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Role of Nuclear Energy in the U.S.

Aftermath of Three Mile Island

by B. H. Cherry

The accident at Three Mile Island (TMI) had a profound and shocking impact on the people of Pennsylvania, General Public Utilities Corp. and its customers, and the entire nuclear industry. It will have a significant impact on future U.S. energy policy. The accident affects only one side of the U.S. energy equation, the supply side. The factors existing prior to the accident, which strongly supported the need for a viable nuclear industry, remain unchanged. Other events of the past year, including the Iranian revolution and subsequent disruption of oil supply and price, simply reinforce the need for a balanced energy policy in the U.S.

The basis upon which one reaches the conclusion that nuclear energy is a necessary part of a balanced supply strategy can be summarized as follows:

1. MAINTENANCE OF REASONABLE ENERGY GROWTH.

A large number of studies have concluded that desirable economic growth requires continued growth in energy usage. While conservation is prudent in many areas, national policy, which counts on conservation to fill part of the growing gap between supply and demand, risks economic disruption and subsequent inflationary markets. Thus, a moderate growth strategy coupled with major improvements in energy efficiency and conservation programs, particularly in the transportation sector, begin to take hold.

2. DECREASED DEPENDENCE ON DEPLETABLE RESOURCES.

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2. DECREASED DEPENDENCE ON DEPLETABLE RESOURCES.

The total U.S. resource base of 25,000 quadrillion BTU will support projected energy needs for another 60 to 70 years assuming no supply constraints develop in the interim. It has taken almost 40 years from technical verification to bring nuclear energy to a point where it contributes 15% of our total electricity needs. We need to pursue all of our options to maintain the orderly development of undevelopable alternatives and continue to support the nuclear option to maintain our available time for development.

3. DIVERSITY OF SUPPLY.

It is imperative to concentrate a majority of our supply options, on a single resource—coal. The development and expansion of coal supply is subject to many problems. Difficulty in expanding our commitment to coal as that were our sole resource could severely impede our ability to meet energy demands.

4. RELIANCE UPON PROVEN TECHNOLOGY.

Nuclear energy has been proven to be safe, reliable and economic. It would be highly imprudent to discard such an option in favor of major dependence on untried, untested technologies.

5. TIMELY DEVELOPMENT OF UNDEVELOPABLE RESOURCES.

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6. ABILITY TO UTILIZE HIGH RISK.

The nations of the world that have the technological and economic resources available to them to utilize high technology for the production of energy have an obligation to do so. Those nations less capable of utilizing these technologies will have an ever increasing need for fossil fuel, particularly oil, in the next 10 to 20 years.

Despite these incentives, in the six years since the first Arab oil embargo, the U.S. has made little progress towards the goal of increasing energy independence. The factor which has had the most significant impact on U.S. oil imports has been the substitution of Alaskan oil for oil which had previously been imported. Even considering the Alaskan oil offset, total U.S. oil use has increased in excess of 30%. By early 1979, the commitment to nuclear plants in service in the mid 80's had been reduced by about 50% from that which had been foreseen in the early 70's. Some of these charges were due to a decrease in a perceived demand for electricity. It is my view, however, that most nuclear plant cancellations and defections were due to an increasing disaffection with the nuclear option by U.S. utilities. This disaffection, which led the industry to a state of de facto moratorium in the period 1974 to 1978 (a time when other factors would have dictated expansion), was due to the environment in which the industry was operating. This environment included several problems:

1. INCURSION OF FINANCIAL RISK.

The construction and operation of nuclear plants was becoming increasingly uncertain in both...
2. LACK OF POLITICAL RESOLUTION OF KEY ISSUES.

A number of issues that the government has had responsibility for, such as high level waste disposal and temporary storage of spent fuel, remained unresolved.

3. LACK OF CLEAR NATIONAL COMMITMENT TO THE NUCLEAR INDUSTRY.

Despite allegations to the contrary, light water reactors did not dream it prudent to make such efforts. By late 1978, despite the clear need for nuclear energy, the U.S. utility industry did not display the confidence to make such an expanded commitment. The basis for this apparent paradox was actually not much different from that given by a senior industry executive: "From a national policy perspective, we are convinced that increased reliance on nuclear power is essential...but as prudent managers of our shareholders' money, unless the business can be considered on a very different basis in the future, nuclear power is not an attractive investment opportunity."

By early 1979 there was hope for changes...hope that "the politicians" would provide the environment necessary for renewed utility interest. For a while, in early 1979, it looked like this might have been the case. That slight comeback was ended by the TMI accident on March 28. It is my hope that the lessons learned from this traumatic event will provide the basis for a stronger, safer and more viable nuclear industry in the U.S.

THE IMPACT OF THREE MILE ISLAND.

The accident magnified the concern of the public and the utility industry in two key areas:
1. The perception of plant safety and risk to the public, and
2. The perception of risk to the financial integrity of the utility investor.

Additionally and importantly, the accident provided a focal point for the previously diverse anti-nuclear interest to rally about. The accident also gave such groups a responsibility and an opportunity to voice their concern. This was a significant change. More homogenous anti-nuclear community may be the single biggest obstacle in the U.S. It is clear that any expansion of nuclear energy in the U.S. will require much greater grass roots political support than ever before. In order to develop such support, the question of plant safety and risks to the public will have to be recognized. From a safety standpoint, the Three Mile Island accident, is one which deserves much of our attention in the near future.

Plant Safety and Risk to the Public.
The question of plant safety and public acceptance of the operational risks of nuclear energy had been substantially regulated by the facilities prior to TMI. It was generally perceived that this was a technology "under control" and that even if there was an accident, health effects would be minimal. The accident was the most serious impact of a fuel accident in the history of nuclear power. The accident was ultimately contained, as it should have been, by the plant safety systems. There is a strong view, however, that neither the operators, regulators or designers were able to understand or fully come to grips with the accident for several days.

The Kemeny Commission findings, reports from the NRC, such as the Mathos "Lessons Learned" report and the reports of the many other investigators whose work is being conducted will ultimately provide the foundation for a safer, more controlled technology. Improvements in many areas of plant design and operation, regulation, operator training and emergency planning will occur.

The industry would be delinquent indeed if it did not maximize the learning experience of such a traumatic event as TMI. The observation that there were warnings of a TMI type accident as early as 1974 in the Beause plant, and at the Davis Besse plant in 1977 is one of the more important expected outcomes of the accident. An understanding of the substance of these two occurrences might not have eliminated the serious consequences of the TMI accident. I should emphasize that such past customer benefits should have significantly increased the probability that the consequences of the TMI accident would have been significantly diminished. The industry has lacked understanding of the need for a strong, more homogeneous anti-nuclear community which must be organized as one whose sole function is to collect, analyze and communicate the operating experience of our industry's nuclear plants. I believe that this key ingredient added to other industry initiatives in other areas will provide a strong basis for the future safe operation of U.S. nuclear power plants.

The assurance of safe operation of plants is very much related to the public acceptance of nuclear technology. Since there are always some risks...the public, and particularly the greater public understanding of the risks of nuclear energy, should have to be a part of the future of the industry. The ability to communicate to the public has been enhanced as a result of the accident on Three Mile Island because of the degree of the press and media coverage. The average citizen has a much better understanding of the fundamentals of nuclear energy than he may have had a year ago. The industry must use this increased level of understanding to its advantage with the public and must not delay in initiating such programs. The "will" of the public today is a necessity that is likely to be short.

