If you're concerned about society and the quality of life, consider a career with Bethlehem Steel. Consider environment: We recognize our responsibility to restore and preserve a viable environment. Few industrial corporations or municipalities can match our accomplishments and the quality of life, consider a career with Bethlehem Steel. Consider environment. We believe in people. We believe in personal development. Our management training program includes persons of all races, male and female. What's more, every effort is made to assure that all employees have equal advancement opportunities. Where lack of education has been holding individuals back, we offer basic education courses. We believe in people. We believe in personal development. We encourage individual participation in community and social welfare activities. We sponsor nonpartisan political education courses. We underwrite continuing education for employees, at both the undergraduate and graduate levels. We provide management training and development.

All this is more fully described in our booklet, "Bethlehem Steel's Loop Course." It's available at your placement office. We think you will like what we are doing.

On Friday evening, Oct. 30, 1970, the traditional Homecoming Bonfire flared and the trailer senior with his Stetson and companion honored his last Homecoming as a student for the class of 1971.—Photo by Kent Higgins.
ALUMNI RECRUITMENT

Project Each One Get One

By Chuck Morris

Each alumna soon will receive a letter from the Admissions Office requesting his help as a volunteer in the "Each One — Get One" drive. This letter will include an outline of the plan, asking alumni to contact potential students and their high school counselors. A reply card will be enclosed with the letter, to be returned to the Admissions Office by alumni who wish to join the project. From the names received, the Admissions Office will arrange contacts.

The alumni sections then will be encouraged to host prospective students and high school counselors at their meetings; a Mines representative will be in attendance to explain fully the School's programs, and its importance.

Timing of the program is set for early spring of 1971, to continue annually, preferably in the fall of the year.

For alumni too far removed from section activity, contacts can be made with follow-up done by correspondence from the Admissions Office.

As President Guy T. McBride, Jr., points out, "This student recruitment plan is one of the principal building blocks in the development of national and international leadership by the Colorado School of Mines in undergraduate training, graduate study, and research. This objective is being aggressively pursued, as it represents the future of the School at a period when more minerals, metals, and fuels must be provided to meet the ever-growing demands of the U.S. public and foreign nations."

The guidepost has been set in a recent report by three consultants to the Colorado Commission of Higher Education. They said, "Mines operates the most efficient engineering program in Colorado. This program should be elevated to make Mines one of the nation's great technological institutions."

Mines, therefore, has a need to attract more outstate students as an integral part of the overall objective of achieving national prominence.

Alumni will play a vital part in the future of the Colorado School of Mines by participating in the student recruitment program. When asked what influenced their decision to come to Mines, many students remark, "The contact and guidance of a graduate of the School."

In this respect, the activities of the Tulsa Alumni Section have been most successful in attracting students to Mines. Its members have arranged contacts with potential students and high school counselors in the Tulsa area for visits by Mines representatives, and have raised funds to provide scholarships and to transport interested students and counselors to the campus for Engineers' Day.

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The British, understandably, were reluctant to invest large sums of capital required to revolve the operation to full scale, because the political climate was not extremely attractive to capital investment. In 1963 the Burma government entered into a Joint Venture Agreement with Burma Mines of London and the Burma Corporation (1963) Ltd. for the development of a high grade mining venture in order to retain its share in the mining operations. Both companies had an equal number of members on the Board of Directors. The Burma government had contributed something like $1,000,000 to the new enterprise.

The difficulty increased but it was apparent that the British policy to convert the mining venture to private ownership of the Corporation late 1963 was more important than an efficient operation. There was little evidence of forward planning in exploration, mining, milling and smelting. Essentially the mining method remained the same as that initially introduced in 1908, namely square-set stoping. The result was that after 55 years, the subsidence throughout the mine was serious. The capacity of high grade ore remaining was limited, and it was apparent that if the existing policy were not changed, the mining enterprise could only last a very few years.

The Burma Government realized the condition of the mine, appealed to the United Nations to conduct a survey to determine what could be done to extend the life of the mine. It was at that point that I entered the picture. I was asked to make a preliminary feasibility study of the proposed U.N. Project. In February 1962 I went to Rangoon, Bago, to study and examine the various aspects of the mining operation in order to decide whether a survey by the U.N. would render the results anticipated. On my return to New York I reported my findings, I stopped in Rangoon where a series of meetings with Cabinet officials were to take place.

We had two meetings with the third meeting to take place at the next morning. I got out of the car the next morning at the appointed time and started in the door of the government building where the meetings were held. When a soldier pointed a rifle at me and would not let me pass. The chauffeur quickly ran over to inquire from the soldier what was the difficulty and was told that there had been a revolution and Gen. Ne Win had taken over the government at 9 that morning. I was later instructed to stay around until called for a continuation of the meetings which was two days later.

At the meeting with the new officers, mostly army officers, I was told that the new government was much interested in knowing the possibilities of the Rawlinson Mine and would kindly start my story all over again. As I looked around the group, all very formal, I said: Before reviewing my findings, I wish to thank you for making me feel at home in your country, because this is the third revolution I have been through. The climate I now find is soothing because I must confess this one has been the most bloodless and pleasant of my experience. It was very obvious that their sense of humor was not the same as mine as not a smile was visible in the crowd. For a few moments I was not at all certain I would get through the day. It was one of my most awkward moments.

The statistics and information on the Rawlinson Mine are interesting. Since Herbert Hoover started the operation in 1908, there had been extracted from the mine 18,000,000 tons of ore averaging about 19 oz Ag, 35% Pb, 15% Zn, and 0.90% Cu. There remained in the recorded reserve 2,000,000 tons of ore containing about 19 oz Ag, 10% Pb, 15% Zn, and 0.90% Cu. It was obvious from the records and maps that there were in addition to the recorded reserve appreciable tonnages of lower grade ore, but the quantity, grade and exact position would require a survey to determine.

There were, however, many problems to solve before a mining operation could be commercial. The existing mining, milling and smelting practices had a total cost of $1.30 per ton of ore extracted. I.e. $1.30 per ton was the cost of the cut-off grade. It was apparent that in point of fact there was at least one phase of the enterprise to be examined and ways and means found for improvement.

Square set stoping, with a total extraction of 10,000,000 over a period of 55 years, had resulted in serious subsidence throughout the mineralized zone. Mining by square-set stoping was also very expensive. Transportation of ore over a 12-mile railroad, cost $1.30 per ton. Milling and smelting were also relatively expensive, and not too efficient.

It was obvious that if the survey were to be successful in pointing the way for a commercial operation in the treatment of the lower grade ore, not only a survey staff of experienced and capable engineers were essential, but consultants in the various departments should be employed on a short time basis to assist the survey team.
Burma’s Bawdwin Mine

Burma’s Bawdwin Mine, returning to U.N. Headquarters in New York, I presented my findings for conducting the project. The committee agreed, accepted my ideas. I returned to Burma in late April of 1962 to direct and manage the U.N. survey. Fortunately, I found some very capable mining and geologic engineers for the survey staff.

Equally fortunate was the fact that the U.N. appointed Edith Northcote of Anaconda as mining consultant and Bob Carpenter, professor of Geology at the Colorado School of Mines, as consultant in geology, both of whom spent two or three weeks at the Bawdwin Mine. The GEM Research Institute was appointed to conduct flotation experiments on ore sent from Bawdwin, and O. W. Wallace and his organization made a preliminary mill layout and cost estimates.

A metallurgist by the name of Jan Riemers of Twente created a feasibility study for the converted lead-zinc mine near Polaris, Jorden made a study of plant transportation for the ore from mine to mill. A Thai hydro-electric engineer, Kanuk Pronthin, working for the U.N., made a study of power development.

