the overall economic viability of the system, designed to enable a professor to meet project requirements. The building site, off any given baseline, most often the construction/operation costs of diesel generators operating at a targeted load at the same site can be considered.
- Initial and operating costs for each "feasible" power source. This is done with respect to some given baseline, often the construction/operation costs of diesel generators operating at the desired load at the same site. One specific aspect that must be considered is the necessity of including the costs of any over-capacity that may be required because of the fluctuating power levels typical of some of the alternate energy sources.
- Materials, labor, transportation. Despite preliminary evaluations of the viability of using an alternative source, the feasibility study itself must be evaluated to meet all relevant design and construction requirements of the alternate energy power plant to a summary of the best options available to the client, including vendors who can supply off-the-shelf systems that will meet his needs.

Pete Bediz, '41, '42
Bediz Exploration Consultants LTD
1661-13th Street North, Calgary, Alberta, T2L 4A6
Office: 403-266-1865
Fax: 403-266-1855

An Effective Solution
The authors believe that the use of alternate energy sources, such as solar, wind, geothermal, water, and nuclear, will provide electric power to isolated mineral industry mines that will undoubtedly become more reliable, and perhaps even desirable in the future if fuel prices continue to rise. While projects with short lifetimes and high rates-of-return on investment will probably not be overly affected by increased fuel costs, longer term projects with less than satisfactory return on investment might not be affected by alternate power production systems cost effective in today's environmental and economic milieu.
Ongoing Innovations Since 1859 Have Made Gardner-Denver The Leader in Underground Rock Drilling.

Leadership. In a rare quality — a combination of insight, confidence, and commitment to achievement that few individuals and companies possess. Gardner-Denver is one of those few.

Ever since Robert Gardner established the Gardner Governor Company in 1859, our history has been one of innovation and advancement — blazing trails that others have followed, and building a reputation for engineering excellence in the process.

Rooted in the pioneer tradition. In 1859, America was in the midst of its westward expansion. Much of the power for the booming industry of that era came from steam engines — devices which multiplied man's muscle greatly, but were laden with hazards, as there was no effective system for controlling their output.

All too often, they would "run wild," tearing themselves to pieces, or even exploding! A young Scottish immigrant, Robert Gardner, invented a device which solved the problem. His invention, the fly-ball governor, tamed the steam engine and made it safe for all types of applications.

Gardner's governors became a standard fixture on steam engines everywhere. And his company — the Gardner Governor Company — prospered and grew. As it expanded, its product line came to include air compressors and pumps of the type used in the mining industry.

Merger with Denver Rock Drill. Also supplying equipment to the mining industry was the Denver Rock Drill Manufacturing Company — whose innovations included a pneumatically-powered hard-rock drill that could be rotated to improve performance.

The mining business brought Gardner Governor and Denver Rock Drill together on numerous occasions. Both were innovators in the field, and increasingly, the two firms found their respective products perfectly suited for use in combination.

In 1927, they merged to form the Gardner-Denver Company. And their innovative tradition has continued to this day.

An early Gardner-Denver innovation was the automatic screw-feed motor, which replaced the hand crank-feed type and increased drilling rates considerably. Gardner-Denver was also the first manufacturer to construct large mobile units — "jumbos" — that carried the new rock drills underground and allowed them to be moved into position quickly and precisely with hydraulic booms.

Two other Gardner-Denver firsts were the sectional drill rod — an improvement made possible by the company's metallurgical expertise — and the original independently rotated drifter drill.

Chosen for the toughest assignments. As a result of these and other innovations, Gardner-Denver has earned a reputation for leadership that led to our equipment being specified for some of the world's largest and toughest jobs.

When Cheyenne Mountain was hollowed out to house the NORAD complex, Gardner-Denver was there. Our units are found in mining operations around the world, from the diamond mines of South Africa to the underground copper mines of Arizona.

Non-stop innovation for a changing world. We've come a long way since 1859. The years have brought a lot of changes — but in one respect, we haven't changed at all. We're still committed to the principle of leadership through innovation. Solving problems through a concerted application of the best skills available.

We're involved in the construction of subways, dams, water and sewer systems, and anything else that involves hard-rock drilling and excavation — from New York and Chicago to the Arctic Circle and the Australian Outback. We're powered hard-rock drill that could be rotated to improve performance. The mining business brought Gardner Governor and Denver Rock Drill together on numerous occasions. Both were innovators in the field, and increasingly, the two firms found their respective products perfectly suited for use in combination.

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Here today, here tomorrow. We believe that our past achievements speak for themselves. Nobody has a stronger record within the mining industry; the Gardner-Denver name is second to none in the field, and a man who exemplifies the innovative spirit of Robert Gardner and the other men and women who have made Gardner-Denver the company it is today.

We're in this business to stay; we have every intention of being the industry pace-setter in the next century, just as we have been in the century past. Because that's what leadership is all about.
Trustees' Summer Keystone Conference

Bill Coors and Paul Giusti, ’80, are obviously in accord here.

Dr. McBride and Jan Goodrich share a relaxing moment.

Tom Martin, ’30, Mrs. Martin, and Bill Coors, Hon. ’73, exchange views.

New student trustee June Leaver listens as Jack Warren, ’50, and Chuck Fogarty, ’42, explain Alumni point of view.

Trustees, administrators, guests and a group of sixteen students from Mines gathered at Keystone, July 10-13, for an in-depth examination of “Student Life.”

The presentations of “Student Life” were planned by the students, under the leadership of Paul Giusti, 1979-1980 student body president. Student life was introduced by the students in the form of lectures, skits and panel discussions, followed by large and small discussion groups.

Student life at Mines is something of a pressure cooker, according to the students. “The first semester is critical,” said Mike Sides, a petroleum senior. “The competition from hundreds of high-achievers either makes you strong or knocks you out of school.”

Students noted that until now, there hasn’t been any system to detect the early warning signals of students under crushing pressures. “Not everyone belongs at Mines,” said one student, “and not everyone should be an engineer. If they can’t adjust, they should be able to go to another school with a measure of pride and self-respect left intact.”

Yet things are different for those who stick it out and graduate. “Under such rigorous competition for grades, we don’t have time for much recreation, for real thinking about the future, nor for emotional growth and management,” said Russ Roundtree, a senior in geophysics. “Everyone lives and studies on the brink, constantly under high pressure,” he said.

Alcohol abuse and cheating are two ways that students mishandle the pressure and stress. “We have a lot of students who are well on their way to being alcoholics. The mythology, the culture of this school, literally pushes students toward alcohol. We have students who, every Friday and Saturday night, drink beyond intoxication, to the point that they are sick,” said Sandra Stash, a senior petroleum student and head resident of a residence hall.