The role of a technology, and its impact on the nuclear industry was substantial. The fact that media misunderstood and sensationalized much of the information, contributed much to that fear is important. The fact that Philadelphia Browns of the NEW YORK TIMES observed that the press coverage of the TMI accident was one of the most important disaster in American journalistic history, received little notice. The impact of such sensationalism may have been substantially blunted if there had been a higher degree of awareness of the technology. Such efforts are desperately needed in the U.S. and in the world if the nuclear option is to be accepted.

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The money burden referred to is associated with the entire cost of capital on the 700 million dollar investment in the facility and in the problem of the unexpected costs associated with operations at the units. We expect the total of these costs to approach 100 million dollars for each year the unit is out of service. The impact of a temporary inability to charge customers for replacement power costs in addition to the burden of fixed charges already resulted in the bankruptcy of the GPU companies. The editorial went on to say:

"There were three in operation at the time of the accident: Oyster Creek—commissioned in 1978, Three Mile Island Unit 1—commissioned in 1974, and Three Mile Island Unit 2—commissioned in 1978."

Financial Integrity of the Utility Investor.
The asymmetrical nature of the risks and benefits of an investment in nuclear energy was underscored by the impact of the TMI accident on General Public Utilities Corp. General Nuclear plants* prior to March 29, 1979 had produced customer benefits of close to 800 million dollars. These benefits were directly off the GPC rate payers through the application of a fuel adjustment clause for the lower cost of nuclear fuel vs. coal and oil. There was little, if any, recognition of such past customer benefits apparent in the initial rulings following the accident by the Pennsylvania and New Jersey Regulatory Commissions. The Pennsylvania ruling was characterized in an editorial in the Harrisburg Patriot as follows:

"Responding to an unprecedented public demand for an unprecedented conclusion, the Pennsylvania Public Utility Commission has ordered that the operators of the Three Mile Island nuclear accident on the owners of the plant..."

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“Every utility in the country recognizes the construction of a new generating capacity must pay heed to the implications of the PUC ruling when it comes to deciding whether to build coal or some other form of generating facility.”

I believe that the above quotation indicates that utilities must consider the financial risks associated with the construction and operation of nuclear power plants in a different light than ever before and clearly in a different light than other investment opportunities. The financial impact on the company is severe. In addition, the current impact of replacement power costs on GPU customers is also substantial. Exacerbated by the NRC mandated shutdown of TMI—Unit 1, these costs are in excess of 20 million dollars per month. Had the burden been spread over the total beneficiaries of nuclear energy across the country, the impact would have been much more manageable. Development of industry supported insurance coverage for replacement power costs would be one way of spreading the burden. Without such a vehicle to spread the financial risks of major plant outages, it’s my judgement that the existing commitment to nuclear power will not be expanded by the utility industry.

While the impact of the cost of replacement power on a customer group can be mitigated through the development of an insurance pool, the problem associated with fixed cost coverage of a disabled plant remains. Without a mechanism for spreading the risk of such fixed costs, I believe it’s improbable that a single utility would take on a commitment for a new nuclear plant. Diversification of such risks through regional pooling of nuclear facilities is suggested for reducing the impact of such costs on a single organization. Such regional consortia could be charged with the responsibility for constructing and operating new facilities. In addition to broadening the financial base of nuclear projects, these organizations could also provide much greater technical and management depth to the projects. Such an approach in an environment of renewed commitment to nuclear energy could provide a viable mechanism for expansion and progress.

The Need For A Clear National Policy

The successful implementation of the range of industry and regulatory programs resulting from the TMI accident can provide the basis for an expanded commitment to nuclear energy in the U.S. with clear national policy backing such a renewed commitment; however, no such expansion will occur.

I am encouraged by President Carter’s reaffirmation of support for nuclear energy in his speech in Kansas City in July. I believe that question the degree of commitment of his support in view of his clear avoidance of even the word “nuclear” in his nationally televised energy message the previous evening.

In the absence of a strong national policy on nuclear energy either for or against it, state and local governments have moved to fill the gap. Reacting to vocal minority pressures and near term cost impacts, this environment is negative. From New York to California, nuclear power is being taken on the chin at the state level. Unless this policy vacuum is filled, nuclear energy will be unable to be expanded on any basis in the private sector, and indeed the battle may shift from expansion and new commitments to plants under construction and in operation.

Summary

The need for a balanced energy supply strategy in the United States is more severe than ever before. The war which the energy problem is to be fulfilled. The aggressive action if the promise of nuclear power to fill a gap in energy supply and demand. However, 190 words in an obscure presidential speech is not the kind of support required to move forward. Without overt support, the war which the energy problem is alleged to be equivalent of, will be lost.

Bernard H. Cherry is vice president, corporate planning, General Public Utilities Service Corporation, a subsidiary of General Public Utilities Corporation. He obtained a B.Sc. Engineering, Columbia University, graduate work in nuclear science and engineering, and is currently a graduate work in nuclear science and engineering, and is currently intolerable. The desirability of nuclear energy policy is undiminished even in the 70’s than ever before in our history. The impact of foreign oil dependence upon the nation’s industry and economy is currently intolerable. The desirability of nuclear energy technology and utility perception of the risk of the technology is not changed. Efforts of the utility industry and regulatory bodies in learning from the accident are minimal and a strong move in the right direction. A significant program aimed at the education of the public to the character and risks of the technology will also be required. A new industry organization to review and evaluate plant problems and identify and communicate their significance to the public will help insure the future safety of nuclear energy. Commitments to new nuclear facilities may require additional insurance coverage and a modified industry structure to spread the financial risks of nuclear energy over a larger base. A series of regional nuclear generating companies is recommended. Finally, the need for a clear national policy on nuclear energy is essential to the expansion of the industry.
Nuclear Option
by Irving S. Shapiro

There was a line in a recent issue of Harper's Magazine, which said, "Split atoms, not wood." We ought to split atoms and wood—and dig coal, and pursue research and development projects in a number of areas. The philosophy ought to be to put lots of eggs in lots of baskets—and watch all the baskets.

One important set of baskets is labeled electric power. Almost one-third of all primary energy is used to make electricity, and the fuel used for that purpose isn't available for any other use. All of us should be concerned about any significant amount of natural gas and oil being used to generate electricity, when there are alternatives. It's no secret that nuclear power is in trouble. There are 71 nuclear plants in operation now. Approximately 90 are on order, but there's a question about how many of them will be completed and put into operation. New orders for nuclear units have been declining for years—long before the accident at Three Mile Island—and the rate of new orders coming in is now zero.

We don't hear much anymore about all the benefits of atomic energy. We hear about the fears of a disaster. We hear about the lack of public trust in the people running the nuclear industry. We hear about the high capital costs and the delays in getting nuclear facilities built and licensed—the timetable is now up to 12 to 14 years in this country, nearly twice as that in some other nations. We hear about utilities scoping their plans for nuclear plants, deferring construction altogether, or selecting coal-fired units. They would rather switch than fight, and, given the controversy over nuclear energy, it's hard to blame them.