Some $400,000 was granted to conduct the proposed survey, 50% of which was from the U.N. and 50% from the Burma Government. The mineral exploration was completed in mid-1962, and I returned to Golden to write the Final Project Report.

It should be mentioned that F. W. Warren, M.I. M. 1932, assisted greatly in developing the many tabulations on capital requirements, cost of production, and anticipated metalurgical balance sheets that accompanied the report. After six months of labor, the final document was prepared by the U.N. and has since been published in a hundred copies for distribution throughout the world.

The report established an ore reserve, of approximately 7,000,000 tons of 7.8 oz Ag, 11.2% Pb, 5.6% Zn, and 0.30% Cu. Furthermore explorations on the ore zone much beyond the known ore deposits in the halo areas around the Bawdwin mine are expected to find additional metal.

The study at Mines has shown that the whole process can be completed in two hours, producing nitrogen contents of up to 50 per cent. Similar tests in other countries have taken up to 240 to 120 hours.

Other benefits of using coals as a fertilizer and conditioner include higher oxygen content, improved moisture penetration of the soil and moisture retention, higher absorption of heat thus extending the growing season by up to two weeks, and stimulation of the growing rate of plant life.

The important factor of the slow release of the nitrogen in the coals also contributes to pollution control, as fertilizers currently used tend to wash out into the ground water and streams.

So far the study at Mines shows that Colorado coals can be reacted with nitrogen compounds to produce plant foods.

More important to a developing nation, the net generation in foreign currency would be $8,000,000 per year, more than twice the present rate. The known ore reserve sufficient to keep the Bawdwin mine in operation for 35 years, if not well into the next century. The total gross sale potential of the products from the known ore reserve over the 17 years would be over $3,000,000.

C O L O R A D O farmers at the future may be spreading coal on their fields as a fertilizer, if a study now under way at the Colorado School of Mines proves feasible.

This possibility will be brought out in a progress report, “Use of Coal as a Fertilizer and Soil Conditioner,” by Dr. James H. Gary, head of the CSM Department of Chemical and Petroleum Refining Engineering, in a talk Sept. 30 before the Denver Coal Club in the Petroleum Club.

In cooperation with the Colorado Department of Natural Resources and Campion Engineers of Denver, Mines has been working on a study to produce organic nitrogen in low grade Colorado coals, and using the coals as a soil conditioner and fertilizer. A Thai, John Reid, State Geologist, has administered the project for the Department of Natural Resources.

The Department of Natural Resources has provided $25,000 for the study, and an additional $25,000 has been appropriated by the 1930 Legislature. It is hoped the Federal Office of Coal Research will provide matching funds to expand the project.

In the study, low grade Colorado coals unsuitable for use as a fuel have been crushed, oxidized, and then reacted with ammonia to provide nitrogen-enriched coals.

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A big challenge facing the researcher is to minimize the cost of the product and to fix the nitrogen in a form which will be released to the plant as the plant needs the food. It is planned that a project will be set up sometime in October with Colorado State University to test the coal fertilizers on greenhouse plants.

When additional funds become available, more research with additional Colorado coals, developing improved processing, design and construction of a pilot plant in cooperation with the Colorado School of Mines Research Institute, and further testing of the effectiveness of nitrogen-enriched coals will be carried out.

“Use of coal as fertilizer is a unique opportunity for both the economy of Colorado and the farmer, and will be helpful to both the industrial and agricultural interest of the state,” Dr. Gary points out.

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MINING • POWER • PETROLEUM • CHEMICAL • FOOD • PAPER • WATER
A Proposal for Private Scholarships
To Support Study of Scientific Russian
At the Colorado School of Mines

By W. John Gislevics

CURRENTLY the number of scientific and technical books published each year in the Russian language is greater than the number of books of the same two categories printed in all other principal languages—including English—put together. Since 1953 about 30,000 scientific and technical books were published in the Soviet Union. Much of this material is available to us through several book-stores handling Soviet book publications. In addition, American scientists can subscribe to nearly 500 different scientific journals or individual articles. However, the above efforts are at best half measures, and the vast bulk of Russian scientific material remains simply inaccessible to us.

The need for scientists with reading knowledge of Russian is so critical, at least in the opinion of the U.S. Government, that back in 1958 the Congress passed a special act, the National Defense Foreign Language Development Act. Title VI of this Act names Russian as the No. 1 "critical language" to the national defense, and provides funds for Russian language programs in our schools. This official encouragement of Russian language studies initially gave rise to hope that our schools at lower levels would meet the urgent need.

Statistics show this hope to be a pure illusion. In 1964 only 9.2 percent of the total number of the high school student population took Russian, and as of that year the trend was already down from the peak enrollment figures of previous years. The corresponding figure for the total number of junior-college, four-year-college, and university students taking Russian in the fall of 1965 was 9.3 percent.

This somewhat higher figure for our colleges and universities is due to a two-million-dollar annual federal subsidy of Russian programs. Yet, all of these programs are language and literature oriented, and not a single program in Russian science or technical translations has been organized to date.

Likewise, only students majoring in Russian language or literature are eligible to receive the $2,000-1- annual NDFL fellowships. No Russian language scholarship of any kind are available to the science or engineering student who might also want to gain a good reading knowledge of scientific Russian along with his major technical subject. As a stop-gap measure many private and government research organizations—e.g. the National Bureau of Standards, the Atomic Energy Commission, etc.—have taken steps to train personnel in Russian. Other programs highly paid Ph.D.'s take time out regularly from their research work. Under these programs highly paid Ph.D.'s take time out regularly from their research work.

A Soviet scientist, assuming that the X-ray effect was common knowledge, discussed it in the presence of a group of U.S. scientists at a meeting. The U.S. scientists rushed back to their laboratories and prepared tests to be carried out underpriced. To their horror, said one authority, they found that the Russians not only had something and were years ahead in theory, but had already tested it out in space and were starting to build such units. The anti-missile system around it.

Indeed, we do not possess scientific material? In fact, Soviet work on the first space satellite in orbit ahead of our own, was also common knowledge among the Russian scientist. They had been doing this project in considerable detail in their scientific journals for one entire year prior to the actual launching date. However, we did not know about the project because our scientists did not read journals, or read journals. Even now, 10 years after Sputnik, only about five percent of our scientists read Russian. Actually, this estimate is probably too high.

As a step. The Interior designers of this Fan Jet Falcon business aircraft specified a lead impregnated vinyl to have convex in normal tones. Lead's density effectively bars noise pollution; it's being used in planes, boats, offices, and literature oriented, and not a single program in Russian science or technical translations has been organized to date.

LEAD puts quiet in flying conference rooms

Even with two powerful fan jet engines only a few feet away, these people can converse in normal tones. How? The interior designers of this Fan Jet Falcon business aircraft specified a lead impregnated vinyl sheet to be sandwiched between the plane's outer skin and interior trim. Lead's density effectively bars both noise and vibration—makes flying more producive, more enjoyable. • Lead alone, or combined with other materials, is one of our best weapons against noise pollution; it's being used in planes, boats, offices, schools and heavy machinery. Designers and architects know that "lead can make life more livable—by hushing things up."
The possibility of a critical shortfall in metals and minerals for the U.S. by the year 2000 was foremost in the minds of metallurgists attending the Fall Meeting of the Metal Powder Industries Federation at the Hotel Fairmont in San Francisco. Senator John Warner, Chairman of the Senate Committee on Appropriations, addressed the meeting and expressed his concern over the potential shortage of metals and minerals.

Mr. MacGregor noted that unlike manufacturing, where a worker's skills can be easily replaced by new machinery, a mining operation is finished once the mine is depleted. "Considerable time and effort are necessary before a new site is located and brought into production. This burden of exploration, much of it completely unrewarding, is a unique characteristic of the industry."