“When your career is literally on the line, over an impossibly difficult or unfair test or assignment, people do desperate things—like cheating,” proclaimed June Leaver, a senior geology student and student member of the GSM Board of Trustees.

When the natural pressure of course work is compounded by a few faculty members with poor teaching skills and attitudes, the pressure becomes well-nigh intolerable. “When you lose respect for a professor, you lose respect for what he’s teaching. Getting through, getting the grade, not the education, then becomes all important,” said another student.

“We are very jealous of our time,” our investment in Mines,” said Leaver. “Technical competence isn’t enough. A teacher has to be able to communicate his knowledge in a form we can understand—otherwise we’re trapped. A good teacher has to challenge us—help us create an excitement and enthusiasm for the subject. A good teacher tests fairly over the covered material. He doesn’t condone to students—doesn’t humiliate or harass students. We are not children. There has to be some mutual respect,” she said.

A number of the students agreed that Mines does not offer or make available enough opportunities for intellectual curiosity nor breadth of vision. “I feel like I’m being trained, not educated,” said Stash.

“All this talk about pressure, survival, and stress,” said GSE Trustee Ted Stockheimer, “is that all there is to life at Mines? Isn’t there any fun?”

The answer was yes, from all the students. Despite all the myths and horror stories about a handful of professors or departments, the 18 students all agreed that “we’d rather be here than anywhere else.”

“When, if things are so tough?”

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“When, if things are so tough?”

“We knew we’d really learn something in Mines, if we could just get through it,” said Jack Warren, one of the students.

“Fun is too small a word for the excitement and intensity of life and learning at Mines,” said George Sanders, a senior geophysics student.

“We have more opportunities at Mines than at a bigger school—opportunities to enjoy music, athletics, politics, without competing against specialists,” said Saunders.

Dr. Graham Herveldt holds the rapt attention of his audience, C. W. “Bud” Leeds, Frank Schaeferagent, Bill Coors.

Joanna Seita, student participant.

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solid evidence of being very close to a grades, while the student would have that the instructor would still be able to evaluated in the class. The students argued away from "grade-mania." One alternative employers. They expressed a desire to get detailed information to prospective em­ give enough grades of A, B, C, D, and duction skills.

Students recommended the addition of rules focusing on public affairs and com­

Alcohol Abuse

The students proposed that an alcohol abuse program be established on cam­

Student Advisory System

Faculty Advisories

The generally accepted definition of spiking is getting help from another stu­

industrial car mover specifically designed to meet the motive power needs of industry. Complete with

SRI-1200/1200R

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SRI-600/600R

Cummins KT-1150-450 horsepower

SRI-450/450R

Cummins KTA-1150-450 horsepower

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The SRI Industrial Car Mover is an industrial car mover specifically designed to meet the motive power needs of industry. Complete with

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Available Models

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SRI-600/600R: Cummins KT-1150-450 horsepower
SRI-450/450R: Cummins KT-1300-400 horsepower
SRI-200/200R: Cummins KTA-1300-350-100 horsepower

Typical Applications

- Coal Industry
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- Grain Industry
- Industry Switching
- Short Line Railroads
- Port Facilities
- Utility/Unit Train Unloading

Remote Control Option

The SRI Industrial Car Mover includes that equipment essential for both radio remote control and manual operation. All equipment has been designed for heavy duty use with increased reliability.

Configuration

We offer two configurations, one with a cab and one without dependent upon your specific needs and requirements.
"20 Santiago Urteaga, E.M., recently sent a few pictures to share memories of his trip to Mines. Now 87 years old, he resides in Monterrey, Mexico.

"40 Walter E. Heinrichs, Geol.,E., attended his 40th reunion during commencement festivities at the School last May. Walter, a valued friend of CSMAA, stopped by the Alumni office during his visit.

"42 Ward O'Malley, E.M., wishes to pass on this note to the classmates: "Chuck Fogarty stopped by Golden, Tipperary with his wife and friends last week. The Fogartys plan to visit north Tipperary about 400 years ago. There are still many Fogarty families near Thurton, the county seat.""

"43 William M. Aubrey, Jr., Met.E., has retired as chief metallurgist in the milling department of Bethlehem Steel Corporation after 32 years service. Aubrey published several technical papers and holds a number of patents dealing with minerals beneficiation. He was involved in the laboratory testing, plant design and start-up of beneficiation installations in Mexico, Canada, Brazil, Chile, Sierra Leone, and Liberia, as well as the United States. Mr. and Mrs. Aubrey will continue to reside in Bethlehem, PA.

"44 Douglas Ball, P.E., served as Co-chairman of the Tar Sands Subcommittee during the mid-year meeting of the intermediate Oil Compact Commission held last June in Val. Colorado. Thomas H. Cole, E.M., announces the formation of UCCO Inc., a new company that will mine coal in Colorado, New Mexico, and Utah. The office is located in Denver. Robert P. Davidson, Geol.,E., is currently a part of the Trubridge Times and counsel for Holland and Hart.

"53 Willie Leon Dawson, Met. E., is currently plant superintendent for Missoula Dan Criswell in Stirling, but has been filling in as acting manager since August, 1979. James R. Biegel, Geol.,E., is a process engineer for United States Steel, Texas Uranium Operations. He was formerly with Minnrec Concentrator as a metallurgist.

"54 Philip H. Halstead, Geol.,E., formerly exploration manager with Statoil in Norway, is now a geologist/geochemist for Halstead Exploration Inc. in Golden. Donald O. Root, E.M., DSc., '59 and Medalist '78, has been promoted from executive vice president of Western Nuclear Inc. to president and chief executive officer of the same company.

"55 Harry M. Conger, E.M., was quoted in an article on the rise and fall of gold and silver prices in the June 9 issue of FORBES magazine. Conger, president of Homestake Mining, said about the future of the market, "We think the long-term trend for gold and silver prices will be equal to or faster than inflation."" Paul K. Gibbs, Geol.,E., has been elected vice president-exploitation for Coseka Resources (U.S.A.) Limited, Denver. Gibbs, who joined Coseka in 1976 as an exploration manager, will be in charge of all exploration activities. Robert J. Holme,
executive committee vice president of the International Society of Exploration Geo­

nology.

86 Richard W. Voik, P.E., has combined his engineering experience with a degree in law from the University of Denver. "Although I was one of the youngest applicants, the board felt I could handle the position. The company had engineering and legal problems, so I guess they thought I was the one best qualified."

87 Thomas M. Carroll, P.E., was promoted from project coordinator to senior project coordinator for the company.

88 Dennis J. Stovall, BSc.Min., has been promoted to manager of U.S. production and drilling.

89 Terry L. Grap, BSc.Pet., has moved from Senior mining engineer to senior petroleum engineer for Gulf Minerals Co. in Denver.