Yet the facts say we ought to be going the other way. It would be desirable to look to nuclear plants to produce more of our electricity within the next 10 to 15 years, at least 20 to 25 percent of the total, as compared to 13 percent now, and something in the range of 35 percent by the turn of the century. This would be prudent and safe, and the technology to make it happen already exists. Other nations are taking this route—more than 40 of them—and unless the U.S. does the same it may lose its position in nuclear technology.

Nuclear Controversy
The controversy about nuclear power comes down to two basic questions: The question of need, and the question of safety. If the U.S. does not need more electric power, there's no case for building generating capacity except for replacement. If there is no way to handle the nuclear safety question, in all its dimensions, then the nation has no nuclear option.

At the moment there is no shortage of electric power. There is capacity in reserve. The problem lies ahead of us, and how big it is depends on our assumptions about economic growth and power demand. We can find a lot of different numbers on this but there seems to be general agreement on a few basics: GNP in the next 10 to 20 years is likely to grow at a slower rate than in the past, and so is overall energy use. The demand for electric power, though, is probably going to increase more rapidly than the overall energy number, because electricity will be displacing some other forms of energy. In Du Pont we forecast an energy growth rate for the U.S. of about 15 percent per year, and an electricity growth rate of about 25 percent. These are conservative numbers, but is important to note that this still works out to be an increase in electric generating capacity of about two-thirds between now and the end of the century. To the extent that our growth rate can be raised above the expectation, the needed generating capacity will be even greater.

Those numbers, incidently, take into account a serious conservation effort. Fewer B.T.U.'s; more work out of the B.T.U.'s available. Co-generation, retrofit homes and offices and industrial plants. All of that can be done, and is being done, but the curve is bound to flatten out. Conservation by itself will not be enough.

What about new or expanded sources? As a practical matter, the options for the near future for electric power come down to coal and nuclear energy. Solar energy and some of the other unconventional technologies, whatever their value in other applications, are not going to give us significant growth in electricity generation in the rest of this century.

The big push in Washington now is to get the natural gas and oil out from under the boilers, and the substitute coal. Ten percent of our oil and 16 percent of the natural gas are now used to generate electricity. Those materials are simply too precious to use in that way, so there is a strong case for substituting coal.

As a singular solution to the energy problem, though, coal is too simple an answer. There are side effects that can't be dismissed lightly. The problems of mining and transportation, and most important, the environmental and health loads. For some of the coal-use technologies large quantities of water are required, and may not be available. Handling the sulfur dioxide emissions and the oxides of nitrogen will not be easy or inexpensive. Beyond that, there are polyaromatic hydrocarbons and the concerns about the buildup of carbon...
double in the atmosphere. Combustion of any fossil fuel produces CO₂, and any of these will increase that concern.

The public is not told that the increased production of energy—people vote for that in the polls—but the support for nuclear power has been declining over the years.

What is the fear?

Is it that a nuclear reactor could fail and go off like a bomb? Two-thirds of the population think the answer is "Yes," although the physicists have said again and again that it simply cannot happen.

Is it that there could be a meltdown? Do not make massive release of radioactivity possible? But thousands of lives? Many people believe there is a serious chance of that. Though the probability of that happening is extremely small.

They also believe that smaller causes health hazards and do genetic damage, that there is no good way to store nuclear wastes, and that other nuclear plants—nations—or terrorists—may get their hands on nuclear fission materials and turn them into bombs.

Set those fears against some facts. Look back to the safety question: Is nuclear power safe? Can it be controlled? The U.S. Nuclear Reactors have been and can be operated safely. The wastes can be handled safely.

The obvious political fact of life is that most people in this country are far from confident that government policies are as safe as they would like it to be. They aren't confident that they are being told the truth, and they are not confident that the people in charge of nuclear plants know what they are doing. The public has been given assurances, but they have also seen news stories about shutdowns of nuclear plants, leaks of radioactive materials, and then there was Three Mile Island—worst accident of the commercial nuclear energy program in the United States.

The public is not told that the accident at Three Mile Island, the Kemeny Commission report on that accident, the effects of the radiation release on the public surrounding the plant will be negligible. It is estimated that the most radiation any citizen might have received was around 70 millirads, that is far less than the average individual receives per year from natural radiation. The most likely health effect is that there is that amount of medical science regards as tolerable. It is about the amount that people receive annually from dental and medical X-rays.

The chances that we will later see an increase in the incidence of certain kinds of cancer because of that accident are so small as to be statistically insignificant. If there had been a meltdown in the reactor at Three Mile Island, the Kemeny report said, it is highly probable that the radiation would still have been contained in the building and would not have been released to the outside.

Du Pont can bring some firsthand testimony to the safety question. Du Pont probably has as much experience—and other countries have some wastes as anyone in the world. Our company built the Hanford, Washington, facility during World War II, and the Savannah River atomic plant in South Carolina. We continue to run Savannah River today.

Savannah River is a big operation by any standard. It covers 315 square miles, and includes 65 miles of railroad track. Five nuclear reactors were built there. Three are operating now. The reactors have not produced nuclear electricity. They are designed to make nuclear materials from which power is produced to generate steam to run turbines, but they are comparable in size to the reactors in a major power plant.

Along with the reactors there are fuel reprocessing units and storage facilities. Employment totals about 8,000. Savannah River has been running a long-time—120 reactor-years: 26 years on the calendar. No member of the operating and management staff has been injured by radiation. No member of the public in the surrounding area has been found to have received a dose that is more than that of a few percentage points above the natural radiation. We know that is true because radiation levels have been monitored at many locations from the first day of operations. From a health standpoint, the most hazardous part of the plant is not the nuclear reactors but the reprocessing fire power station used to generate the electricity needed to keep the plant running and set up better operating procedures.

What about nuclear proliferation?

Nuclear waste is a problem, but it is not a bigger problem than the use of coal. The building of light-water reactors—the kind producing electricity today—does not add to the hazards to world peace. The nuclear reactor is a long way from the bomb. It is an undeniably clean power source. It is not a potential weapon of mass destruction. The nuclear fuel cycle can make a bomb. The building of light-water reactors does not add to the hazards to world peace.

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What about nuclear proliferation?

When uranium is reprocessed, plutonium is produced, and a handful of plutonium can make a bomb. The building of light-water reactors—the kind producing electricity today—does not add to the hazards to world peace. The nuclear reactor is a long way from the bomb. It is an undeniably clean power source. It is not a potential weapon of mass destruction. The nuclear fuel cycle can make a bomb. The building of light-water reactors does not add to the hazards to world peace.

The safety question in all of its dimensions is not one of absolutes, but of keeping risks acceptably small. By any comparative standard, nuclear power is surely one of the safest bets we could make. It may prove to be less hazardous than the use of coal-fired plants, and to the extent that nuclear energy reduces consumption of oil and natural gas, that improves our security position by limiting dependence on foreign sources.

What's the formula for an energy program? Is there a particular balance of different sources that is best?

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that happen we need better communic­
ation. And we need some changes in the way the public goes about its nuclear program.