He also noted that mineral deposits in general are becoming of increasingly lower grade and less economic to develop under present technology—resulting in the further need for more favorable tax considerations.

A potential barrier to domestic mineral development lies in current U.S. and foreign legislation. "Competition has made our American free enterprise system grow and prosper," Mr. MacGregor said. "Times have changed, however. We have today to think beyond our borders. Anti-trust laws which related well to the growing and isolated U.S. of the last century may impede our country's competitive position in the new world industrial sphere."

Another potential obstacle faced by the industry is continuing government restrictions on the export of capital and raw materials. "This country will never again be sufficiently involved in most of the metals if it requires," Mr. MacGregor stated, "involving continued and increasing dependence on foreign sources."

Russian Scholarships (Continued from Page 10)

A report which contains the following statement: *To date there has been no satisfactory machine translation of scientific texts and none is expected.*

Study of scientific Russian is the only true solution. We will be able to take real advantage of Russian scientific knowledge only if large numbers of our science and engineering students learn Russian. An average student can develop this skill by taking two years (12 semester credit hours) of Russian. However, Russian is a rather difficult language and to study it along with a heavy load of science or engineering course work would indeed be a truly difficult task.

Therefore, those students who are willing to make the effort really deserve a scholarship. Without this encouragement very few indeed will ever do it. As I have already pointed out, perhaps the most important role science and engineering in science or engineering are not eligible for the government scholarships. This means, of course, that only private donors, who recognize the national need of making Russian scientific knowledge available to our scientists and engineers, can help them. We are, therefore, asking you to support our effort to establish a number of special scholarships for our students of scientific Russian.

Our scientific Russian scholarship program, which has received only a modest private response, is designed in a manner as to make virtually certain that each scholarship will be accompanied by an educational purpose—namely, to help graduate a student of science or engineering who will have also acquired a good reading knowledge of scientific Russian.

To this end the scholarship award of $700 each will be made to junior, senior, or graduate students who have already completed the first year (six semester hours) of Beginning and Scientific Russian, and have earned a grade of A or B, and who have registered for the second year. The payments will be made in two installments, one during the Fall and the other during the Spring semester of their second year of study; and the payments will be contingent on the maintenance of the A or B grade in the course. Graduate students complying with the above requirements will be given priority. The students of first-year Russian will also become eligible providing that some scholarship will still be left after making of the awards to all qualifying students of second-year Russian. Each scholarship of $700 will be awarded to a specific student who will be advised of the donor's identity. Likewise we shall report to the donor on the recipient's progress.

Qualifications of CSM for the scholarship program. Has any other university presented a similar program for your consideration? The Colorado School of Mines is the only one anywhere providing such a program. In fact, we have an active interest in Russian scientific work and have already started a program, for the time being of limited scope, of publishing reviews of Soviet research in such fields as mining, oil shale, earthquake prediction, and geophysics.

For the last five years CSM has been offering a one-year course in Beginning and Scientific Russian, and an additional one-year course in Advanced Scientific Russian. This program has been supported by the U.S. government and by a number of private donors. We believe that this program is well worth supporting and hope that you will be interested in making a contribution. We have an active interest in Russian scientific work and have already started a program, for the time being of limited scope, of publishing reviews of Soviet research in such fields as mining, oil shale, earthquake prediction, and geophysics.

For the last five years CSM has been offering a one-year course in Beginning and Scientific Russian. By offering a reasonably large and stable enrollment, the proposed scholarship program would make it possible for us to offer and maintain a two-year program. All of our students are either science or engineering majors.

Finally, our Russian language courses are taught by an assistant professor who holds both the M.S. degree in Earth Sciences and the M.A. degree in Russian language.
A RATIONAL OUTLOOK

From many people. When approached together they often number of riots, crimes, accidents, etc. — seem to back statistics are brought to public attention and the crowded revelations and still more forecasts have combined in re-
demand that we reverse our economic trends and seek to look forward to a trillion dollar GNP, there are those increasing environmental degradation, dwindling natural resources and mounting waste are singled out as effects of industrial growth on the environment is stressed the national "Environmental Teach-In" across the country. The general tenor of the thinking I have in mind — and the release of any additional energy in support of that growth can only hasten the demise of man and the biosphere.

The population explosion has become a major topic of discussion and a basic theme in current rhetoric. Malnourished statistics are brought to public attention and the crowded conditions of our stressful urban life — with their growing number of riots, crimes, accidents, etc. — seem to back up the dread, so to paraphrase a familiar expression I say, "Come, let us reason together" about this matter of energy.

Let's examine some of the background and logic of this trend of thought. To begin with, a number of events, many revelations and still more forecasts have combined in recent years to engender a strong public attitude about growth and pollution.

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er efficiency and the miniaturization of many technologies will be the root cause of many of the problems we face with the environment. In fact, one of the most significant problems we are facing today is the smoke from fossil fuels, which is causing significant harm to both human health and the environment. The smoke from fossil fuels contains a wide range of harmful substances, including sulfur dioxide, nitrogen oxides, and particulate matter. These substances can cause respiratory problems, heart disease, and other health issues, as well as contribute to acid rain and other environmental problems.

Many people believe that nuclear power is a solution to these problems, citing its high efficiency and low emissions as advantages. While nuclear power does produce less greenhouse gas emissions than fossil fuels, it still has significant environmental impacts. Nuclear power plants can leak radiation, and the disposal of nuclear waste is a major concern. Additionally, the construction and operation of nuclear power plants require significant amounts of water, which can exacerbate existing water scarcity issues. Therefore, it is important to carefully consider the environmental impacts of any energy source before we adopt it as a solution to our energy needs.

Despite these concerns, it is clear that we need to transition away from fossil fuels. This transition will require significant investment in research and development, as well as collaboration among scientists, policymakers, and industry leaders. It will also require a shift in public perception, as many people are concerned about the potential risks associated with nuclear power. However, if we work together, we can find innovative and sustainable solutions to our energy needs, and protect the environment for future generations.
sea but also birds, bears, moose, caribou and mountain sheep. The clearness of the day was even more appreciable when we were informed that it was one of the six or seven clear days in the season. The bus trip included a stop at the Kenai (White Pass) Ranger Station to see a demonstration of a dog team used for selling trapper gear. The bus trip was concluded just in time to catch the plane for Anchorage.

We spent our first night at Nome, a town on a beach of gold-bearing sand with no real port facilities. All cargo ships must anchor away out at sea, and the freight is brought in by lighters. An attempt has been made to protect the town by spending what we were told was about $3,000,000 to pile large rocks along the shore to stop erosion. It seems strange that the town remains where it is, because there is a bay with a good anchorage not far away. The climate of Nome is said to be dreadful. The climate of Alaska is Island is favorable to cattle raising. The train reached the Park at noon, and we saw gold mining and panning operations at one of the old dredges, and we saw the effects of stripping off the tundra from permafrost areas, with resultant melting of the ice-cemented loess base.

From Nome we flew to Kotzebue, where we saw cutting and polishing jade mined in the hills nearby. Time did not permit a visit either to the jade mine or to the archeological digs. Riddles of the earliest inhabitants of this continent have been discovered in recent years. Kotzebue has good air and sea transport facilities. With the minerals already known in the area, there are distinct possibilities of industrial development. After a very interesting morning in Kotzebue, we flew back to Fairbanks, not too surprising when one realizes that Sitka needs and wants an assay laboratory so that samples will not have to be sent to Seattle for analysis.

The flight home from Sitka via Seattle was uneventful, and I got home Sept. 17 to return to regular duties the next day.