90 Skip Armim, BSc.Pet., has joined Exxon Minerals Company as a petroleum geophysicist. He was with Mobil Oil Corporation as a petroleum engineer. Paul D. Scheldtein, BSc.Pet., was formerly with Texaco, Inc. as a staff geologist. He is now a petroleum engineer for Gulf Oil Chemco Co. John C. Patton, BSc.Pet., is currently a senior mining engineer for the Salt River Project in Phoenix, Arizona, where he is involved in the political subdivision of the State of Arizona, providing electric power and energy to more than 200,000 residential, commercial, industrial and agricultural retail customers in the greater Phoenix metropolitan area and several mining customers in portions of Eastern Arizona. Kevin D. Norman, BSc.Phy., formerly with U.S.G.S. Conservation Division, is with Aero Power Systems Inc. as a petroleum engineer. He was with Pratt & Whitney as a project engineer for Aero Power Systems Inc.

91 George R. Rathbun, Geol.E., has been appointed senior staff mineral analyst for Exxon. He was previously located in Wyoming as senior mine analyst. He is presently involved in a train­

ing program for new mining engineers.

92 Terry L. Grap, BSc.Pet., has been named district sales manager and as an area manager for the Rocky Mountain Division in Denver.

93 John A. Falk, BSc.Phy., has joined Davis Mining Co. in the mining and production as a production engineer in Commerce City, Colo. He was formerly with Fairchild Camera and Instrument Corp. as a petroleum engineer.

94 Norman D. Hiram, MSc.CPR, has been employed by Golder Associates as a petroleum geophysicist for the Exxon Oil Corporation.

95 Robert L. Pearson, Geol.E., has joined Hazard Research, Inc. as a petroleum engineer. He was formerly with Pennzoil as a petroleum engineer.

96 Thomas A. Sladek, BSc.Min., has joined Hazen Research, Inc. as senior process engineer. He is currently involved in a training program for new mining engineers.

97 Terry L. Grap, BSc.Pet., has been named district sales manager and area manager for the Rocky Mountain Division in Denver.

98 Thomas L. Page, BSc.Pet., has been named district sales manager for the Rocky Mountain Division in Denver.

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The Gyrasphere 1900 is built to be big in mining.

That's because the Telsmith Gyrasphere 1900 cone crusher is just right for today's mining. With the size, capacity and stamina you need today, the 1900 outperforms other crushers.

Takes feed to 16-3/4". Delivers nominal products as small as 3/8". On just 300 or 400 hp. With many design advances and standard features some others don't even offer as options. Including:

- All-roller-bearing design: cuts friction, boosts efficiency, to outproduce 7' crushers.
- Crushing chamber: computer-designed to match your specific crushing needs exactly...efficiently.
- Easy access: upper frame lifts off quickly, enables you to replace mantle with head in place.
- Lubrication: pressurized, to all essential parts. With self-contained reservoir, external pump and motor. Exclusive TEIiSMITH self-draining countershaft box. Oil temperature and pressure alarms are both standard.
- The Telsmith Gyrasphere Model 1900. For extra-coarse, standard or fine crushing around the clock in hard, abrasive ore. High reduction on low power. Low, low cost per ton. Today's tool, for today's mining. No matter how you break it down.

Contact your nearest mining sales office, or Telsmith Division, Barber-Greene Company, P.O. Box 723, 532 E. Capitol Drive, Milwaukee, W1 53201.

No matter how you break it down

The Gyrasphere 1900 is built to be big in mining.

New CSMAA Director

Colonel (Ret.) William E. Leckie, MSc., Min. 1949, has been appointed Executive Director of the CSMAA Alumni Association, effective September 1. He replaced George W. Mitchell, Jr., '53, who resigned to accept employment in private industry.

Colonel Leckie is well known to the CSMAA community through his work on campus as an Associate Professor in the Mining Department and many administrative positions. He has worked as assistant to the Vice-President, Academic Affairs, assistant to the President, and, for more than 12 years, director of continuing education for the School.

Prior to this employment at CSMAA, Leckie served 26 years in the U.S. Army Corps of Engineers.

The new Executive Director will oversee the growing services of the Alumni Association office, including continuing education, placement, records maintenance, alumni affairs and publication of the MINES Magazine.

New Publications Associate

Kathleen B. Johnson has joined the MINES Magazine staff as Publications Associate.

A native of Missouri, she is a 1980 University of Missouri—Journalism School graduate with an emphasis in advertising and writing. In 1979, she interned with E.D.S. Federal Corporation as a technical writer responsible for the company newsletter.

During her college years, Mrs. Johnson was an active campus leader. She served as president of Mortar Board National Honor Society, Historian/reporter for Zeta Tau Alpha sorority, senator in the student government, and campus coordinator for the Red Cross.

She is a member of Kappa Tau Alpha, an honorary journalism fraternity, Women in Mining, and Business and Professional Advertising Association.

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The right people to do your job, valuable resources in themselves, are a challenge to find. So if you are seeking a new position, or if your firm needs qualified technical/ managerial personnel, contact Sharon Farquhar, (303) 279-0300, ext. 2294, or mail the coupon below.
With the selection of a chairman of the Nominating Committee by the Board of Directors President each year, a new process of selection begins for Board members. The process is challenging, sometimes frustrating and often interesting. It is immensely important to the CSM Alumni Association, providing as it does the leadership for the organization and guaranteeing continuity of programs and services.

Three former Board Presidents; Bob Brace, Art Meyer and Don Craig, have shared some impressions of their stints as Board members. The Board is maintained and that the Alumni Association have a good working knowledge of how directors and officers are chosen. Bob Brace ’49, has this to say; “It’s an enriching privilege and honor to serve the Alumni Association in this manner. It is, however, in spite of the fact that we number over 9,000 living alumni, not always easy to find those who are able to be candidates for a Board position.” Brace points out that there are three Directors and four officers to be elected this year, which will begin to serve in January, 1981. He has also made available those portions of the by-laws of the Association which apply to the Directors and the officers. Once an alumnus has been elected to the post of Secretary to the Board, the assumption is made that this person will continue to serve through the President, the by-laws state:

**ARTICLE III: Directors**

Section 1. The officers and management of the Alumni Association are to be under the control of a Board of Directors of eleven members consisting of the President, the Vice President, Secretary, and Treasurer of the Alumni Association, and seven other directors, who shall be elected to serve for three years.

Section 2. The Board of Directors shall have the power and authority under the Certificate of Incorporation to do all acts and perform all functions necessary to carry out the purposes for which the Alumni Association has been organized. It shall review the President’s appointments to the standing and special committees. The Board shall adopt a set of By-laws. They shall have the final authority in determining what expenditures the Alumni Association shall incur.