There has been an excess of zeal on both sides of the nuclear controversy. The people against it—including some who are going to be opposed no matter what the facts are—have used dooms­day rhetoric to block power plant con­struction and licensing; but there have also been mistakes made on the other side. For example, we were once promised that the nuclear age was going to bring us electricity so cheap it wouldn’t pay to meter it. That rings a little hollow to the people paying the light bill today. More recently, advocates of nuclear power have left the impression that the future should be nuclear­powered almost to the exclusion of other sources, and that of course turns the public around in appealing for the public’s support.

Nuclear Needs Friends

Nuclear power needs more friends in government, as well as with the public. That means something called coalition­building—whichever is the modern label for good old political give-and-take. This kind of thing has appeal for the public because it speaks to the emotion of people. They want to go with the light, and be fully rational in a technological or economic decision—unless the pro­nuclear camp operates in a spirit of com­promise, there may not be much left for it to defend in years to come.

On the question of plant location, let’s recognize that many of the people opposed to having a nuclear plant next door are willing to see plants built a few miles farther away. Why push to build a plant close to the public? Why not focus our efforts on getting a nuclear plant far enough away that people will not take it as a basis? It’s like asking a man to buy a very expensive car without promising that he will be allowed to drive it when he gets it home. What is needed is a one-step licensing procedure, with rigid inspections to ensure that the con­struction job and the training programs for employees meet the standards in every way.

None of these changes, none of the technologies that are required, none of the funding requirements—all of the steps we ought to take to ensure the safe production of adequate electric power for the future—is beyond our resources or skills.

We are looking at it a need. It is real. We’re looking at options. They are promising, though some questions we can’t answer yet. The option considered here, nuclear power, is one with more answers than most. We have the technology and the experience to expand capacity efficiently and safely and gain a great many kilowatts.

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above all, at the level of the commitment to safe operation. Regulations can help, but they cannot do the whole job on safety. As the Kennecott Commission said in the Three Mile Island accident: "...the people have been led away from the notion that because a practice is widely accepted, it is therefore completely safe."

Nuclear Needs Friends

Nuclear power needs more friends in government, as well as with the public. That means something called coalition­building—whichever is the modern label for good old political give-and-take. This kind of thing has appeal for the public because it speaks to the emotion of people. They want to go with the light, and be fully rational in a technological or economic decision—unless the pro­nuclear camp operates in a spirit of com­promise, there may not be much left for it to defend in years to come.

On the question of plant location, let’s recognize that many of the people opposed to having a nuclear plant next door are willing to see plants built a few miles farther away. Why push to build a plant close to the public? Why not focus our efforts on getting a nuclear plant far enough away that people will not take it as a basis? It’s like asking a man to buy a very expensive car without promising that he will be allowed to drive it when he gets it home. What is needed is a one-step licensing procedure, with rigid inspections to ensure that the con­struction job and the training programs for employees meet the standards in every way.

None of these changes, none of the technologies that are required, none of the funding requirements—all of the steps we ought to take to ensure the safe production of adequate electric power for the future—is beyond our resources or skills.

We are looking at it a need. It is real. We’re looking at options. They are promising, though some questions we can’t answer yet. The option considered here, nuclear power, is one with more answers than most. We have the technology and the experience to expand capacity efficiently and safely and gain a great many kilowatts.

Fred Fox ’54
Bill Thornley ’48 Ex.
Rick Weber ’65
Regan Heath ’74
Don Taylor ’77

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above all, at the level of the commitment to safe operation. Regulations can help, but they cannot do the whole job on safety. As the Kennecott Commission said in the Three Mile Island accident: "...the people have been led away from the notion that because a practice is widely accepted, it is therefore completely safe."

Nuclear Needs Friends

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Mt. Taylor Project—Overview
by Richard J. Barendsen

September of 1974 and shaft sinking was initiated in 1976. Now, 5 years later, we are at the point of beginning the large scale underground development that will lead to commercial production rates.

We believe the reserves present in the Mt. Taylor project area comprise the largest in the U.S. accessible from one location, with reserves estimated in excess of 1.2 billion pounds. Based on the 1979 DOE estimate of remaining low-cost U.S. reserves of 580 million pounds, Mt. Taylor represents some 22 percent and should prove to be a stable and dependable source of uranium for between 20 and 25 years. The uranium contained in the exceptionally high grade set of ore bodies, when used for power generation, will be equivalent to the energy of about 4 billion barrels of oil. The deposit is contained in the Westerly Canyon member of the Morrison sandstones which, at this location, are buried between 3,100 feet and 3,300 feet deep. The average grade of the deposit would be somewhat above 5 pounds per ton, and in the location of the shafts, the source of production in the early years, the grade will run very substantially above 5 pounds per ton, a very high grade indeed for production in the U.S. today. According to the DOE, the average for the entire nation for the year 1979 was slightly over 2 pounds per ton.

There are two concrete-lined shafts 400 feet apart and 3,300 feet deep. These shafts were sunk using conventional sinking methods. The main shaft is 24 feet in diameter and will be used for hoisting the ore as well as the exhausting of ventilation air. It was started in January, 1976, and bottomed in early 1979. The service shaft is a 14 foot shaft which was designed for the movement of men and materials as well as the exhausting of ventilation air. Sinking was started in July, 1975, and it also was completed in 1979. The pumping stations have a primary design capacity of 7,000 gallons per minute with a secondary system capable of an additional 6,000 GPM. These are now pumping from 4000 to 6000 GPM from the bottom of the mine.

To more effectively deal with the difficulties associated with water, heat and radon, we are planning to go to a multilevel development scheme. The ore level is at about 3,100 feet, the haulage level at approximately 3,200 feet and the drainage exhaust level at approximately 3,300 feet. Long-hoists will be drilled upward from the haulage level to provide access to the ore. The drainage exhaust level will be drilled upward from the haulage level. There are two concrete-lined shafts 400 feet apart and 3,300 feet deep. These shafts were sunk using conventional sinking methods. The main shaft is 24 feet in diameter and will be used for hoisting the ore as well as the exhausting of ventilation air. It was started in January, 1976, and bottomed in early 1979. The service shaft is a 14 foot shaft which was designed for the movement of men and materials as well as the exhausting of ventilation air. Sinking was started in July, 1975, and it also was completed in 1979. The pumping stations have a primary design capacity of 7,000 gallons per minute with a secondary system capable of an additional 6,000 GPM. These are now pumping from 4000 to 6000 GPM from the bottom of the mine.

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The captive mill will be located approximately 3 miles north of the shafts. The process will be acid leach with the initial capacity expected to be approximately 2,000 TPD or about 4.5 million pounds UO3 per year. Tailings will be disposed of at a site about 2 miles away. The mill will have a 20 to 25 year life and will operate 7 days a week with 3 shifts per day. A coarse fraction of the tailings will be separated at the mill and be returned to the mill to be used as backfill. The remaining approximately 50 percent will be disposed of using a new below-grade trench burial scheme.

During the first quarter, we successfully completed a pilot mining program intended to verify the quality of the deposit, the ground conditions and the basic approach to be used in mining. Following corporate Board approval in December, we have embarked on the major mine development program accessing the ore. The detailed design of the mill was started in the second half of 1978 following the completion of submission of our application for a Radiological Materials License from the state of New Mexico in May of 1978. Site preparation and construction of the mill and tailings disposal area should begin as soon as this license is obtained, which is now expected mid-year 1980. The target for initial operation of the mill is currently mid-year 1982.