I feel well pleased with this trip and am confident of a permanent solution to the labor trouble as soon as the problems of the natives are settled. Whether home-staying may again be allowed, I re­serve that little time did not permit it to see either end of the proposed pipe line. From Fairbanks to Valdez. When enough geological, geophysical and biological work in the islands of the southeast is completed to justify investments, the result will be important development of this very interesting area.

There's one good thing about all these protest marches, comments Potomac Petroleum: that people still can talk.

The clergyman was preparing his Sunday sermon while his daughter watched. "Daddy," she finally said, "does God tell you what to say?"

"Of course, honey," he replied.

"What do you say to her?"

"Oh," was the reply, "then why do you scratch some of its tail?"
BETWEEN now and year 2000… Uranium supply will be "a matter of major concern" even if economic breeder reactors are developed by the 1990's. Availability of natural gas will depend "on the rate and scale that natural gas comes from the ground," as demand for this clean fuel will continue unabated in the "price is right." A shale oil industry with production "as high as 2 billion barrels annually" by year 2000 is possible; it is equally possible that no shale oil industry will develop at all in the next 30 years.

Demand for oil is expected to continue high both here and abroad in the next 10-15 years, but by year 2010 demand may be met in part by synthetic liquid fuels made from coal, oil shale and tar sands.

Gas will be available to make up any shortfall in other fuels, and by year 2000 the top demand for coal may be for the production of synthetic gas and liquid fuel. These projections are drawn from the advance sheets of the 1970 mineral yearbook of the U. S. Bureau of Mines. The yearbook will be published near the end of the year. The projections vary widely for all fuels because no one can foresee the extent of technological developments nor what action will be taken by future administrations to control or expand domestic supplies. The development of nuclear energy and liquid fuel from coal are "questionable availability" due to high foreign demand, and a shift to a different energy mix, according to the Bureau. It said that different mix might include direct energy conversion systems, increased quantities of fossil fuels, fusion reactors and possibly nuclear energy.

Natural gas will continue to be in high demand because it is a clean-burning, convenient, low-cost fuel, according to the Bureau. The Bureau forecast. Demand for natural gas might skyrocket in transportation as vehicles become equipped for liquid fuel.

"Even in the most optimistic case, the uncertain requirements are classified. Domestic demand for natural gas in the market place will increase in transportation as vehicles become equipped for liquid fuel, and natural gas will be used in power plants and in industrial processes. In years ahead an increasing amount of domestic supplies of natural gas will come from Alaska, off-shore and Mexico," the Bureau said.

"The only alternatives to scarce, high-cost domestic natural gas, according to the Bureau, are likely to be foreign sources of uranium with "questionable availability" due to high foreign demand, and a shift to a different energy mix, according to the Bureau. The development of nuclear energy and liquid fuel from coal are "questionable availability" due to high foreign demand, and a shift to a different energy mix, according to the Bureau. It said that different mix might include direct energy conversion systems, increased quantities of fossil fuels, fusion reactors and possibly nuclear energy.

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**Long Range Uranium Supply**

**Major Item of Concern**

As the light-water and advanced-converter reactors are used mainly to run power plants.

**From Petroleum to Crushed Stone**

After graduating from the Colorado School of Mines with a Petroleum Engineering degree (1948), Jon F. Hamlin worked for about four years in the petroleum business. In 1962 he was employed by one of the major crushed stone producers in Florida. During his stay with this company, he became involved in the design and construction of many different plants covering crushed stone, sand, and gravel operations.

**CASE HISTORY OF A MINER**

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At the time of his initiation into the company, there was only one other engineer who was moved, almost immediately to a management position. Jon was saddled with all the company's technical problems of production and expansion. By the time five different plants had crossed his drawing board, he had become what might be called an expert in the design and construction of crushed stone and rock products.

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A NEW direct reduction, pollution-free process for converting 250,000 tons of high-grade copper ore to copper has been announced by Duval Corp., a subsidiary of Pennzoil Co., and American Smelting and Refining Co. in a joint venture on a limited basis, but construction will not be completed until about the end of the year, following which full-scale testing will move into high gear.

Duval, which is a subsidiary of Pennzoil Co., is building an experimental pilot plant at its Hayden, Arizona, acid plant, while the company is constructing a conventional sulphuric acid plant at its Hayden smelter, building an elemental sulphur plant using an approach different than the one at Ajo.

In an approach similar to Duval's direct reduction—Duval is constructing an experimental pilot plant at its big research center near Tucson, Arizona's multi-mill ton dollar pilot plant is operating successfully on a limited basis, but construction will not be completed until about the end of the year, following which full-scale testing will move into high gear.

Duval is experimenting with a pilot plant at Arizona's commodity research center near Tucson, in an approach different than the one at Ajo.

Dr. John B. Sardisco, president, research, engineering and development for quite some time, in Duval, which is a subsidiary of Pennzoil Co., has no smelter, having experimented with a pilot plant at Ajo.

Dr. Wyckoff, professor of Physics and Microbiology at the University of Arizona, has provided good advice based upon his experience in over a half century of work in physics and chemistry. Dr. Wyckoff received his Doctorate from Cornell University in 1929, and his professional approach is to avoid complications since time since have spawned many scientific fields. Many awards and honors have been bestowed upon him in this country and in Spain, in recognition of his contributions to science.

The Duval Process was developed in Duval laboratories in Tucson, Ariz., and in Pennzoil laboratories in Shreveport, La., under the direction of W. P. Morel and R. T. Atwood, president and executive vice president, respectively, of Duval.

Among those who were particularly active in the development of the process were Charles H. Curtis, vice president, Research, Richard W. Living-}

1. Attempting to capture and remove pollutants, primarily particulate mate-

2. Development of a direct reduction process, which was accomplished in a pollution free manner. Part of the problem has been to perfect a system that will recover, in addition to the copper, associated metals, such as gold, silver and molybdenum, in the ore. Often it is the recovery of the associated metals that makes the process profitable.

3. Every copper producer that operates smelters is conducting experimental research and development programs seeking to eliminate smelter pollutants.

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They’re “shooting the curl” in Phoenix.

Surfing has come at last to the Arizona desert. The ersatz ocean is called Big Surf*. At 4 million gallons, it’s believed to be the biggest “pool” ever built: 400 feet long by 300 feet wide, and nine feet at its deepest point.

And it makes its own waves.

Every 60 seconds, the crashing surf propels an army of Arizona’s finest toward a sandy 4½ acre beach.

Now about the waves. They’re made by pumping water into a 160 foot by 41 foot tank-like “reservoir.” Up to 100,000 gallons are released through 15 gates at the reservoir base. The water passes over a custom concrete “reef” and is formed into a wave up to five feet high.

The restless sea is kept restless by three 250 hp Peerless mixed flow pumps from FMC Corporation. They are the same pumps that irrigate deserts in the Middle East, provide flood control in Louisiana, and fill city reservoirs in New York.

And FMC is the same company that makes fibers, food machinery, railroad cars, industrial chemicals, and a whole lot of other things you never hear about because we work behind the scenes.

If you’d like to do something about making waves in the desert, or fighting famine in India, or anything else that a diversified company does to improve life, pick up a copy of our brochure “Careers with FMC” from your placement office. Or write FMC Corporation, Box 760, San Jose, Calif. We’re an equal opportunity employer.
U.S. Steel Subsidiary Will Assist Companhia Siderurgica Nacional

Contracts to provide a local technical assistance and training program for one of the largest steel companies in South America have been signed by USS Engineers and Constructors, Inc., according to J. Donald Rollins, president of the U. S. Steel subsidiaries.