Section 3. The chairman of all standing committees of the Alumni Association shall be an ex-officio member of the Board of Directors who shall be non-voting. The chairman of each committee shall, by the President, be appointed or invited to attend all Board meetings.

Section 4. The Board of Directors may, at its discretion, appoint an Assistant Secretary and an Assistant Treasurer and may authorize such officer or officers to sign all books and execute all deeds and other instruments in the name of the Alumni Association and to assist such other officers in the management of the Association, and may appoint such other officers as the Board of Directors may designate and may delegate any power or duty to such other officers as it may designate.

**ARTICLE IV: Officers**

Section 1. The officers of the Alumni Association shall be a President, Vice President, Secretary, and Treasurer, all of whom shall be active members of the Alumni Association and shall be elected at the annual meeting for one year. All officers shall serve until their successors are elected and qualified, as provided by the Board of Directors. They may be assigned the duties and responsibilities of the office of the President in his absence or inability to act.

Section 2. The duties of the President shall be to preside at all meetings, announce business, call for motions, conduct the business of the Association, appoint committees, make other appointments as provided in the Certificate of Incorporation, and be the ex-officio member of every committee.

Section 3. The President of the Alumni Association shall be president of the Board of Directors of the Alumni Association.

Section 4. The Secretary shall keep a record of the proceedings of the Alumni Association and shall perform such other duties as may be assigned to him by the Board of Directors.

Section 5. The Treasurer shall have the responsibility of collecting all dues and accounting for all monies kept in a bank or other depositories to be chosen by the Board of Directors. The Treasurer shall have the responsibility of accounting for the financial and report any excess to the Alumni Association and the Board of Directors. He shall have the power to employ such help as needed to carry on the work of the Alumni Association.

In no case can the Board of Directors employ or appoint anyone to serve for a longer period than until the next annual meeting when the new Board of Directors is elected. Section 5. Any vacancies occurring during the year at any of the elective offices shall be appointed by the President with the approval of the Board of Directors. Such appointment shall serve until the next annual meeting.

Section 6. The Board of Directors shall have the power to select and hire an Executive Director, and/or an assistant treasurer and may outline its discretion, appoint an assistant secretary and/or an assistant treasurer and may outline its discretion, appoint an assistant secretary and/or an assistant treasurer and may outline its discretion, appoint an assistant secretary and may approve an assistant treasurer. Once an alumnus has been elected to the post of Secretary to the Board, the assumption is made that this person will continue to serve through the President, the by-laws state:

WATERSAVER LINERS

**ARTICLE V: Elections of Officers and Directors**

Section 1. The nominating committee shall canvass the membership in this manner. It shall consist of five members, at least two of whom must be alumni, and one of whom must be a student member. The nominations shall be made in advance of the Annual Meeting. The board of directors shall determine the number of candidates for each office, not to exceed the maximum number of candidates permitted by law. The candidates shall be duly elected at the Annual Meeting.

Section 2. Directors President each year, a new Nominating Committee by the Board of Directors of eleven members consisting of the President, the Vice President, Secretary, and Treasurer of the Alumni Association, and seven other directors, who shall be elected to serve for three years. The Nominating Committee is appointed by the Board of Directors for the ensuing year. To this end, he urges all alumni interested in serving the Alumni Association and the School, to consider the Nominating Committee, and to join in the School to contribute to the Alumni Association and the School.

**ARTICLE VI: Memberships**

Section 1. The nominating committee shall canvass the membership in this manner. It shall consist of five members, at least two of whom must be alumni, and one of whom must be a student member. The nominations shall be made in advance of the Annual Meeting. The board of directors shall determine the number of candidates for each office, not to exceed the maximum number of candidates permitted by law. The candidates shall be duly elected at the Annual Meeting.
HOMECOMING
COLORADO SCHOOL OF MINES
HOMECOMING 1980
Friday-Saturday, October 24-25, 1980

Schedule of Events

FRIDAY, OCTOBER 24
All Day—Alumni Registration
Noon * Open House at the Alumni Office
* International Student Welcome at the Open House
2:00 p.m. * Football Tours—football coaches will be at the Football Stadium
4:00 p.m. * Student-Hosted Bonfire at the site of the football stadium
6:30 p.m. * Alumni Cocktail Reception—In Meehan Commons
7:00 p.m. * Alumni Football Tailgate Party—In Friedhoff Hall
7:15 p.m. * Homecoming Parade—Meet at the Student Center at 7:00 p.m., proceed to the site of the football stadium
7:45 p.m. * All-Alumni Banquet—located at the Whale, Gold Hill Inn, Hinman Avenue

SATURDAY, OCTOBER 25
10:00 a.m. Homecoming Parade—Meet at the Student Center at 7:00 p.m., proceed to the site of the football stadium
11:15 a.m. * Alumni Luncheon—Meet in the Guggenheim Stairs
1:00 p.m. * International Student Welcome at the International Student Office
2:00 p.m. * Student-Hosted Bonfire at the site of the football stadium
6:30 p.m. * Alumni Cocktail Reception—In Meehan Commons
6:00 p.m. * Alumni Football Tailgate Party—In Friedhoff Hall
7:00 p.m. * All-Alumni Banquet—located at the Whale, Gold Hill Inn, Hinman Avenue

RESERVATIONS
HOMECOMING = 1980
Complete and mail this form today to be sure you get in on all the events.

Name ___________________________ Address ___________________________
Phone ___________________________ Spouse ___________________________
Guests ___________________________ Total ___________________________

Alumni Luncheon, Friday @ $ 4.00 ea. No. of Tickets ___________ Amount ______
Alumni Banquet, Friday (CASH BAR) @ $11.50 ea. Total ___________________________
Alumni Luncheon, Saturday @ $ 4.00 ea. ___________ Amount ______
Football Game, Saturday @ $ 3.00 ea. Amount ______

TOTAL ___________________________

Enroll Your Check (made to CSM Alumni Association) and This Form and Mail Today:

If you have any items dating back to 1980 which could belong in an early analysts or mineralogists office, the Mines Museum has been elected to the Board of Directors of the Coalition for Responsible Mining Law.

In a move to expand the board from 17 to 21 members, Trent was one of four newly elected directors.

The Coalition is a non-profit organization established in 1978. It was founded to provide information on the General Mining Law and attempts to resolve the law.

Woodward-Clyde Consultants
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WHO ARE THESE MEN?

 thế mine magazine • September 1980
and to manage and administer bequests of the CSM Foundation.