Exploitation on the project through year-end 1979 were approximately $160 million for the development of the mine. Additional money was spent on acquisition of mineral leases and surface rights. We expect that the mine will start producing commercial volumes during 1981. Current plans are that production will reach about 5 million pounds per year as the underground development is expanded and as more mining areas are opened up by the mid-1980's.

Our ultimate production goal, should the world market be able to absorb it, is to de-bottleneck the mill and expand the mine to reach a production rate of above 4,000 tons per day yielding between 7 and 8 million pounds UO3 per year.

We estimate that the capital required for initial mine development and fixed plant over the next several years to reach the 5 million pounds per year level of production will amount to between $150 and $200 million and the cost of the mill and tailings program will be between $50 and $100 million more. The resources are also large, so that the initial capital costs per pound will still not be much over $4.

We have not yet committed any of the production to market but we are currently engaged in discussions which will lead to such commitments.

Richard J. Barendsen is Manager, Planning and Budgeting, Uranium Division, Gulf Mineral Resources Co., with headquarters in Denver.

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Mt. Taylor Project—Mine
by John A. Heron

The major uncertainties concerning the mining programs for Mt. Taylor have been determined during the stage construction and pilot mining work in development in the Westwater Sands.

The rock strength is better than anticipated and observations at the mines have provided ample evidence that steel support is unnecessary except in unusual geologic situations and main station areas. Higher rock strengths allow more flexibility in mining methods and reduce mining development, and drift maintenance costs. Rock strengths were measured to be in the range of 2,720 PSI in barren rock near shafts to 8,000 PSI in the Westwater Sands.

Engineering and operational solutions have been developed for the problems of pumping water, drainage of ore blocks, ventilation refrigeration of work areas and movement of ore, men and materials.

The full continuity of the ore bodies will only be known as closely-spaced long-holing is completed from the drifts under the ore zone. Presently, over 2,800 feet of drift has been driven in ore with very good ore continuity, and we have every hope that other ore bodies will exhibit similar characteristics.

The primary access to the ore trend has been established with the completion of the production and service shafts and the pumping facilities. A pilot program was structured to establish the economics of mining and provide a basis for the development of the ore body. A new cut is then made alongside the fill. This cycle is repeated in a retraction pattern until the entire block of ore is removed, mined and replaced by the sand fraction of the ore. Portion of the system is used in the mining pilot program with conventional drill blast mining equipment. This system also lends itself to use of mechanical continuous miners which are now under-going tests underground.

MINE OPERATIONS

Mill the Westwater Sandstone ores in the Grants district is a well-established process at several plants. Mt. Taylor ore bodies are quite similar but slightly higher grade. Ore preparation and recovery testing have confirmed that recovery of over 96% of uranium values can be accomplished in a conventional two stage acid leach, followed by CCD solvent extraction process using extended leach times with higher temperatures and additional acid. Stopping and ore preparation mining equipment.

The mining plan involves three basic steps: stope preparation, backfilling the void with cemented sand. (This system also lends itself to use of mechanical continuous miners which are now under-going tests underground.)

Slope preparation involves the drilling of drifts to the extremities of an ore block and establishment of extraction faces (longwall or slot). Secondary Development

The secondary development will generally consist of a set of four parallel drifts driven along the trend, underneath the ore bodies. From these drifts, long- hole drilling upwards into the ore zone will give detailed information on the area to be mined and begin drainage of the ore. Then raises and inclines ramps will be driven upwards to begin actual extraction of ore. Stope preparation work will consist of driving drifts to the extremities of an ore block and establishing of extraction faces (longwall or slot).

OPPORTUNITIES

The Mt. Taylor ore body has tremendous potential for being mined mechanically. The support systems for each individual stope are quite extensive and the centralization of a number of small conventional stopes into more productive, larger mechanically mined stope panels is attractive because of a common support base. Contrary to a number of mines in the Grants area, the continuity and large size of the higher grade ore bodies, the mine life, and the stability of support systems all tend to support the conversion to larger more mechanized mining systems. The mechanized mining systems for Mt. Taylor are being aggressively pursued, and the mine will convert to mechanized mining equipment as soon as is economically justified. Milling the Westwater Sandstone ores in the Grants district is a well-established process at several plants. Mt. Taylor ore bodies are quite similar but slightly higher grade. Ore preparation and recovery testing have confirmed that recovery of over 96% of uranium values can be accomplished in a conventional two stage acid leach, followed by CCD solvent extraction process using extended leach times with higher temperatures and additional acid. Stopping and ore preparation mining equipment.

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anuncios


DONALD MORRISON DAVIS

Donald Morrison Davis, b. 1925, died on January 5, 1980 in Eastland, Texas. Mr. Davis retired in 1967 from his position as vice-president of exploration for the Union Oil Co. Except for three and one half years spent in the executive office of the Pure Oil Co. at Chicago, he had always worked in Houston.

A native of Washington D.C., he attended Central High School before entering Mines in 1925. He married Lilian Harvey in 1926 and moved to Houston as a geologist for Pure Oil. He was particularly adept in geophysics and applied these talents to exploration geology, which resulted in many oil and gas discoveries for his firm.

He was a member of Sigma Gamma Epsilon and Mu Epsilon Tau internships and a number of professional societies, including A.A.P.G. His wife Lilian; daughter Mrs. H. J. Bulgren; five grandchildren; one great-grandchild; two brothers, L. R. Davis of McLennan, VA, and Dr. R. B. Davis of Greens- wick, KY; survive him.

Editor's Note: Many thanks to M. C. Kies, 25, who sent us the information. He was Mr. Davis's college roommate, lifetime friend and colleague.

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DONALD MORRISON DAVIS

Mark Ulysses Watrous E.M. 1914 and Medalist 1954 died in Denver January 28. He was 88 at the time of his death, which followed several weeks of hospitalization for pneumonia.

Watrous, retired from the State of Colorado Highway Department in 1963, after having been one of the most productive and controversial chief engineers of the department's history. He became chief highway engineer in 1946, and thereafter pushed constantly for more funds to upgrade the state's highway system. He is widely credited with the conception and construction of both Interstate Highway 25 and the Denver-Boulder turnpike.

A native of New York, Watrous moved with his family to Monto Vista, Colorado as a small child. The family lived briefly in Alaska, also, but returned to Colorado just after the turn of the century.

After graduation from CSM, Watrous worked as a mining engineer in various Western states, then served during WW II in a special Army mapping and surveying detachment.

Following his service, he returned to Monto Vista and operated his own engineering firm for a time, until entering the employ of the U.S. Forest Service for four years. He then became a construction engineer, until his appointment by Gov. John Vivan in 1946. While instituting many reforms in specification writing, funding, and control of the department, Watrous often found himself under fire. He was uncompromising in his beliefs, however, and usually implemented his project despite opposition.

He became a Medalist of Colorado School of Mines in 1954, in recognition of his services to the State and to his profession. His first wife died many years ago, and he married Dorothy M. Bowen in 1961. In addition to his wife, he is survived by a daughter, Carol Wood, four grandchildren and five great-grandchildren.