Under the agreements, Companhia Siderurgica Nacional, a Brazilian steelmaker based in Rio de Janeiro, will receive technical assistance in all aspects of steelmaking at the company’s Volta Redonda steelmaking complex; and similarly, appropriate personnel of the firm will be trained at USS plants and offices in the United States.

The agreements call for assistance in planning an expansion of the South American steelmaker’s facilities.

Allis-Chalmers & Siemens AG

Sign Licensing Agreement

Allis-Chalmers and Siemens AG, of Germany, have signed a license agreement under which Allis-Chalmers will manufacture and set a wide range of electrical products and systems to the utility and industrial markets.

David C. Scott, president and chairman of the board of Allis-Chalmers, said that the agreement gave Allis-Chalmers “immediate access to the advanced technology of Siemens, and that it made available a broad range of research and development, design and engineering in these product lines.”

Industrialists Tour Sweden

W. R. Koger, vice president of Ingersoll-Rand Co., is among a group of industrialists, government officials and concerned citizens taking a special tour of Swedish pioneering efforts to fight pollution.

The tour, arranged by the National Business Council on Environment, is to include a look at such projects as the revival of polluted lakes with compressed air and the reduction of noise in mining operations.

Denver Pulp Distributor (323)

Continuous Centrifuge (329)

Continuous Centrifuge

A separating or de-watering continuous centrifuge, available from CF&I Engineers, Inc., 2909 Blake St., Denver, Colo. 80205, handles this slurry or highly viscous mixtures with excellent results and a significant degradation of solids even when very soft clays are involved.

Standard centrifugal conditions to date have been in the sugar and salt industries. The automatic centrifugal machine is a subsidiary of the CF&I Steel Co.

Circle 233 on Reader Service Card.

Dust Collector (313)

This Aerodynamic Type “S” Dust Collector meets local and state air pollution code requirements by collecting air from a central pulp belt air dryer. Manufacturer, Melpar Inc., Waukesha, Wis. The record bearings were shipped to the Dominion Consulting Engineers, Ltd., Toronto, Canada, and will be part of a huge ball mill for crushing ore.

The 7,500-pound bearings are 10 feet in diameter and have bearing widths of 28 inches. Two were shipped along with three companion bearings with 28-inch diameters. The bearings were shipped semi-machined.

Molpar Develops New Use for Anthracite Coal

Molpar scientists have developed a new use for anthracite coal. J. P. Chambers, President, announced. Anthracite, a once popular fuel, has been replaced by oil and gas in home heating.

Molpar’s Patent, Number 3,460,925, describes a new method that uses solid sodium hydroxide and anthracite coal (carbon) in a hot homogeneous stream to make sodium carbide. Sodium carbide (like the calcium carbide used in cement work) can be mixed with water to produce acetylene. A by-product, producer gas, is also gases that can be used to heat the sodium hydroxide and produce power for heating. Acetylene is the starting material used in making neon signs, vinyl plastics and synthetic rubber.

“The time is near,” said Molpar officials, “when a plastics producing industry can build in the anthracite regions and develop new products and a new economy for the now depressed anthracite industry.”

William Crowe Kellogg, 43

Kellogg Exploration Company—Geophysicists


BROWN & ROY, INC.

Engineers—Constructors

GEORGE R. BOW, ‘72

P.O. Box 3 Houston, Texas

Measuring Devices (315)

A new “man” measuring devices for industry and commerce use consists of three models of the “Measure-Meter,” an all-purpose measuring device, manufactured by Industrial Specialties, 1631 Prairie St., Northbridge, Calif. 91734. These meters, composed of a ½ inch handgrip with plastic hand-grip are used to push a 4-inch measuring wheel, which a foot gauge is attached. The manufacturer says accuracy is within one inch in measuring distances from one inch to 1,000 feet. Circle 315 on Reader Service Card.

Bistic Optical Device (321)

A new experimental class of two-terminal bistable devices with many alluring features for switching and memory purposes has been developed at IBM Research. The devices have desirable characteristics in terms of speed, as well as of voltage and excitation requirements. A feature desirable for memory applications is their relative non-volatility. Although one of the states (the low-impedance one) is thermodynamically ‘unstable,’ at zero bias this state persists for as long as three years, and at normal room temperature. Moreover, the devices are formed from well-characterized materials so that those used for transistors, in contrast to bistable devices, form the majority of available materials.

Water Sparker System (332)

Alden Electric & Imprint Recording Equipment Co. has introduced the Model 30-080 Shallow Water Sparker System for use in exploration, marine diving and construction and offshore fishing. This low power profiling system covers the gap between crystal transducer sound profiling systems and high power, heavier and more costly systems.

Circle 306 on Reader Service Card.

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Donald R. Stewart ’61 — W. H. Thorneley, Jr.

MEASUREMENTS OF SOIL AND ROCK BEHAVIOR

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读者服务卡。

FLUORIDE ION ANALYZER (440)

高生产装载。三个模块提供4路液压，模块提供4路液压，模块提供4路液压。

Case Co., Racine. Wise. The Case Modular System

Made of spark free materials, the Wilden pumps

cavitation project to pump water-gel explosives

and stability. The principle of selective ion

hose weighs only 22 lbs.) with great strength

plant. The booklet completely describes this plant

Service Card.

integrally bonded to the tubes by Uniroyal's ex-

air compressor package available in sizes from

The United States and its Territories at the Annual

Pageant of Peace in the nation's capital.

Guenter B. Moldado, M.Sc. '69

miles. The search may be expanded to

concentration and fraction. These sludge cakes are directly hydrophobic.

Denver Mine Jig. In Flowsheet No. 3, 12,000 lbs.
fine gold in ash and classifier circuits in flotation and

JIGGLING FLOWSHEETS (452)

one Flowsheet illustrates how free gold from

all recovery of an all-gravity concentration plant.

metals. Gradeability performance curves are given to

immediately four months.

PUMPING LIFT EXPLOSIONS

The search for gold in which air oper-

a shop or its influences on water and water

resources. For data sheet and price write Ziegler

Consultant for the AEC at Plant

and the exploration program proceeds.

New Director of SMPD

Frank E. McGlinchey, a metallurgical engineer

at AEC office since 1955, was appointed

director of the SMPD. Material Pre-

Denison Mines Concludes $300 Million Contract

Denison Mines Limited has concluded a major long-term contract valued in excess of $300 million for sale of uranium to a Japanese power company's mining operation.

Involving 313.5 million pounds of concentrates, the deal is considered one of the largest and most significant in the industry's history.

The contract will be executed over a 10-year period.

Edward J. Johnson, '49

Petrophysical Geology

Room 300

943-8526, Office: 721-5433, Home

Oklahoma City, Okla.

Edward P. Jucvico, '60

Geosciences and Mining

Metallurgical Engineer

Mining Investment Evaluations

9811 North Fifty, Suite 101

Reno, Nevada 89507

PETROLEUM GEOLOGY

Mineral Exploration

Mineral Exploration

Off Coast of Greenland

Denison Mining Corporation, Inc., began mineral exploration off the southwest coast of Greenland, according to an announcement by W. David Grammer, president of the Santa Monica-based firm.

According to Grammer, the entire program is expected to extend for approximately four months.

U.S. GEOLOGIC REFERENCES

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way is by latitude and longitude. Our GEOLOGIC INDEX, $15.00 completely up-to-date data is efficient and easy to use.

Monthly Supplements, $15.00 per year keep in current. Quarterly Supplements

are $4.00 per year and Yearly Supplement $16.00 each.

See BOOK REVIEW in Mines Magazine, August, 1969, or write for particulars.

Widely used all over the U.S. and southern Canada.