School of Mines Foundation, Inc., with

tion is engaged in an initial ten-year, benefit of the Colorado School of Mines

Frank R. Lee as chief executive officer

sequently as administrative assistant to

tary to Senator Peter Dominick (R-Colo), from 1963 to 1967, and sub­

Mr. Lee has been management con­

ers, says, "The nation, Colorado and the Colo­

and is author of a novel about silver

aid, capital construction and endowed professorships has reached a new level of urgency.

Mines is experiencing a surge of ex­

expansion," Wilson said, "fuelled by the worldwide energy crisis and our own energy needs in the West. To maintain

standards of quality education, the school's board of trustees has drama­

ically increased the levels of in-state and out-of-state tuition. At the same time, the trustees feel duty and honor bound to keep the school's doors open to qualified students from middle and lower income level families. As a result, the CSM Foundation has undertaken the task of raising more money for scholar­

ships, grants and loans than we've ever attempted before." 

Prior to December, Frank R. Lee served the Independent Petroleum Association of Mountain States as executive director for four-and-half years. In that time, he brought the or­

genation from its infancy to a membership of over 1,100 firms in 11 states. The organization is now one of the most respected regional oil and gas associa­
tions in the nation, noted Wilson.

Mr. Lee has been management con­

sidered a variety of energy companies with government relative problems.

He has served in Washington, D.C., on two occasions: initially as press sec­

ry to Senator Peter Dominick (R-Colo) from 1963 to 1967, and sub­

sequently as administrative assistant to

on two occasions: initially as press sec­

ers, says, "The nation, Colorado and the Colo­

New Foundation Staff

Colorado School of Mines Foundation, Inc., has appointed two new staff mem­

ber to assist with STE. The appoint­

ments were announced by Willem K. Cooke, chairman of The Resource Fund and president of CSM Board of Trust­

named to direct major and annual giving programs was Norman J. "Jay" Large, Jr., Oshio, Davis Smith­

Garbutt, Salt Lake City, Utah, will direct publications and grant development, and

will provide assistance to the giving program.

Norman J. Large

Lange has served in various fund­raising positions at the University of Chicago, Vassar College, the Medical College of Wisconsin (Milwaukee), and Deaconess Hospital (St. Louis). Most re­cently he was campaign manager for

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sequently as administrative assistant to

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CJM Graduate Student Awarded $8,000 Scholarship

A Ph.D. candidate at the Colorado School of Mines in Golden, Bryan Anthony James, has been named the first recipient of the Brent D. Fuller Scholarship awarded by the Foundation of the International Society of Exploration Geophysicists (SEG). The $8,000 scholarship, applicable to the 1980-81 school year, was awarded to a graduate student in the field of nonseismic exploration geophysics.

Bryan James

The $8,000 scholarship, applicable to the 1980-81 school year, was awarded to a graduate student in the field of nonseismic exploration geophysics.

Leaver, 20, is a junior, majoring in geological exploration business, while her mother, Helen is a metallurgist for Pine Junction. Her father, Fred, runs his own precious metals business.

In the past 10 years, there has never been a woman's voice on the Colorado School of Mines Board of Trustees, and we feel that this change will bring new perspectives and ideas.

I guess I became interested in the profession by working on a seminar that we students presented to the trustees this summer, called "Student Life." I got involved because I've been concerned about student-teacher relationships. Being a student trustee would give me an opportunity to make my views known, she said.

Those views have gone through a number of changes. "After I talked to a number of faculty members, I realized that some of the poor relationships I've seen on the campus have more than one side to them," Leaver noted.

"I'm not sure they'll like everything I'm going to say," Coors said, referring to the parents of 1,929 yards held by Jim Taylor. "I'm not sure they'll like everything I'm going to say," Coors said, referring to the parents of 1,929 yards held by Jim Taylor. "I'm not sure they'll like everything I'm going to say," Coors said, referring to the parents of 1,929 yards held by Jim Taylor.
**1980 VOLLEYBALL ROSTER**

- **Michelle Bell**, Sophomore, 5'0" - Position: Setter, from Colorado Springs (South) - Brenda Crumb, Freshman, 5'6" - Position: Defender, from Colorado Springs (Palm)

New Coach

Bob Pearson

Our new Soccer coach is now in his 10th year at Mines. His coaching assignments over the years have included: Football, Basketball, Tennis, Track, Baseball, and Soccer. In addition to his Soccer duties, he will be the assistant Varsity basketball coach and the Intramural Director.

Pearson is a Navy veteran of the Korean War and a 1959 graduate of Mines. After a short time in engineering, he joined the faculty of the Golden Recreation Department when it opened in 1961. As Golden's recreation director, he brought youth Soccer to the community in 1961. This program has expanded to the Triangle Soccer association, providing competition for hundreds of area boys and girls. Pearson also served as an administrator for Mines' 1970 varsity team, which placed third in the NCAA College Division playoffs in Fullerton, California.

**1980 VOLLEYBALL**

The 1980 Oredigger volleyball team will feature more experience than ever before, thanks to returning letterwinners. The squad is led by senior captain Michelle Bell, last year's MVP and team member of the RMAC All-Conference squad. Debbie Buonoir is a strong right side hitter, who led the team in kills last year, and Mary Meagher plans to concentrate on blocking.

The women's athletic program at Mines is now headed by Gail Klock, Assistant Professor of Physical Education and Athletics. Klock is a graduate of Colorado State University and earned her MSPE degree at the University of North Carolina in Greensboro. Since that time, she has taught and coached at Brown University, Provence College, and at Mines.

Gail Klock New Women's Coach

The women's athletic program at Mines is now headed by Gail Klock, Assistant Professor of Physical Education and Athletics. Klock is a graduate of Colorado State University and earned her MSPE degree at the University of North Carolina in Greensboro. Since that time, she has taught and coached at Brown University, Providence College, and at Mines.
The Register is on the wrong track this
year. Why? Perhaps because it’s a
regional publication, restricted in
its range of people and places to
Colorado, and is really interested in
the affairs of the Central City Register.

Dear George.

I’d like to tell you what happened to
my son, a Mines graduate. He’s
actually a student of Dr. Robert
Lowe, a professor in the School of
Mines.

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Mines.
in memoriam

Richard M. Fullaway

Richard M. "Steve" Fullaway, E.M. 1919, died from cancer on May 23, 1980 at the age of 87. He was born in Los Angeles on November 4, 1912. While at Mines he earned letters in baseball, football, track and rugby, and was awarded a Blaine pass to CSM athletic events.

After graduation he worked in various mines in California and Mexico. During World War II he served in the Corps of Engineers as a 2nd Lt. Fullaway worked for Stantm Oil Company of California for 35 years until his retirement in 1957. He was considered an expert in oil cleaning and waste disposal and had worked in the areas of civil, petroleum, mechanical and chemical engineering.