James V. Thompson 1.40
David L. Watson 1.60
Richard J. Pinney 1.60
Douglas C. McIntosh 1.66
Larry G. Hayes 1.52
Curtis J. Tempkini 1.53
John J. Chadick 1.68

Editor's Note: Many thanks to M. C. Klaas '25, who sent us the information. He was Mr. Davis's college roommate, lifelong friend and colleague.

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Bulgaria: five grandchildren; one great-grandchild; two brothers, L. H. Davis of McLean, VA, and Dr. J. B. Davis of Green-

The mines magazine • may 1980

Recap of Colorado School of Mines Alumni Assn. Board of Director's Meetings February & March 1980

Membership is slightly ahead of last year with 2256 members, 210 junior members and 197 life members. The membership committee is co-chaired by Stew Squires '74 and Gary Nydegger '74. The financial statement for the first five months of operations shows the expenditures to be on budget target for the year.

Marshall Crouch, Alumni Assoc. President, made the following committee appointments for the year:
2. Membership—Stew Squires and Gary Nydegger, co-chairmen.
3. Nominating—Three immediate past presidents.
4. Teller—Walt Durrie, chairman.
6. Foundation Fund Raising—Tom Smogals, chairman.
7. Continuing Education—Bob Reeder, chairman.
9. Local Section—John Lindemann, chairman.
10. Loan & Scholarship—John Wright, chairman.

Ad Hoc Committees:
1. Alumni House—Bob Brace, chairman.
2. Special Survey—Gary Nydegger, chairman.
3. Foundation Board—Jim Link, chairman.

It is intended that committees will take an increasing role in the operational direction of the Alumni Association. Two important committees will be the Long Range Planning, which will help formulate long term goals and objectives for the Association. The Foundation Committee is currently preparing a report on the current status of local sections and how the Alumni Association can provide greater support to currently active sections and also to reestablish dormant sections.

It is of utmost importance that the officers and the board of directors of the Alumni Association receive input from the membership. This will allow the Association to provide services required by the membership and truly represent the graduates of the Colorado School of Mines.

Robert Rodoor
Secretary

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 Shariet Berentsen, (303) 279-0300, ext. 2295, or mail the coupon below.
The 1981 AIME Annual Meeting, held in Las Vegas, Nevada, February 24-28, featured programs of the Society of Mining Engineers of AIME, the Metallurgical Society of AIME and the Iron and Steel Society of AIME. Within these broad framework, the Society of Economic Geologists, Council of Economists and the Women's Auxiliary to the AIME.

Since its inception in 1871, the American Institute of Mining, Metallurgy and Petroleum Engineers has been recognized as a prestigious voice in the industries represented by its members. AIME has traditionally been involved in the education of member groups and individuals, and always recognized this responsibility in this function.

The Colorado School of Mines, which has had many of its graduates participate in AIME high offices and educational activities, was particularly well represented in both the recipients and awards for service to the industry at this most recent meeting.

Jan D. Miller, MSc. Met. E. '66 and PhD. Met. '69, was a member of the annual meeting program committee. Burt C. Mariacher, E.M. '41, was an outgoing vice president of AIME and participated in these also.

A number of Mines alumni received medals for distinguished service and achievement in the minerals industry.

Joe B. Rosenbaum, Met. E. '34
Robert C. Earlougher, P.E. '36
Donald O. Rausch, E.M. '54, PhD. '59
Alfred G. Hoyl, E.M. '40, GeoL E. '40
Reynard B. Bhattig, Met. E. '50,
MSc. Met. E. '50, PhD. Met. E. '53
Truman H. Kuhn, Hon. Mem. '69
James A. Lawver, Met. E. '43, DSc. Met. '56
Mark Strever, undergraduate

In addition to the several awards received, CSM alumni presented a number of papers during technical sessions, or served as chairmen of sessions.

Richard V. Jergensen, Chem. E. '65, was co-chairman of the "Materials Handling and Process Developments" session.

Arden L. Bement, Met. E. '54, PhD. Met. '70, was co-chairman of the Fundamentals/General Session, held on February 26.

Other session chairmen were

Douglas Medal
Lucas Medal
President's Citation
GEM Award
Distinguished Member-SME
AIME
Distinguished Member-SME
AIME
Richards Award
SME-AIME Student Paper Prize

A number of Mines alumni received medals for distinguished service and achievement in the minerals industry.

AIME
President's Citation
SME-AIME Student Paper Prize
Richards Award
Distinguished Member-SME

encouraged the use of the automobile and truck over other means of transportation? Or, perhaps he refers to the land grants made to the railroads in the late 1800's that turned several million acres of public domain into so-called private industry? Or maybe he refers to the tract sizes in offshore oil sales that favor the major oil companies? Or state utilizing tax? Or pollution? Or the depletion allowance? Or...

The first major oil shortage in this country occurred in 1973. I am very much in favor of more control over the oil industry. But was the situation more related to the importing of foreign oil that began in the 1950's, and the ultimate dependence of the public on these imports? Dr. McBride objects to government intervention in the free-market. Just read the record.

... the legislation is a two-phase synthetic fuels program... $20 billion to provide financial aid to develop...

... approved $1.5 billion loan guarantees plan to aid... Chrysler

... approved by voice vote a bill to raise the 1978 target price for wheat and corn by 7 percent. The wheat target... $3.63 a bushel and the corn to $2.36...

... will seek Senate approval... to put at least 12 percent of the nation's energy research and development funds into small businesses...

... approved... $1.5 billion loan guarantees plan to aid... Chrysler

... approved... $1.5 billion loan guarantees plan to aid... Chrysler

Dear Bob:

... the problems we face concerning petroleum; it's entirely possible they might arrive at some intelligent suggestions. Very truly yours,

Robert F. McMillen

Dear Bob,

Despite my obvious biases in being a Mines graduate and a member of the School alumni, "that bastion of capitalism and free enterprise," I share your view to a large extent. I do not claim that all of our problems result from government regulation, though I think you'll find that most regulation has been at the request of business.

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Dear George:

Thank you for your January letter regarding the country's economic condition. I quite well agree that we shall probably never return to the laissez-faire capitalism of the late 19th century.

You people have been doing an excellent job on the Mines magazine. I particularly enjoyed the January issue which arrived earlier this month. The articles by Keatler on rail shipment of coal and by Case on energy used in transportation were both thought-provoking. Pat Petty's comments were also valuable tool for both the applied ecologist in search of the elusive baseline as well as the student of vegetation.

The work is by Beatrice E. Willard, Professor of Environmental Sciences at the Colorado School of Mines. Willard employed a study technique developed by the Zurich-Montpellier School of geobotanical physiocoology. Recurring detailed knowledge of flora and infinite patience, traces of the energy industry can be described, in depth, the plant associations of a region.

With mining development in the high country of the Rockies, ecologists are concerned with the impact on the fragile, yet tough tundra, where plants endure Arctic conditions, but face decades to recover from the effects of a careless foolhardy.

Under the current law, mining developments cannot begin without preparing an environmental impact study, which establishes a baseline of information on the surrounding area. The need for this information is obvious—you can't ignore the impact of exponential growth on finite resources, with a section titled "A Compendium of Horror Stories."