GEOLICAL PUBLISHING COMPANY

8801 West Colfax, Suite 210

Denver, Colorado 80215

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GEOLICAL PUBLISHING COMPANY

8801 West Colfax, Suite 210

Denver, Colorado 80215
Underwater Mining Institute Planned

An institute on “Underwater Mining” will be held Thursday and Fri­
day, May 20-21, 1971, at the downtown campus of the University of Wis­
sconsin-Milwaukee, 600 E. Kilbourn, begin­ning at 8:30 Thursday morning. It
will be the culmination of a successful con­
ference held last year and will involve the
latest developments in new ex­
ploration methods, economic assess­
ment of discoveries and legal con­
cerns. The institute will be particu­
lar interest to engineers, geologists, and technical management personnel.
For further information call 414/228
5125, or write University of Wiscon­
sin, University Extension, Engineering
Dept., 600 W. Kilbourn, Milwaukee, Wis. 53203.

Energy Goal Must Be Defined Dorsey Believes

Environmental concerns and the scarcity of energy require the United States to take a critical look at the ability to provide the ne­
cessary energy. According to B. R. Dorsey, president of Allied Met­
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“Put briefly, what we need is guidelines for the kind of society we want to be. We need to encourage industries that will have the greatest that has long characterized the energy field in this country.”

Mr. Dorsey said the nation “must decide whether we want to develop scarce sources of energy within the United States or become increasingly dependent on foreign sources of energy. Once the decision is made on domes­
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“If it takes more studies to define our goals, let’s have them,” he con­
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Stanley O. Reichert

STANLEY ORVILLE REICHERT, D.Sc., 1943, died unexpectedly on July 5, 1970 in Perth, Australia, where he had recently accepted a position as a consulting geologist and engineer. The cause of death was "accidental carbon monoxide poisoning." Burial was in Karrakatta Cemetery, Perth, Western Australia.

Dr. Reichert left his home in Granville, N. C. on May 5, 1970 for Australia after having worked there for two years, employed for nine years as a geologist and hydrologist with the Radiological Sciences Division of the Savannah River Laboratory. He had previously served on the faculties of the University of Florida, Louisiana State University and the Colorado School of Mines.

Dr. Reichert had also been employed as a research engineer for Bishop Memorial Institute at Columbia, Ohio, and had been engaged in geological and mining activities in the United States, Mexico and Central America.

Born April 29, 1912 in Cincinnati, Ohio, Dr. Reichert was the son of the late Gustav and Clara Wunderlich Reichert. He held a B.S. degree in Geological Engineering and a Doctor of Science degree in the Colorado School of Mines.

The author of 21 scientific publications, mostly in the field of geology, Dr. Reichert had lectured at seven universities as a travelling lecturer for the Oak Ridge Associated Universities. He was a member of the American Institute of Mining, Metallurgical and Petroleum Engineers, and a member of the American Geophysical Union.

Surviving, in addition to his widow, Mr. Thomas G. Reichert of Denver, Mrs. Charles Field III of Cincinnati, and Miss Mary I. Taylor of Denver, and four grandchildren.

Contributions may be made to the Edward Taylor Memorial Fund, 6/6 of First National Bank, 611 17th St., Denver. The fund will be used for an annual award to a Denver's outstanding junior ski patrolman.

G. C. Weaver, '26

POTASH CONSULTANT
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CARLSBAD, NEW MEXICO

Fred Nagel, '40

Robert McPhee, ’42

Consulting Engineers
Computer Systems/Programming
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Denver, Colo. 80203
Phone: 744-3381
An additional material in the magazine which has been prepared by the administration will outline at least in detail a proposal of the method of operation that is planned. Of course, it is possible that a pilot program will prove to be even more effective than that proposed, since this particular effort was mentioned in both the Secretary's column and the minutes of the October meeting which appeared in MINES Magazine.

Dr. McBride feels that it was essential that MINES should become involved in undergraduate education, which was given the responsibility of setting forth the initial cost of this program, and we want to adhere to other surfaces, can be...
P. A. Archibald Honored; Made Fellow AMERICAN INSTITUTE OF METALLURGICAL ENGINEERS

Mr. Walter Archibald was honored for his outstanding contributions to the field of metallurgy by being elected a Fellow of the American Institute of Metallurgical Engineers. He has been active in numerous professional organizations, including the American Society of Mechanical Engineers, Railway and Turbine Divisions; Society of Automotive Engineers, Aerospace Material Specifications Committee; American Society for Testing Materials; and various committees of the American Institute of Metallurgical Engineers. He has been at the forefront in developing new technical procedures for the processing and utilization of materials. His contributions have been recognized by his colleagues in the field.

Homecoming 1970

The following is a list of alumni who attended Homecoming 1970. We are honored to have had such a large number of alumni return to their alma mater.

Howard R. Keller, E.M., 1954, who has been with Compass Pumps, Inc., for many years, expects to retire soon. Howard has been a valued member of the company and we wish him well in his retirement.

John A. Cremon, Jr., E.M., 1962, who has been with Compass Pumps, Inc., for many years, expects to retire soon. Howard has been a valued member of the company and we wish him well in his retirement.

Class Notes

Eugene E. Dawson, 38

Robert E. Johnson, P.E., 1963, currently a consultant in various roles, including a position as Senior Engineer at Humble Oil Refining Co., located in Baytown, Tex.

Robert A. Meitz, Geol., 1963, geologist, Duval Corp., Tucson, gave a paper entitled "Rapid Exploration in Large Open Trench Pits" at the Society of Mining Engineers Convention held recently in St. Louis. The Society of Mining Engineers Convention will be held in Open Pit Mining, Bob has a great deal of experience in this field. His knowledge is extensive and he is well respected in the industry.

A graduate of Colorado School of Mines with a degree in Petroleum Engineering, Kirk received a Master of Science degree in Chemical Engineering from the University of California in 1969. He is a member of the American Institute of Chemical Engineers.

Mrs. Kirby is the former Spence Jones, daughter of Mr. and Mrs. Frank A. Jones of Houston. Mrs. Kirby's parents are Mr. and Mrs. Archibald H. Jones, both of Houston. They have one daughter, Kristen Elin.

Dear Mr. Kaanta:

I am writing to express my appreciation for the excellent quality of the Myes Magazine and to notify you of a change in address. I have been a subscriber for many years and I am looking forward to receiving future issues. Please make sure to have the new address on file.

John D. Ross, 231 East Fourth St., Kansas City, Mo. 64106

Dear Mr. Kaanta:

This letter is to advise you of a recent change in address. Mr. and Mrs. Robert E. Johnson have been transferred back to Bartsville, Oklahoma. They have purchased their home here and have now moved to the area. The new address is 6224 E. Yucca St., Bartlesville, Oklahoma 74003.

John B. Martinson, 32, 1953, who has been with Compass Pumps, Inc., for many years, expects to retire soon. Howard has been a valued member of the company and we wish him well in his retirement.

Robert G. Martin, P.E., 1955, is with the Deposit Guaranty Bank in Houston, Texas. He is an experienced engineer with over 20 years of experience in the oil and gas industry.

Dear Mr. Kaanta:

I have been transferred to the office of state representative in the state of Arizona. My new address is 231 E. 1st Ave., Phoenix, Ariz. 85004. I look forward to continuing to work with you in the future.

Robert E. Johnson, P.E., 1970, is currently a consultant in various roles, including a position as Senior Engineer at Humble Oil Refining Co., located in Baytown, Tex.

Robert A. Meitz, Geol., 1963, geologist, Duval Corp., Tucson, gave a paper entitled "Rapid Exploration in Large Open Trench Pits" at the Society of Mining Engineers Convention held recently in St. Louis. The Society of Mining Engineers Convention will be held in Open Pit Mining, Bob has a great deal of experience in this field. His knowledge is extensive and he is well respected in the industry.