Fullaway was active in CSMMA and assisted in recruiting students for CSM. He was selected a Fellow in the American Institute of Mining Engineers. Particular interest in the history of Colorado mining, he was pursuing his research in this field as it concerned the Cornwall mines.

Surviving Allen are his wife, the former Eileen Wagonbach, a son, daughter and step-grandson.

Harold R. Allen Harold R. Allen, E.M. 1940, died on April 19, 1980, at the age of 40. Born November 20, 1913, in Hancock, Mich., he was the son of Mr. and Mrs. Donald Allen, 1909 Mines graduates. Allen spent his early years in Arizona until his family returned to Golden. He attended the University of Colorado for one year before transferring to Mines. During World War II he was employed at Wright Aeronautical Corporation in Pottersburg, N.J., in 1946 he returned to Golden as an employee of Mines, where he continued for 20 years until his retirement. He was later employed by the State of Colorado's Civil Defense Agency at Camp George West. He retired from that position a few years ago.

He was a former member of the American Society of Mechanical Engineers. Particularly interested in the history of Colorado mining, he was pursuing his research in this field as it concerned the Cornwall mines.

Surviving Allen are his wife, the former Eileen Wagonbach, a son, daughter and step-grandson.

Wayne N. Denning Wayne N. Denning, Grad. Eng. 1926, died at his home in Golden on June 8, 1980. He was 82 at the time of his death. Denning was active in CSMAA and participating in intramural sports all four years. During that time he was also the Post Master for the Post Office in mining until his retirement.

After graduation he worked for Midwest Mining Company in Denver until 1937. In that year he joined the U.S. Army and served as a captain in World War II. In 1946 he returned to Golden as an employee of Mines and was a member of the Masonic Lodge. He served as a scout leader at the World Wars.

He is survived by his wife, Georgia.

D. Lowell Kassler D. Lowell Kassler, Grad. Eng. 1935, died at Mercy Medical Center in Denver at the age of 74. At the time of his death he was employed by Gates Rubber Co. where he had worked for 36 years.

He was born March 19, 1902, in Red Cliffs, N.B., and had lived in Denver for 70 years. He attended Manual Training High School.

Kassler was a registered professional engineer and a member of Beta Theta Pi. He was instrumental in establishing industry standards of the American Petroleum Institute, American Society of Agricultural Engineers, Society of Automotive Engineers, Rubber Manufacturers Association, and Mechanical Power Transmission Association in the mechanical engineering specialty of power transmission. He represented these associations in the American National Standards Institute and was influential in getting standards accepted by the national organizations. After the World War II, he represented international acceptance of the American standards.

He is survived by his wife, the former Eva Kassler, a daughter and three grandchildren.

Lucy E. Conger Lucy E. Conger, E.M. 1930, died on February 5, 1980, at the Veteran's Home of California in Yucaipa. She was born in Delists, Iowa, on November 23, 1901. After two years' service in World War I, she graduated from high school in Seattle, Washington. Following his graduation from Mines, Conger worked for several mining and engineering firms across the country.

In 1941, he was employed by the Corps of Engineers, U.S. Army, Honolulu District. He received special commendation for work on the Corps for his work on the Johnston island water system and the Kurea project. He moved to the firm of Lee & Wison, architectural engineers, and was employed by Porter-Uribeit Home, Sacramento, California. In 1956, he was selected a Fellow in the American Institute of Mining Engineers.

He is survived by his son and daughter.

Frank Casdren Frank Casdren, M.E. 1927, died May 18, 1979 at his home in Santa Fe, New Mexico. He was 82 at the time of his death.

Born in Redlands, Texas, he received a B.A. degree in Chemistry from the University of Texas in 1922. He was a chemist for Cordova Hidalgo in Mexico until entering Mines in 1925. After graduation he joined All-Chilama Mine Co. in Wisconsin. During his years he served as an engineer for the company and published a paper on Aggregate Production Methods at Iowa's Conference in 1944. He became manager of his father's properties in Texas and had left his own ranch. He also did occasional consulting work until his retirement in 1969.

Casdren served as an infantry soldier in World War II. He was a former member of the American Chemical Society and AAIME. At Mines he was elected to Sigma Gamma Epsilon, honorary geology fraternity.

Wesley N. Farmer Wesley N. Farmer died in March 1980, after a long illness. He attended the University of Minnesota, 1918, with a degree in Civil Engineering. He received an A.B. in Geology from the University of Oregon before entering Mines in 1923. He operated the Miller Engineering and Geology Co., in Hobbs, N.M. and later had his own ranch.

While at Mines he earned letters in varsity football. In 1927 he became associated with Vossell Oil and Gas Company and was Vice President-Operations for this company at the time of his death.

On May 15, 1943, he married Martha R. Hairway, Surviving Bob, in addition to his wife, is a son, Michael H. Poundstone of Carson, a daughter, Ann P. Denning of Denver, and a sister, Paula Hedeway of Tulsa, Oklahoma.

Poundstone attended Mines and was a member permanent member of the Laguna Hills Beta Theta Pi Alumni Association at the time of his death.

JAMES M. PHILLIPS. 1941 PHILREC, INC.

LAWRENCE E. SMITH, M.E. 1937 35 Railroad Ave.

W. F. DUKES Consulting Geologist

Philex Mining Corporation

P.O. Box 1201 MCC

Coosa Mining Company

27000 MTX Building

Makati, Rizal, Metro Manila, R.P.

PHILEX MINING CORPORATION

Vice President - Operations

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W.M. F. DUKES Consulting Geologist

Makati, Rizal, Metro Manila, R.P.

110 South Delaware

Federico Videgaray

Fort Wayne, Indiana 46808

W. M. F. DUKES Consulting Geologist

Wells Fargo Financial, Foreign, Domestic

P.O. Box 44051

Federico Videgaray, M.E. 1930, died at his home in Golden, Colorado on April 15, 1980. He attended Manual Training High School before transferring to Denver University where he earned a B.S. in 1934 as a member of the Phi Kappa Psi fraternity.

He is survived by his wife, the former Elise Vogel, a son and daughter.

Charles S. Ryland

Charles S. Ryland died at his home in Golden, Colorado on April 15, 1980. He attended Mines for one year before transferring to Denver University where he earned a B.S. in 1934 as a member of the Phi Kappa Psi fraternity.

While at Mines he earned letters in varsity football. In 1927 he became associated with Vossell Oil and Gas Company and was Vice President-Operations for this company at the time of his death.

Federico Videgaray

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Richard M. Fullaway

Robert R. Allen

Robert R. Fullaway, E.M. 1940, died on a memorial heart attack at his home on April 19, 1980. Born November 20, 1913, in Hancock, Mich., he was the son of Maynard C. Allen, a 1906 Mines graduate. Allen spent his early years in Arizona until his family returned to Golden. He attended the University of Colorado for one year before transferring to Mines. During World War II he was employed at Wright Aeronautical Corporation in Paterson, N.J.