For example, he notes that the rate of mining growth has grown steadily at 7.04 percent per year for the past 50 years to 1975, at 7.04 percent for the past 50 years to 1975. How much longer could this steady growth continue if our oil supply was a spherical tank the size of the earth?

The grim answer is 32 years.

If the government would just get off the backs of the energy industry.

Exponential growth is characterized by doubling in a fixed period of time and that a few doublings can quickly lead to enormous numbers. It may be too late to retool our economy or switch from a high demand to a low demand—a freeze of current consumption of our finite fuels, with a section titled "A Compendium of Horror Stories."

For those with a mathematical gimmick, but it has applications in a real and finite world. Using this simple tool, Bartlett destroys the optimistic talk of energy experts who claim that the United States alone has oil, gas or coal to last for decades or even centuries, if the government would just get off the backs of the energy industry.

Predictions of 100, 200 or even 1,000 year fossil fuels supply don't stand up to exponential growth, according to Bartlett's calculations. These estimates are valid only if the U.S. economy switches from a state of steady growth, to no growth at all—a freeze of current consumption patterns!

That is anathema to every Chamber of Commerce, industrialist and businessman in the country! Bartlett goes on to document how energy experts, the national media, politicians and even Ralph Nader all ignore the impact of exponential growth on finite resources, with a section titled "A Compendium of Horror Stories."

For example, he notes that the rate of mining growth has grown steadily at 7.04 percent per year for the past 50 years to 1975. How much longer could this steady growth continue if our oil supply was a spherical tank the size of the earth?

The grim answer is 32 years.

Bartlett does relieve the numbing pessimism of exponential growth with some practical suggestions and even a few rays of hope... from the sun. It should be required reading for energy spokesman, reporters, politicians, indeed, anyone who contributes to the consumption of our finite fuels.

—Brode Farquhar

book review

Tundra Examination by Beatrice E. Willard

A new publication by Colorado School of Mines' Quarterly, "Plant Sociology of Alpine Tundra, Trail Ridge, Rocky Mountain National Park, Colorado." A valuable tool for both the applied ecologist in search of the elusive baseline as well as the student of vegetation.

Energy crisis. You need or talk about it every day, yet you never suspect that your perception of it is fundamentally distorted. Never, unless you had read "Forgotten Fundamentals of the Energy Crisis" by Albert A. Bartlett, professor of physics of Colorado University and recently published by "Mineral and Energy Resources", a bimonthly publication of the Colorado School of Mines.

Bartlett seems to be coming from a pragmatic viewpoint, based on the elementary arithmetic of growth. Step by step, using math that even high school graduate (or maybe college graduate) could follow, Bartlett introduces the reader to the alarming world of exponential growth.

Exponential growth is characterized by doubling in a fixed period of time and that a few doublings can quickly lead to enormous numbers. Exponential growth may seem like a mathematical gimmick, but it has applications in a real and finite world. Using this simple tool, Bartlett destroys the optimistic talk of energy experts who claim that the United States alone has oil, gas or coal to last for decades or even centuries, if the government would just get off the backs of the energy industry.

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Forgotten Fundamentals of the Energy Crisis

by Albert A. Barlett


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Colorado School of Mines President Guy T. McBride, Jr., has announced the appointment of Sharon Farquhar as public information officer for CSM. Farquhar is the former managing editor of the Chaffee County Times, a weekly newspaper in Buena Vista, Colorado. A graduate of the University of Northern Colorado, Farquhar has spent a professional journalist career since 1974. Since that time, she has won Colorado Press Association awards for best story, community service, editorial excellence, general excellence, best ad of the year and in layout, typography and design.

In addition to his responsibilities as public information officer, campus photographer and sports information director, Farquhar hopes to serve as a technical resource for CSM student faculty, alumni and foundation publications. He will also assist the CSM in planning, development and public relations responsibilities, said McBride.

Farquhar plans to move his wife Sharon, and eighteen-month-old son Eric to the Golden area in the near future.

Farquhar replaces Leanne Gibson as the CSM public information officer. Gibson, who held the position since September 1977, resigned her position to enter the CSM mineral engineering department as a master’s degree candidate.

In addition to her course work, Gibson is a staff member with the CSM Western Energy Field Institute, an effort of the Colorado Geological Society; the CSM Student Mine; the CSM Garden Club; and the CSM Student Miner. Gibson is also a member of AIME, ASME, SME, SMME and AIME.

Traveling Scholarship

AIME, an active service organization in the mining industry, recently sponsored two students from the Colorado School of Mines on work-look trips to two industrial sites. Winners of the annual award, both metallurgists, were Valerie Berry and David Nobles.

The purpose of these trips is to acquaint the young engineer with procedures and processes in industry, to supplement the training received in the classroom and laboratory. AIME, Women’s Auxiliary of the American Institute of Mining, Metallurgical and Petroleum Engineers, has been awarding such trips to students for many years. The program began when a chapter of the group in Peru sent young Peruvian engineering students to the United States to view mining and mill sites in this country. The Denver chapter adopted the idea from hosting a number of these students and has since been responsible for sending people to mines, foundries, pipeline installations, steel mills and other industry-related areas.

Mr. Noble traveled to White Pine Mine, Michigan, a Copper Range Company. In this remote area of the Upper Peninsula, he watched the special procedures involved in extracting and refining copper ore. White Pine is well-known as the roster of interesting copper mines.

AIME awards these travel scholarships on the basis of grade point averages, desire to participate and recommendations of the department involved. The award is circulated through three departments: mining, petroleum, and metallurgy. All expenses for the travel are paid by AIME, and the participating company houses and entertains the student while on site.

Last Game for CSM Women

The Colorado School of Mines women’s basketball team was knocked out of the 4A/AAV tournament in Grand Junction. The Orediggers were defeated by Denver University, 74-51.

Mines was only three points behind DU at the half, but ran into some serious foul trouble as the game continued in the second half. With 10 minutes left to go, the Orediggers lost three of their starters to fouls—Bela Tougaw, Lauri Myers and Sandy Wrobela.

From there, the DU team expanded their seven-point lead to 23 points. The outstanding player for Mines was Mary Meagher, according to Coach Wills Meylink. Meagher scored a total of 21 points and was the game’s leader on rebounding—16 of them. Robbin Yale and Tougaw both scored seven points, while Wrobela and Myers contributed six each. Michelle Bell hit for four points.

Basketball Honors

According to the NCAA Division II Statistics Service, Colorado School of Mines ranks seventh in the nation in field goal percentages. The Orediggers netted 790 field goals out of 1470 attempts for a percentage of 53.7. The best percentage in the nation was Pembroke State in North Carolina, with 55 percent.

Jeff Rhodes was fitted in the NCAA’s rebound statistics, with a 6’9” sophomore center from Pueblo Central, most 319 rebounds in the season for an average of 11.8 per game. The best average in the nation was by Ricky Mahon of the Hampton Institute, with an average of 15.8 per game. Rhodes was last year’s MVP in the Oredigger team. This year, he was selected to the Second Team of the All-RRMAC as well as the First Team NAA Honor Mention.