A graduate of Colorado School of Mines with a degree in Petroleum Engineering, Kirk received a Master of Science degree in Chemical Engineering from the University of California in 1969. He is a member of the American Institute of Chemical Engineers.

Mrs. Kirby is the former Spence Jones, daughter of Mr. and Mrs. Frank A. Jones of Houston. Mrs. Kirby's parents are Mr. and Mrs. Archibald H. Jones, both of Houston. They have one daughter, Kristen Elin.

Dear Mr. Kaanta:

I am writing to express my appreciation for the excellent quality of the Myes Magazine and to notify you of a change in address. I have been a subscriber for many years and I am looking forward to receiving future issues. Please make sure to have the new address on file.

John D. Ross, 231 East Fourth St., Kansas City, Mo. 64106

Dear Mr. Kaanta:

This letter is to advise you of a recent change in address. Mr. and Mrs. Robert E. Johnson have been transferred back to Bartsville, Oklahoma. They have purchased their home here and have now moved to the area. The new address is 6224 E. Yucca St., Bartlesville, Oklahoma 74003.

John B. Martinson, 32, 1953, who has been with Compass Pumps, Inc., for many years, expects to retire soon. Howard has been a valued member of the company and we wish him well in his retirement.

Robert G. Martin, P.E., 1955, is with the Deposit Guaranty Bank in Houston, Texas. He is an experienced engineer with over 20 years of experience in the oil and gas industry.

Dear Mr. Kaanta:

I have been transferred to the office of state representative in the state of Arizona. My new address is 231 E. 1st Ave., Phoenix, Ariz. 85004. I look forward to continuing to work with you in the future.
CSM EXPERIMENTAL MINE

This Experimental Mine, located just north of Malo Springs, Colo., has been a great success to the Colorado School of Mines for the past 49 years as a practical classroom for future mining engineering students. The experimental mine was obtained by the school in 1921 and utilized at that time for mine surveying, but with the addition of the mine's first compressor in 1923, the facility became an actual experimental underground classroom.

The mine, originally developed in the 1870's as the Edgar Mine, was named after the Edgar Vein which cuts across the east slope of the Rocky Mountains at Hakill Gulch from an elevation of 8,125 feet with a strike of 3N6E and dips of 70-85 degrees NW. The vein consists in thickness of only inches to a maximum of three feet and is rich in silver, gold, copper, iron, and lead.

The early records of the Edgar Mine show that the vein contained a high percentage of silver, averaging 89 ounces of silver, and 0.3 ounces of gold per ton, and seldom less than 65 to 70 per cent lead. Some of the ore from the vein carried as much as 185 ounces of silver per ton, probably the result of a supergene enrichment. In addition, some of the ore contained 1.3 to 6.5 per cent copper and up to 16 per cent zinc.

The actual mine, which presently does not possess any of the vein's ore, was made up of more than 4,000 feet of tunnels and other workings, and is presently furnished with more than $50,000 worth of equipment, much of which has been contributed by manufacturers of mining equipment.

The Garden-Denver Co., a leading supplier of mining equipment throughout the world, has through the past continued its support in contributions to the CSM Experimental Mine. Garden-Denver has also utilized the mine since 1923 as its major center for drill compressor and underground equipment.

A unique feature of the mine is that public tours of the facility are conducted each year from Memorial Day to Labor Day six days a week. During the 1970 summer the mine was toured by a total 11,200 people, and an additional 1,000 will be hosted during the remainder of the year through specially arranged tours conducted by the CSM Mining Department. The mine will also be open on Saturdays for special tours of faculty and student employees in the metropolitan Denver area schools.

Mrs. Childers Retires

Mrs. Ingra Childers, former secretary for Dean Signer and Dean Kuhn, retired after many years with the Dean's office. She started in 1968. Co-workers and friends sponsored a farewell reception, which was held in the faculty lounge of the Ben H. Parker Student Union.

World Authority On Rock Mechanics

Dr. R. J. N. W. Cook, director of the Mining Research Laboratory of the Chamber of Mines of South Africa, recently visited the Colorado School of Mines Mining Department staff. Dr. Cook has directed the Mining Research Laboratory since 1964, pioneering work in rock mechanics, using analog computer techniques, rock burst detection and prevention, rock cutting, and the concept of mine stiffening.

He is co-author, with Prof. J. C. Jaeger, of a textbook, "Fundamentals of Rock Mechanics," 1960, and was recognized with Professor Jaeger in 1969 by the AIME for the outstanding contributions in rock mechanics. Dr. Cook received his B.Sc. degree in Mechanical Engineering from the University of Witwatersrand in 1939 and subsequently gained a Ph.D. in Geophysics from the University of Minnesota.

Earlougher Engineering

C. Earlougher, M.E., Registered Engineer

Petroleum Consultants
Core and Water Analysis Laboratory

2316 E. 9th St.
C. O. Box 4577
Tulsa, Okla. 74114

CSM EXPERIMENTAL MINE

When the Economics of Copper was the subject discussed by a special panel during the month of November by CSM's Mineral Economics Department, with graduate students taking the lead, the panel was chaired by Professor Alfred Patrick, Jr., of the economics department. From left to right, the panelists were: Stephen D. Wightman, assistant professor in the School of Mineral Engineering; J. R. Grandy, professor of Mineral Economics; and Ted Good, professor of Mechanical Engineering. Following the panel discussion, the students were asked to submit their papers on the topic of the Economics of Copper. Professor Patrick, Jr., has been at the University of Colorado since 1970 and has been actively engaged in research and teaching in the field of Mineral Economics. He is currently engaged in research on the Economics of Copper. He is a member of the American Economic Association and the National Association of Business Economists. He is also a member of the CSM's Economics Club, which is sponsored by the Economics Department.

Annual Student-Parent Day

Colorado School of Mines hosted its annual Student Parent Day on Saturday, Nov. 14, on the Golden, Colo., campus. Major emphasis was placed upon all junior and senior high school students in Colorado visiting CSM with their parents to aid in formulating the students future college plans.

Registration of parents and students began at 8:30 a.m. in the CSM gymnasium at 14th and Illinois Streets. Tours were offered immediately after registration, allowing the students and parents to become familiar with CSM's facilities including laboratories, classrooms, and student facilities such as the dorms and student center.

At 10:15 a.m. both the students and parents were introduced to Charles McNell, Associated Student president; Dr. Roy McKinnic, Jr., president of CSM; Dr. Albert W. Schlechten, vice president for Academic Affairs; and Dean of Students Francis E. Smiley. Introductions were followed by Dr. Arturo G. Perg, vice president for Development and Student Affairs. Following the introductions of the administrative staff and the department heads at CSM, additional tours to specific departments were offered during the morning.

Lunch was served in the Ben H. Parker Student Center, followed by an invitation to students and parents to watch CSM's last home football game against Adams State College at Brooks Field at 1:30 p.m.
Osborn Memorial Fund For Foreign Students

Prof. Robert H. Osborn, retired from the CSM Mathematics Department, has established a memorial fund, to be known as the Stephen H. Osborn Memorial Fund, in memory of his son. Interest-free emergency loans will be offered to foreign students at CSM with no interest charge, in amounts up to $50.00 in 60-day short-term bonds. A flat handling charge will be applied to each loan.

All loans through the memorial fund will be administered by the Colorado School of Mines Financial Aid Office.

Mobil Foundation Gift For Research Project

The CSM Petroleum Engineering Department has received from the Mobil Foundation a gift of $5,000 for unrestricted use on CSM's reservoir simulation research project. Development of models, which can be permanently used for instructional purposes and with the introductory course in reservoir simulation, will be applied partially towards the gift.