In 1946 he returned to Golden as an employee of the U.S. Bureau of Mines, where he continued for 20 years until his retirement in 1966. He later was employed by the State of Colorado's Oil and Gas Division and Army Corps of Engineers as a 2nd Lt. Fuliaway was a member of the American Society of Mechanical Engineers, the American Institute of Chemists and was a 50-year member of the Elks.

He was bom in Los Angeles on November 4, 1920. While in high school he lettered in football, baseball, track and rugby, and was awarded a lifetime pass to CSM athletic events.

After graduation he worked in various mines in Nevada, Arizona and Mexico. During World War II, he served in the Corps of Engineers as a 2nd Lt. Fuliaway was selected a Fellow in the American Institute of Mechanical and Chemical Engineering.

After graduation he worked in various fields and eventually operated a general merchandise business inxmina, Idaho. In 1978 he married Vivian K. Wisniewski, a son and daughter-in-law.

Wayne H. Denning, Geol.Eng. 1926, died at his home in Gothenburg, Neb., April 11, 1980. He was 83.

A native of Golden and a graduate of the University of Denver, he was president of a veteran of World War II, after which he attended the University of Nebraska. In 1952 he returned to Golden and enrolled in Mines. He was graduated the University of Missouri for Metal Refining Company in Denver until the beginning of the Depression, in 1934, he joined Western Geophysical Co. in Pasadena, where he remained until his retirement in 1953 as vice president of that company. Although officially retired he was self-employed as a consultant at the time of his death.

Denning was a member of AIME, SEG, AGI and AIME Theta Pi. He is survived by his wife, the former Betty Kimble, a daughter and three grandchildren.

Lee Henry Fulkerson, E.M. 1969, died April 18, 1980, in St. Joseph Hospital, Denver. He attended Mines before serving the Army during World War II. Between 1950 and 1942, he worked for Piggy Wiggly Grocery Stores, and then transferred to the U.S. Mint in Denver until his retirement in 1967. He is survived by his wife, four sons and eight grandchildren.

Frank Cadena

Francis Cadena, mot. E. 1927, died May 18, 1979 at his home in San Antonio, Texas. He was 82 at the time of his death.

In Realitos, Calif., he received a B.S. in Chemistry and B.S. in Chemical Engineering from the University of Texas in 1922. He operated an engineering firm for 35 years, he retired in 1978. At the time of his death he was writing a book for Academic Press in San Antonio.

Howard C. Pyle, Hon.Eng. 1959, a retired petroleum executive, died in Orange, California on December 12, 1980, following heart surgery. He was 70.

Pyle was born in Indiana and grew up in Pennsylvania. He joined Union Oil Company of California in 1927 as a geologist and petroleum engineer after graduating from the University of South Dakota in 1928 with a BS degree in petroleum engineering. He was chief production engineer for the company when he joined the U.S. Army in January 1943. Pyle was instrumental in supplying the Allied forces with oil through portable fuel lines. After his discharge, he joined Bank of America in the petroleum finance department. During his career in the oil industry he served as president of Monterey Oil Co. and Santa Fe International Corp., and director on the board of Reserve Oil and Cares.

In 1928 he was president of the American Institute of Mining Engineers and received the honorary degree of Doctor of Engineering from Mines.

He is survived by his wife, Linda, a son, and daughter and five grandchildren.
Denver

Denver's Section held its first Miner's Night at Elton Gardens on July 17, 1980. It was a fun night for all miners and their families with pruned roses, miniature golf tournament and plenty of beer and soft drinks. Approximately 25 miners and their families attended, according to Ken Menz, 69C, President. 70B, chairman of the evening. He hopes to make it an annual event. Steve Decker, 70B, was assistant coordinator.

Grand Junction, Colorado

An "I. H. S. Blues--Readjustment" party was held October 29 for the 1980 Grand Junction alumni and guests. The pot luck supper was hosted by Bliton and Peter Rydgberg, 6M. '59. The reception and conclusion of this event was thanks to Mr. and Mrs. I. H. S. Denver's Section.

The section sponsored a dinner at the home of Dr. and Mrs. Jirgolson with a carry-in dinner at their home in Durango, Colorado. The hostess served "Saltinas", a Bolivian delight, along with various other appetizers and libations. The following are the names of those attending:

- Mr. and Mrs. John Pense, '59, Mr. and Mrs. Tony Worland, '33; Mr. and Mrs. Tony Worland, '50; Mr. and Mrs. Jim Armstrong, '50; Mrs. Jack Armstrong, '50; Dr. DuBois Morris, 6D. '62; and Mrs. Robert Irish, '62.

Pacific Northwest

The Pacific Northwest Section held its annual meeting Oct. 17. The following is Bob Odenstein's report of the meeting and the reactions of those attending.

"Along with the usual fun of nonacademic old members and greetings that all fore­ told for the first time we had the pleasure of having as our guests Professors Glen Eddison and Fred Duvill. They added to the meeting the excitement that this alumni section, even though many miles from Colorado, is very much part of CSM."

"We were privileged to have an excellent slide program of the school's development and activities to which each of us were able to relate. This was especially appropriate as our section spans an age group from Eric Smith, member of the class of '05, to Ken Brinton, a new student this fall.

"The Minors and their guests all agreed it was a great evening and look forward to the next meeting. Attending the meeting were: Mr. and Mrs. James Kennedy, '34; Mr. and Mrs. Tony Worland, '33; Mr. and Mrs. John Pense, '59; Mr. and Mrs. Tony Worland, '50; Mr. and Mrs. Bruce Clark, '48.

Arizona

Eric Smith, 6M. '05, one of the old­ est Miner Alumni, attended every Pacific Northwest Section Meeting.

PACIFIC NORTHWEST SECTION

Stevens J. L. John Schroll, '39; J. W. Kirkbride, '40; E. M. Smith, '40; R. E. M. Smith, '40; L. W. Middleditch, '43; and Mrs. Frank Woodard, Met. E. '42.


denver

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- Mr. and Mrs. John Pense, '59, Mr. and Mrs. Tony Worland, '33; Mr. and Mrs. Tony Worland, '50; Mr. and Mrs. Jim Armstrong, '50; Mrs. Jack Armstrong, '50; Dr. DuBois Morris, 6D. '62; and Mrs. Robert Irish, '62.

Pacific Northwest

The Pacific Northwest Section held its annual meeting Oct. 17. The following is Bob Odenstein's report of the meeting and the reactions of those attending.