Bart Fleck was named the Oredigger MVP this season. The 6’4” sophomore forward from Thornton High School was also 46th in the NCAA Division II scoring statistics. Fleck averaged 19.4 points per game, with 234 field goals and 57 free throws for a total of 525 points. No one else from RMAC or NCAA District 7 was ranked in the top 50. Fleck was chosen All-RRMAC Honorable Mention.

The third honored Oredigger was sophomore guard Tim Hermann, a 6’5” sophomore guard from Thornton High School. Hermann was also honored as coach of the year in the NAIA District 7.

Three Colorado high school seniors were recipients of Engineer Day Scholarships from the Colorado School of Mines. The four-year tuition scholarships were presented to the three students by Colorado Governor Richard Lamm April 11, at Guggenheim Hall on the Mines campus.

The three are Susan Kane of Littleton, Senior High, Michael Gorder of Highlands High School in Thornton and Randall Mackie of Washoung High School in Colorado Springs.

Every Colorado high school is invited to have its outstanding students take a special test, administered by the Engineer of E-Day Scholarship Committee. A total of 384 students took the test this year. The test designed by the respective departments of Colorado School of Mines, is composed of required English and Math segments, then the best score achieved in Chemistry or Physics. The scores are added up and the top three scorers are invited to attend Mines.

Susan Kane, a senior at Littleton Senior High School, will be following her father’s footsteps into the Colorado School of Mines, thanks to the Engineer Day Scholarship.

A. V. Kane of 5760 Oak Creek Lane, Littleton, is a petroleum engineer graduate of Mines in 1965. His daughter Susan is one of three high school seniors who were awarded the tuition scholarships.

Susan should be well prepared for a career in energy development. She has lived in Venezuela, Argentina and Texas. A National Merit Finalist at Littleton High, Kane has also attended the 1979 Air Force Academy Summer Scientific Seminar and the American Legion Girls State.

Gorder is a senior at Highland High School. A talented musician who plays both the euphonium and trombone. Gorder is also a member of the National Honor Society, Future Business Leaders of America and the Boy Scouts.

Mackie currently aims toward a career in geophysical engineering. He is the son of James and Ruth Mackie, a CBPD detective and a judicial clerk. Randall Mackie is a member of the National Honor Society and has a 4.25 grade point average at Washington.
Mineral Bowl

The Montana School of Mines and Technology Hard Rockers outlasted the field to claim the 1980 Mineral Bowl title in the second-annual intercollegiate mining competition.

Colorado School of Mines Orediggers scored 18 points to place fourth in the competition behind Montana School of Mines, Arizona, Arizona State and Missouri Mines. Others in the competition were South Dakota Tech, Idaho University, New Mexico Tech, Nevada University, Utah, Wisconsin University and Wisconsin University.

The teams were timed and measured in the classic mining competition events of single-jacking with hammer and hand steel, 3-man hand mucking, individual feed leg drilling, and 5-man track standing.

The ten schools competed in this annual Mineral Bowl at the University of Arizona’s San Xavier Mining Lab south of Tucson, on Saturday, March 23rd. The Arizona Wildcatters were the host team by virtue of their 1979 win at the University of Idaho in Moscow. An enthusiastic crowd of spectators, friends, and mining industry sponsors cheered each contestant and each event.

A traveling trophy was presented to the winning Montana Tech team who have now been designated as the host for the 1981 competition. The distinguished “Carbonate Lamp Award” from Gardner Denver Company was given to the winning team and winning participants in each event.

Commercial sponsors for regional mining areas provided personnel, equipment, feed and funds.

The Orediggers who represented Mines at the Mineral Bowl were Rick Sinistrin, Scott Neunuebel, Herbert Gibson, Pete Borre, and Mark Ludwig.

Mines Netters Dumped by Pioneers

The Colorado School of Mines tennis team lost their final match of the season April 9, dropping a 9-0 decision to the University of Denver. The Orediggers were forced to play the match without their number one singles player, Brian Hoosman.

Mines could have overtaken the shutout, but they failed to win two tiebreakers and other close sets.

Both the Orediggers and the Pioneers from Denver will be represented at the NAIA tournament. The journey will be held in Pueblo in early May.

Phillips at E-Day

Citing his own experiences as an active member of the CSM Alumni Association, he is also a geophysicist for the Oil Shale Corporation in Denver, a 31-year record of experience in solving problems for the minerals industry...

- Pilot Plants
- Ore Processing
- Geology, Mineralogy
- Analytical Laboratories
- Coal Analysis, Preparation
- Synfuels, Solar and Biomass
- Reclamation, Environmental Control

Our full-time staff of 180 people is skilled in getting practical answers to minerals and energy problems. The odds are very good that, if you need assistance on any problem involving minerals, energy or the environment, CSMRI can provide it.

A 31-YEAR RECORD OF EXPERIENCE IN SOLVING PROBLEMS FOR THE MINERALS INDUSTRY...
Colorado School of Mines women's basketball Coach Willy Meylink was named "Coach of the Year" Monday by the Intermountain Association for Intercollegiate Athletics for Women (Region 7, Division II).

The Orediggers were winless, a third of the way into the season, when they started winning, and kept winning, right up to the game for the Rocky Mountain Athletic Conference crown. Although they lost to Mesa College, the Origgers went on to the AIAW playoffs—a place they never expected to be.

I think the other coaches were surprised that Mines did so well, and particularly with only eight gids on the team," said Meylink.

This is Meylink's last season at Mines. After three years with the Orediggers, Meylink is leaving to pursue a Master's degree in counseling at the Conservative Baptist Seminary in Denver.

Oredigger coach Bob McCandless. (Photo by Public Information Office)

Cowan Press Women honored two women from Colorado School of Mines as first place finishers: Patricia Petty, editor of Mines Magazine at CSM, and Leanne Gibson, from the Colorado Press Women communication contest. She took first place for special articles; second for public relations; press releases; and third for multi-picture photos.

As first place finishers, Patty and Gibson's articles now go to the National Federation of Press Women communication contests. Winners will be announced in the spring, according to Athletic Director Bruce Allison.
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Whatever the project— low or no lead gasoline, plastics, petro-chemicals, or other—we supply the full range of services for satisfactory completion— on time and on budget.

The advantages of our FLEXIBILITY approach serve an international clientele.
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The Wilfley invisible seal means no dilution.

You can't see it or touch it, but the unique Wilfley hydraulic seal virtually eliminates leaking. An expeller operating in conjunction with the impeller creates a centrifugal force that seals the pump. Packing, stuffing boxes, water glands, and mechanical seals are eliminated. And so are the problems that go with them. There's no more costly downtime. No more annoying repairs on worn out packing and mechanical seals. And most important, no more dilution.

Wilfley pumps are designed for both corrosive and abrasive applications. They're made from a wide variety of quality materials, including cast irons, alloys and stainless steels. And if metal isn't right for your job, we'll make it from something that is. Plastics. Or rubbers.

Or synthetic elastomers. Any one of 80 different materials. In a complete range of sizes.

If you're ready for a pump that can finally solve a sticky economic problem, contact a Wilfley representative or call us direct.

Proven reliability.

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It's simple. Wilfley builds better pumps.

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