CSM's 1970 HOMECOMING was accompanied by good weather, warm temperature, a winning football game, and a large enthusiastic attendance. The results were fulfillment of many happy post moments among the students and alumni during the weekend festivities.

MARCHING "MK" BAND was part of the Annual Homecoming Parade which was held on the streets of Golden, Nov. 14, 1970. Lawrence Cleary was presented with the "MK" awardee and a Lifetime Letterman's Pass and his wife, Blossom, received a coupon to a Denver-Buffalo game. In making the presenta- tion, CSM Director of Athletics Fritz Brennocks declared: "More than 50 years ago, Mr. Lawrence T. Cleary moved to Golden, entered business, and became a resident of this community. He developed great interest in the activities of the students of the Colorado School of Mines. Particularly the athletic program.

"Since arriving in this community, Mr. Cleary and his wife, Elizabeth, better known as 'Blossom' have been among the most loyal fans and supporters of Mines football. During all those years that they have lived in Golden, they have attended practically every Mines home game, come rain or shine. Quite a record! Fifty years going to Mines football games.

"As a token of appreciation for these many years of loyalty to the Oredigger Football Team, the Mines Athletic Association would like to make you, Lawrence, an Honorary Member of the CSM Football team. Please present you with this sweater and Lifetime Letterman's Pass which will admit you free to all future Mines home athletic events.

"And to you, Blossom, we'd like to give this corsage.

"Congratulations, and our most heartfelt thanks, Mr. and Mrs. Cleary. We hope you'll be back to see the Miners play many more games."

The Orediggers finished fourth in the Rocky Mountain Intercollegiate Soccer League, behind Denver University, Air Force Academy and Colorado College. Since these three teams are all classified in the university division of the NCAA, Mines is in the college division entry.

First round games will be Friday, Nov. 27th, with hosts playing at 8 a.m. and 11 a.m., Nov. 28th and winners playing for the championship at 1:30 p.m.

The CSM soccer team will be represented by 26 players. Thirteen of these are from the United States, one from England, one from Peru, one from Saudi Arabia, one from Iran, one from the Philippines, and two from Turkey.

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Trends in Physics Held in Meyer Hall

The Physics Department of the Colorado School of Mines again offered its annual open house called "Trends in Physics," on Dec. 3, in Meyer Hall.

The program is presented annually as an opportunity for students and educators to become familiar with both the academic and laboratory facilities offered by the School of Mines. Among the many displays, assembled by CM physics students and demonstrated to the public during the day, was a device for the detection of sea ice using a microwave resonator. Various displays were the result of classroom projects by the physics students of the Mines.

Numerous hallway exhibits, illustrating single concepts, involved the visitor in actual miniature laboratory experiences in several classrooms and laboratories.

$28,000 Research Grant to Mines

The Colorado School of Mines has received an $28,000 research grant from the National Science Foundation to conduct research in Geophysics. The former ESSA, to involves the study of earth strains of Denver, Colo., and Salt Lake City, Utah. This research is for a period of one year, and will be directed by Dr. W. J. Major and Dr. Phillip R. Rose, both professors at CSM. The research program will be a continuation of the intensive studies of the earth's strains in seismically active areas. Emphasis will be placed upon the continuation of operations on the Denver-Gold Hill, subset and studies of the results. Such strain retard field studies associated with the Denver, earthquake, possible strain anomalies associated with fluid injection into the subsurface, and earthquake predictions.

The study will continue under this grants until the end of the late summer of 1971.

Cryptographer

Few people in Golden or in Colorado, for that matter, realize that Dr. D. O. R., professor of mathematics, is the president of the American Cryptogram Association and one of the world's most distinguished cryptographers.

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Selection Committee For All-American Team

A 17-man selection committee headed by Spring Football Coach Ted Duna has been named by the Mines Football Association to choose the third Koda College Division All-America team during the 1970 season.

Outstanding players selected to the third team represent the schools of Bradshaw of Louisiana Tech, and Richard McGeough of Cockeysville, Tennessee. David Williams of North Carolina Central, and record-setting Jack Foster of Kansas State.

Player selections are made annually from the list of outstanding football players, chosen by members of the Associated Press coaches divison of the APFA. In addition to Coach Duna, the 1970 committee includes: Fritz Brennaker, Colorado School of Mines; Norval Armstrong, Valparaiso; Baski, Morgan State; John Bell, East Tennessee; Louie Dotche, Northwestern Michigan; Vic Bielek, Central Michigan; Charles Stukel, Pennsylvania; and Robert Grifflt, Florida A&M.

Joining them are Gordon Lageon, Akron; Bob Mitten, West Chester; Robert W SOUTH, East Texas; Robert S. Painter, Louisiana; Evelyn; Delia Dotche, Southeastern Missouri; and Don Walls, South Western Illinois.

Coed Rifle Team Wins First Match

The Colorado School of Mines ROTC Rifle Team has won a match against the University of Colorado. Under the leadership of Captain Joseph D. Brown, the Mines Rifle team of 12 men and 7 women, came out of the meet with a score of 1,369-1,339. The Mines' six other rifle clubs are also competing in the Rifle meet.

The clubs will face the Rochester State University and Ohio Northern State College in Nov. 21 in preparation for the national tournament. Kansas State University Dec. 4 and 5, CSM's rifle team will travel to the state meet. The rifle club is sponsored by the Mines' Rifle Club. A list of the rifle clubs is available at the Rifle meet.

The rifle clubs will face the Rochester State University and Ohio Northern State College. The Mines Rifles are scheduled to meet on Nov. 21 in preparation for the national tournament.

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Antelope Down Miners

The Gophers lost to Kearney State College at Laramie, Wyo., in a 48-0 rout. The Antelope's football team is ranked 14 for conference action this season.

DECEMBER, 1970 • THE MINES MAGAZINE
Alumni Headliners

Address Changes

Distler, W. P., Made Mine Manager

Davidson, B. B., Jr., Becomes President

Cedarblade, D. L., Directs Planning

Supply and Demand of Free World's
Soviet Petroleum Objectives Ex-

Fleshman, H. G., promoted to DFC

Humble to Eastern Marine Division May p. 33

for Sage Oil Co Mar. p. 31

for Humble Oil June p. 32

date for Congressional Seat in

at Wilhamsport, Pa. College Mar. p. 31

W., Elevated to Vice Presidents


Certificate of Appreciation for

and Medalhon from AIME Apr, p, 28

at D.U. Research Institute Oct. p, 43

Climax Western Operations Aug. p. 25

Fogarty, Dr. C. F., Commencement

Reynolds, J. F., Promoted by U.S.

Garfield, L. A., Forms New Consult-

Gist, R. L., Joins Humble Oil at

Mountain Home AFB Oct. p. 44

& Moore June p. 33

Admitted to Partnership in Dames

Mr. P. F. McCormick, Vice President.

Academic Year 1967-1968

January

February

March

April

May

June

July

August

September

October

November

December

1968

1969

1970

1971

1972

1973
A. R. Wilfley and Sons, Inc.  
P. O. Box 2330  
Denver, Colorado 80201

Attention:  
Mr. Wilt DeGroff, Director of Advertising

Dear Mr. DeGroff:

A Kynar pump was installed at Allied Chemical Corporation, Denver Plant, on February 12, 1968. This pump is on test replacing an Alloy 20 pump on our Gas Cooling Tower, pumping weak Sulfuric Acid containing iron pyrites solids, which cause excessive pump wear. An Alloy 20 pump in this service will last from four to six months. Periodic inspection of Kynar pump parts indicated very little wear and, after eighteen months, the Kynar pump is still in good condition. This is a 24 hour, seven day week service.

Very truly yours,

Paul E. Atherton  
Supervisor Maintenance

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