"Along with the usual fun of non-academic old members and greetings that all foretold for the first time we had the pleasure of having as our guests Professors Glen Eddison and Fred Duvill. They added to the meeting the excitement that this alumni section, even though many miles from Colorado, is very much part of CSM."

"We were privileged to have an excellent slide program of the school's development and activities to which each of us were able to relate. This was especially appropriate as our section spans an age group from Eric Smith, member of the class of '05, to Ken Brinton, a new student this fall.

"The Minors and their guests all agreed it was a great evening and look forward to the next meeting. Attending the meeting were: Mr. and Mrs. James Kennedy, '34; Mr. and Mrs. Tony Worland, '33; Mr. and Mrs. John Pense, '59; Mr. and Mrs. Tony Worland, '50; Mr. and Mrs. Bruce Clark, '48.

Arizona

Eric Smith, 6M. '05, one of the oldest Miner Alumni, attended every Pacific Northwest Section Meeting.

PACIFIC NORTHWEST SECTION

Stevens J. L. John Schroll, '39; J. W. Kirkbride, '40; E. M. Smith, '40; R. E. M. Smith, '40; L. W. Middleditch, '43; and Mrs. Frank Woodard, Met. E. '42.
Playing Catch-up

All of us are familiar with that game—the stacks of mail waiting for attention, the files that "sometime" will be cleaned out, the notes piling up on the editorial columns. When the whole summer's load of information is waiting to be funneled into our editorial columns.

My personal information store approaches the overload: I enjoyed a business holiday in England, visiting mines in Yorkshire and Devon, addressing a combined mining and public relations audience, talking to mining people and the head of the NUM, A. G. Corrigan, and much, much more. One of the highlights was attending a reception for Prince Charles, another was the get-together of Miners, alumni in London. Bit by bit, all these things will find their way into the Magazine.

Information on the School is exciting—you'll note the dramatic comments and conclusions of the Keystone Conference on page 19. New faculty, new plans, new percentage—yes, for example, the fact that almost 20% of the entering Freshmen class is female. The Colorado Legislature passed the enacting laws to allow us to control our own financial destiny, resulting in a new set of enabling laws to allow us to control our own tuition and fees. This is the first step in setting our own financial destiny, resulting in a new set of enabling laws to allow us to control our own tuition and fees. This is the first step in setting our own tuition and fees.

For all of us, the information load on politics has been more than can be comfortably digested. Two major conventions, intra-party wrestling, the ridicolous attitude of "Biligate," and the comitaditary promises of the candidates add up to more silliness than substance. The "real" campaign, as opposed to the pre-convention maneuvering to which we have been subjected, will now be winding up in earnest.

I was in England when the Vance convention ended, and when Mr. Carter made his statement on increased coal production in the United States. Together with the questions on handling of the energy crisis, the artificially controlled price on gasoline and the Rosalyn actually the power behind the President, I had no choice but to answer the question of the capability of the United States and the coal industry to deliver on the increased production promise. I am a realist. I am, also, a critic. Therefore, it seemed to me that I had to reply to that, under our existing regulations and restrictions, that it will be impossible for the U.S. to meet that commitment. Sir Derek Ezra, head of the National Coal Board, with one of the many asked this question and received this answer.

There is a distinct feeling of uneasiness in defending or explaining the policies of one's country, foreign or domestic, while a visitor in another country, I would have liked to have said, "Yes, of course, we will do just what you promised." I could have said, "The industry is capable of doubling coal production"—if true, but not the full story. So, reluctantly, I had to say that I felt Mr. Carter was in error.

When I returned to Colorado, I spent a day in Paonia, at the Orchard Valley Mine of Colorado Westmoreland Co. A stray piece of knowledge came my way that day which made me feel less uneasy in my response. This Orchard Valley Mine has, in part of its area, a 27 ft. coal seam. In accordance with government regulations, under the current coal lease and Local Loan regulations, only 13 feet of that coal can be mined. Using a conventional room and pillar method of extraction, the remaining coal will be effectively lost, as pillars are pulled and the roof collapsed. Should there be a need for the coal in the future, the cost of recovery into the mine would be economically unfeasible and geologically uncertain.

Another salient aspect of this is a situation that only when a company has signed a contract for sale of a certain amount of coal can a Federal lease be awarded to mine that amount. Even though Orchard Valley has the capacity for processing 2.5 million tons of coal, there was no signed contract for that amount. The lease awarded the company, therefore, allowed only 500,000 tons on one lease and 750,000 on another. The result is easy to see—coal stays in the ground, coal for which there is now a market, employment possibilities for the area are curtailed, and the benefit derived from the extra tonnage of 7% ash, .44% sulfur coal is lost. This premise has been tested in court. NRDC vs. Hughes, and upheld by a Federal Judge.

These examples, bizarre as they may seem, are not anomalous. They are, in fact, representative of many such situations in coal development. They are the best kind of evidence that we shall not, as I reluctantly told my English hosts, fulfill the Venice promise.

In 1974, the National Coal Board announced a long-range energy plan, designed to utilize as completely as possible the country's excellent reserves. This was undertaken in spite of the fact that England had tremendous reserves of coal in the North, and has been producing in the face of new oil reserves recently announced. Recognizing that the differences in development when undertaken by a nationalized industry, the likelihood of lower production—all of the criticisms which those of us in the private sector would level at such an industry, it still seems strange that the 1974 British coal plan is moving ahead, and that the United States still lacks a comprehensive coal development plan or goal.

With the seeming lack of understanding on the part of many major political candidates today in reference to resource development, it is important to lift off from all the hype and bluster, to develop a comprehensive and easy-to-read documentation. The most extensive selection of software solutions to problems in science, engineering and business throughout your academic and professional career, HP. Ask any professional about Hewlett-Packard calculators. They've discovered they're the ones dedicated to solving your problems. In the world of calculators, Hewlett-Packard means outstanding performance. Better than software and programming features to save you time and increase accuracy; the most advanced design to give you greater ease-of-use, rigid quality control for flawless performance year after year; the most comprehensive and easy-to-read documentation, the most extensive selection of software solutions to problems in science, engineering and business throughout your academic and professional career. HP 12C Scientific with Statistics $199.95. HP 12C Professional Scientific with Continuous Memory $399.95. HP 38C Advanced Professional Scientific with Continuous Memory. HP 17B Business. HP 17B Professional Financial Programmable with Continuous Memory $299.95. HP 38C Professional Financial Programmable with Continuous Memory $399.95. So visit a Hewlett-Packard dealer now. They make the professional decision—an HP. For details and the address of your nearest dealer, CALL TOLL-FREE 800-547-3400, Ext. 145. Hewlett-Packard Company, Denver West Travel Service 28, 30, 32. 33, 34, 37, 39, 43, 44, 45, 46, 47, 48, 49, 50.
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